

**EFDE for D2Q5 with constant velocities,**  
supplementary material for  
**Equivalent Finite Difference Equations and Equivalent**  
**Partial Differential Equations for the Lattice Boltzmann**  
**Method**

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## 1 Global definitions

In  $\mathbb{R}^2$ , the position and velocity vectors are given by  $\mathbf{x} = (x, y)$  and  $\mathbf{u} = (u, v)$ , respectively. Discrete velocity vectors:

$$\{\mathbf{c}_i\}_{i=1}^5 = \left( \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 0 \\ 1 \end{pmatrix}, \begin{pmatrix} -1 \\ 0 \end{pmatrix}, \begin{pmatrix} 0 \\ -1 \end{pmatrix} \right).$$

Equilibrium DF vector  $\mathbf{f}^{eq}$ :

$$\mathbf{f}^{eq} = \begin{pmatrix} 1 - u^2 - 2c_s^2 - v^2 \\ \frac{1}{2}u + \frac{1}{2}u^2 + \frac{1}{2}c_s^2 \\ \frac{1}{2}v + \frac{1}{2}c_s^2 + \frac{1}{2}v^2 \\ -\frac{1}{2}u + \frac{1}{2}u^2 + \frac{1}{2}c_s^2 \\ -\frac{1}{2}v + \frac{1}{2}c_s^2 + \frac{1}{2}v^2 \end{pmatrix}.$$

Lattice speed of sound:  $c_s = \frac{1}{\sqrt{3}}$ .

Moments  $\boldsymbol{\mu} = (\mu_1, \mu_2, \dots, \mu_5)^T$  are given by

$$\boldsymbol{\mu} = \tilde{\mathbf{M}}\mathbf{f},$$

where  $\mathbf{f} = (f_1, f_2, \dots, f_5)^T$  and Matrix  $\mathbf{M}$ :

$$\tilde{\mathbf{M}} = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 0 & -1 & 0 \\ 0 & 0 & 1 & 0 & -1 \\ 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 \end{pmatrix}.$$

## 2 SRT

### 2.1 Definitions

Matrix  $\mathbf{A} = \mathbf{S}$ :

$$\mathbf{A} = \begin{pmatrix} \omega & 0 & 0 & 0 & 0 \\ 0 & \omega & 0 & 0 & 0 \\ 0 & 0 & \omega & 0 & 0 \\ 0 & 0 & 0 & \omega & 0 \\ 0 & 0 & 0 & 0 & \omega \end{pmatrix}.$$

where

$$\mathbf{S} = \text{diag}(\omega, \omega, \omega, \omega, \omega).$$

Matrix  $\mathbf{B}$ :

$$\mathbf{B} = \begin{pmatrix} 0 & -1 + \omega & -1 + \omega & -1 + \omega & -1 + \omega \\ -1 + \omega & 0 & -1 + \omega & -1 + \omega & -1 + \omega \\ -1 + \omega & -1 + \omega & 0 & -1 + \omega & -1 + \omega \\ -1 + \omega & -1 + \omega & -1 + \omega & 0 & -1 + \omega \\ -1 + \omega & -1 + \omega & -1 + \omega & -1 + \omega & 0 \end{pmatrix}.$$

### 2.2 EFDE for $\mu_1$

$$\mu_{1,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l, y+j\delta_l}^{[\mu_1], t-\ell\delta_t} \mu_{x+i\delta_l, y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x,y-\delta_l}^{[\mu_1],t} = 1 + \frac{1}{2}\omega v^2 - \omega + \frac{1}{2}\omega v + \frac{1}{2}\omega c_s^2.$$

$$\alpha_{x-\delta_l,y}^{[\mu_1],t} = 1 - \omega + \frac{1}{2}\omega c_s^2 + \frac{1}{2}u^2\omega + \frac{1}{2}u\omega.$$

$$\alpha_{x,y}^{[\mu_1],t} = 1 - \omega v^2 - 2\omega c_s^2 - u^2\omega.$$

$$\alpha_{x+\delta_l,y}^{[\mu_1],t} = 1 - \omega + \frac{1}{2}\omega c_s^2 + \frac{1}{2}u^2\omega - \frac{1}{2}u\omega.$$

$$\alpha_{x,y+\delta_l}^{[\mu_1],t} = 1 + \frac{1}{2}\omega v^2 - \omega - \frac{1}{2}\omega v + \frac{1}{2}\omega c_s^2.$$

$$\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} = -1 + \frac{1}{2}u^2\omega^2 - \frac{1}{2}\omega v^2 + 2\omega - \omega^2 - \frac{1}{2}\omega v - \omega c_s^2 - \frac{1}{2}u^2\omega + \omega^2 c_s^2 - \frac{1}{2}u\omega + \frac{1}{2}\omega^2 v + \frac{1}{2}\omega^2 v^2 + \frac{1}{2}u\omega^2,$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 - u^2\omega^2 + \frac{1}{2}\omega v^2 + \omega - \frac{1}{2}\omega v + \frac{3}{2}\omega c_s^2 + u^2\omega - \frac{3}{2}\omega^2 c_s^2 + \frac{1}{2}\omega^2 v - \frac{1}{2}\omega^2 v^2, \\
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{2}u^2\omega^2 - \frac{1}{2}\omega v^2 + 2\omega - \omega^2 - \frac{1}{2}\omega v - \omega c_s^2 - \frac{1}{2}u^2\omega + \omega^2 c_s^2 + \frac{1}{2}u\omega + \frac{1}{2}\omega^2 v + \frac{1}{2}\omega^2 v^2 - \frac{1}{2}u\omega^2, \\
\alpha_{x-\delta_l,y}^{[\mu_1],t-\delta_t} &= -1 - \frac{1}{2}u^2\omega^2 + \omega v^2 + \omega + \frac{3}{2}\omega c_s^2 + \frac{1}{2}u^2\omega - \frac{3}{2}\omega^2 c_s^2 - \frac{1}{2}u\omega - \omega^2 v^2 + \frac{1}{2}u\omega^2, \\
\alpha_{x,y}^{[\mu_1],t-\delta_t} &= -2 + u^2\omega^2 - \omega v^2 + 4\omega - 2\omega^2 - 2\omega c_s^2 - u^2\omega + 2\omega^2 c_s^2 + \omega^2 v^2, \\
\alpha_{x+\delta_l,y}^{[\mu_1],t-\delta_t} &= -1 - \frac{1}{2}u^2\omega^2 + \omega v^2 + \omega + \frac{3}{2}\omega c_s^2 + \frac{1}{2}u^2\omega - \frac{3}{2}\omega^2 c_s^2 + \frac{1}{2}u\omega - \omega^2 v^2 - \frac{1}{2}u\omega^2, \\
\alpha_{x-\delta_l,y+\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{2}u^2\omega^2 - \frac{1}{2}\omega v^2 + 2\omega - \omega^2 + \frac{1}{2}\omega v - \omega c_s^2 - \frac{1}{2}u^2\omega + \omega^2 c_s^2 - \frac{1}{2}u\omega - \frac{1}{2}\omega^2 v + \frac{1}{2}\omega^2 v^2 + \frac{1}{2}u\omega^2, \\
\alpha_{x,y+\delta_l}^{[\mu_1],t-\delta_t} &= -1 - u^2\omega^2 + \frac{1}{2}\omega v^2 + \omega + \frac{1}{2}\omega v + \frac{3}{2}\omega c_s^2 + u^2\omega - \frac{3}{2}\omega^2 c_s^2 - \frac{1}{2}\omega^2 v - \frac{1}{2}\omega^2 v^2, \\
\alpha_{x+\delta_l,y+\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{2}u^2\omega^2 - \frac{1}{2}\omega v^2 + 2\omega - \omega^2 + \frac{1}{2}\omega v - \omega c_s^2 - \frac{1}{2}u^2\omega + \omega^2 c_s^2 + \frac{1}{2}u\omega - \frac{1}{2}\omega^2 v + \frac{1}{2}\omega^2 v^2 - \frac{1}{2}u\omega^2, \\
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-2\delta_t} &= 1 + u^2\omega^2 - \frac{1}{2}u^2\omega^3 - \frac{1}{2}\omega v^2 - 2\omega + \omega^2 + \frac{1}{2}\omega v - \omega c_s^2 - \frac{1}{2}u^2\omega - \frac{1}{2}\omega^3 v^2 + 2\omega^2 c_s^2 + \frac{1}{2}u\omega - \omega^2 v + \frac{1}{2}u\omega^3 + \omega^2 v^2 - \omega^3 c_s^2 + \frac{1}{2}\omega^3 v - u\omega^2, \\
\alpha_{x,y-\delta_l}^{[\mu_1],t-2\delta_t} &= 1 - 2u^2\omega^2 + u^2\omega^3 + \frac{1}{2}\omega v^2 - 3\omega + 3\omega^2 + \frac{1}{2}\omega v - \omega^3 + \frac{3}{2}\omega c_s^2 + u^2\omega + \frac{1}{2}\omega^3 v^2 - 3\omega^2 c_s^2 - \omega^2 v - \omega^2 v^2 + \frac{3}{2}\omega^3 c_s^2 + \frac{1}{2}\omega^3 v, \\
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-2\delta_t} &= 1 + u^2\omega^2 - \frac{1}{2}u^2\omega^3 - \frac{1}{2}\omega v^2 - 2\omega + \omega^2 + \frac{1}{2}\omega v - \omega c_s^2 - \frac{1}{2}u^2\omega - \frac{1}{2}\omega^3 v^2 + 2\omega^2 c_s^2 - \frac{1}{2}u\omega - \omega^2 v - \frac{1}{2}u\omega^3 + \omega^2 v^2 - \omega^3 c_s^2 + \frac{1}{2}\omega^3 v + u\omega^2, \\
\alpha_{x-\delta_l,y}^{[\mu_1],t-2\delta_t} &= 1 - u^2\omega^2 + \frac{1}{2}u^2\omega^3 + \omega v^2 - 3\omega + 3\omega^2 - \omega^3 + \frac{3}{2}\omega c_s^2 + \frac{1}{2}u^2\omega + \omega^3 v^2 - 3\omega^2 c_s^2 + \frac{1}{2}u\omega + \frac{1}{2}u\omega^3 - 2\omega^2 v^2 + \frac{3}{2}\omega^3 c_s^2 - u\omega^2, \\
\alpha_{x,y}^{[\mu_1],t-2\delta_t} &= 2 + 2u^2\omega^2 - u^2\omega^3 - \omega v^2 - 4\omega + 2\omega^2 - 2\omega c_s^2 - u^2\omega - \omega^3 v^2 + 4\omega^2 c_s^2 + 2\omega^2 v^2 - 2\omega^3 c_s^2, \\
\alpha_{x+\delta_l,y}^{[\mu_1],t-2\delta_t} &= 1 - u^2\omega^2 + \frac{1}{2}u^2\omega^3 + \omega v^2 - 3\omega + 3\omega^2 - \omega^3 + \frac{3}{2}\omega c_s^2 + \frac{1}{2}u^2\omega + \omega^3 v^2 - 3\omega^2 c_s^2 - \frac{1}{2}u\omega - \frac{1}{2}u\omega^3 - 2\omega^2 v^2 + \frac{3}{2}\omega^3 c_s^2 + u\omega^2, \\
\alpha_{x-\delta_l,y+\delta_l}^{[\mu_1],t-2\delta_t} &= 1 + u^2\omega^2 - \frac{1}{2}u^2\omega^3 - \frac{1}{2}\omega v^2 - 2\omega + \omega^2 - \frac{1}{2}\omega v - \omega c_s^2 - \frac{1}{2}u^2\omega - \frac{1}{2}\omega^3 v^2 + 2\omega^2 c_s^2 + \frac{1}{2}u\omega + \omega^2 v - \frac{1}{2}u\omega^3 + \omega^2 v^2 - \omega^3 c_s^2 - \frac{1}{2}\omega^3 v - u\omega^2, \\
\alpha_{x,y+\delta_l}^{[\mu_1],t-2\delta_t} &= 1 - 2u^2\omega^2 + u^2\omega^3 + \frac{1}{2}\omega v^2 - 3\omega + 3\omega^2 - \frac{1}{2}\omega v - \omega^3 + \frac{3}{2}\omega c_s^2 + u^2\omega + \frac{1}{2}\omega^3 v^2 - 3\omega^2 c_s^2 + \omega^2 v - \omega^2 v^2 + \frac{3}{2}\omega^3 c_s^2 - \frac{1}{2}\omega^3 v, \\
\alpha_{x+\delta_l,y+\delta_l}^{[\mu_1],t-2\delta_t} &= 1 + u^2\omega^2 - \frac{1}{2}u^2\omega^3 - \frac{1}{2}\omega v^2 - 2\omega + \omega^2 - \frac{1}{2}\omega v - \omega c_s^2 - \frac{1}{2}u^2\omega - \frac{1}{2}\omega^3 v^2 + 2\omega^2 c_s^2 - \frac{1}{2}u\omega + \omega^2 v - \frac{1}{2}u\omega^3 + \omega^2 v^2 - \omega^3 c_s^2 - \frac{1}{2}\omega^3 v + u\omega^2, \\
\alpha_{x,y-\delta_l}^{[\mu_1],t-3\delta_t} &= -1 + \frac{1}{2}\omega^4 v + \frac{1}{2}\omega v^2 - \frac{1}{2}\omega^4 c_s^2 + 3\omega - 3\omega^2 - \frac{1}{2}\omega v + \omega^3 - \frac{1}{2}\omega^4 v^2 + \frac{1}{2}\omega c_s^2 + \frac{3}{2}\omega^3 v^2 - \frac{3}{2}\omega^2 c_s^2 + \frac{3}{2}\omega^2 v - \frac{3}{2}\omega^2 v^2 + \frac{3}{2}\omega^3 c_s^2 - \frac{3}{2}\omega^3 v, \\
\alpha_{x-\delta_l,y}^{[\mu_1],t-3\delta_t} &= -1 - \frac{3}{2}u^2\omega^2 + \frac{3}{2}u^2\omega^3 - \frac{1}{2}\omega^4 c_s^2 + \frac{1}{2}u\omega^4 + 3\omega - 3\omega^2 + \omega^3 + \frac{1}{2}\omega c_s^2 + \frac{1}{2}u^2\omega - \frac{3}{2}\omega^2 c_s^2 - \frac{1}{2}u\omega - \frac{3}{2}u\omega^3 + \frac{3}{2}\omega^3 c_s^2 - \frac{1}{2}u^2\omega^4 + \frac{3}{2}u\omega^2, \\
\alpha_{x,y}^{[\mu_1],t-3\delta_t} &= -1 + 3u^2\omega^2 - 3u^2\omega^3 - \omega v^2 + 2\omega^4 c_s^2 + 4\omega - 6\omega^2 + 4\omega^3 + \omega^4 v^2 - 2\omega c_s^2 - u^2\omega - 3\omega^3 v^2 + 6\omega^2 c_s^2 - \omega^4 + 3\omega^2 v^2 - 6\omega^3 c_s^2 + u^2\omega^4, \\
\alpha_{x+\delta_l,y}^{[\mu_1],t-3\delta_t} &= -1 - \frac{3}{2}u^2\omega^2 + \frac{3}{2}u^2\omega^3 - \frac{1}{2}\omega^4 c_s^2 - \frac{1}{2}u\omega^4 + 3\omega - 3\omega^2 + \omega^3 + \frac{1}{2}\omega c_s^2 + \frac{1}{2}u^2\omega - \frac{3}{2}\omega^2 c_s^2 + \frac{1}{2}u\omega + \frac{3}{2}u\omega^3 + \frac{3}{2}\omega^3 c_s^2 - \frac{1}{2}u^2\omega^4 - \frac{3}{2}u\omega^2,
\end{aligned}$$

$$\begin{aligned}\alpha_{x,y+\delta_l}^{[\mu_1],t-3\delta_t} &= -1 - \frac{1}{2}\omega^4v + \frac{1}{2}\omega v^2 - \frac{1}{2}\omega^4c_s^2 + 3\omega - 3\omega^2 + \frac{1}{2}\omega v + \omega^3 - \frac{1}{2}\omega^4v^2 + \frac{1}{2}\omega c_s^2 + \frac{3}{2}\omega^3v^2 - \frac{3}{2}\omega^2c_s^2 - \frac{3}{2}\omega^2v - \\ &\quad \frac{3}{2}\omega^2v^2 + \frac{3}{2}\omega^3c_s^2 + \frac{3}{2}\omega^3v, \\ \alpha_{x,y}^{[\mu_1],t-4\delta_t} &= 1 - 4\omega + 6\omega^2 - 4\omega^3 + \omega^4,\end{aligned}$$

### 2.3 EFDE for $\mu_2$

$$\mu_{2,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_2],t-\ell\delta_t} \mu_{2,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\begin{aligned}\alpha_{x-\delta_l,y}^{[\mu_1],t} &= 1 - \omega + \frac{1}{2}\omega c_s^2 + \frac{1}{2}u^2\omega + \frac{1}{2}u\omega. \\ \alpha_{x+\delta_l,y}^{[\mu_1],t} &= -1 + \omega - \frac{1}{2}\omega c_s^2 - \frac{1}{2}u^2\omega + \frac{1}{2}u\omega. \\ \alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 - \frac{1}{2}\omega v^2 + 2\omega - \omega^2 - \frac{1}{2}\omega v - \frac{1}{2}\omega c_s^2 + \frac{1}{2}\omega^2c_s^2 + \frac{1}{2}\omega^2v + \frac{1}{2}\omega^2v^2, \\ \alpha_{x-\delta_l,y-\delta_l}^{[\mu_2],t-\delta_t} &= 1 - 2\omega + \omega^2, \\ \alpha_{x,y-\delta_l}^{[\mu_2],t-\delta_t} &= 1 - 2\omega + \omega^2, \\ \alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= 1 + \frac{1}{2}\omega v^2 - 2\omega + \omega^2 + \frac{1}{2}\omega v + \frac{1}{2}\omega c_s^2 - \frac{1}{2}\omega^2c_s^2 - \frac{1}{2}\omega^2v - \frac{1}{2}\omega^2v^2, \\ \alpha_{x+\delta_l,y-\delta_l}^{[\mu_2],t-\delta_t} &= 1 - 2\omega + \omega^2, \\ \alpha_{x-\delta_l,y}^{[\mu_1],t-\delta_t} &= -1 - u^2\omega^2 + \omega v^2 + \omega + 2\omega c_s^2 + u^2\omega - 2\omega^2c_s^2 - \omega^2v^2, \\ \alpha_{x-\delta_l,y}^{[\mu_2],t-\delta_t} &= 1 - 2\omega + \omega^2, \\ \alpha_{x,y}^{[\mu_1],t-\delta_t} &= u\omega - u\omega^2, \\ \alpha_{x,y}^{[\mu_2],t-\delta_t} &= 2 - 4\omega + 2\omega^2, \\ \alpha_{x+\delta_l,y}^{[\mu_1],t-\delta_t} &= 1 + u^2\omega^2 - \omega v^2 - \omega - 2\omega c_s^2 - u^2\omega + 2\omega^2c_s^2 + \omega^2v^2, \\ \alpha_{x+\delta_l,y}^{[\mu_2],t-\delta_t} &= 1 - 2\omega + \omega^2, \\ \alpha_{x-\delta_l,y+\delta_l}^{[\mu_1],t-\delta_t} &= -1 - \frac{1}{2}\omega v^2 + 2\omega - \omega^2 + \frac{1}{2}\omega v - \frac{1}{2}\omega c_s^2 + \frac{1}{2}\omega^2c_s^2 - \frac{1}{2}\omega^2v + \frac{1}{2}\omega^2v^2, \\ \alpha_{x-\delta_l,y+\delta_l}^{[\mu_2],t-\delta_t} &= 1 - 2\omega + \omega^2, \\ \alpha_{x,y+\delta_l}^{[\mu_2],t-\delta_t} &= 1 - 2\omega + \omega^2, \\ \alpha_{x+\delta_l,y+\delta_l}^{[\mu_1],t-\delta_t} &= 1 + \frac{1}{2}\omega v^2 - 2\omega + \omega^2 - \frac{1}{2}\omega v + \frac{1}{2}\omega c_s^2 - \frac{1}{2}\omega^2c_s^2 + \frac{1}{2}\omega^2v - \frac{1}{2}\omega^2v^2, \\ \alpha_{x+\delta_l,y+\delta_l}^{[\mu_2],t-\delta_t} &= 1 - 2\omega + \omega^2, \\ \alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-2\delta_t} &= 1 + 3u^2\omega^2 - \frac{3}{2}u^2\omega^3 - \frac{1}{2}\omega v^2 - 2\omega + \omega^2 + \frac{1}{2}\omega v - 2\omega c_s^2 - \frac{3}{2}u^2\omega - \frac{1}{2}\omega^3v^2 + 4\omega^2c_s^2 - \frac{1}{2}u\omega - \omega^2v - \\ &\quad \frac{1}{2}u\omega^3 + \omega^2v^2 - 2\omega^3c_s^2 + \frac{1}{2}\omega^3v + u\omega^2,\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_2], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x, y-\delta_l}^{[\mu_1], t-2\delta_t} &= -2u\omega - 2u\omega^3 + 4u\omega^2, \\
\alpha_{x, y-\delta_l}^{[\mu_2], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x+\delta_l, y-\delta_l}^{[\mu_1], t-2\delta_t} &= -1 - 3u^2\omega^2 + \frac{3}{2}u^2\omega^3 + \frac{1}{2}\omega v^2 + 2\omega - \omega^2 - \frac{1}{2}\omega v + 2\omega c_s^2 + \frac{3}{2}u^2\omega + \frac{1}{2}\omega^3 v^2 - 4\omega^2 c_s^2 - \frac{1}{2}u\omega + \omega^2 v - \frac{1}{2}u\omega^3 - \omega^2 v^2 + 2\omega^3 c_s^2 - \frac{1}{2}\omega^3 v + u\omega^2, \\
\alpha_{x+\delta_l, y-\delta_l}^{[\mu_2], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x-\delta_l, y}^{[\mu_1], t-2\delta_t} &= 1 + u^2\omega^2 - \frac{1}{2}u^2\omega^3 + \omega v^2 - 3\omega + 3\omega^2 - \omega^3 + \frac{1}{2}\omega c_s^2 - \frac{1}{2}u^2\omega + \omega^3 v^2 - \omega^2 c_s^2 - \frac{1}{2}u\omega - \frac{1}{2}u\omega^3 - 2\omega^2 v^2 + \frac{1}{2}\omega^3 c_s^2 + u\omega^2, \\
\alpha_{x-\delta_l, y}^{[\mu_2], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x, y}^{[\mu_1], t-2\delta_t} &= -2u\omega - 2u\omega^3 + 4u\omega^2, \\
\alpha_{x, y}^{[\mu_2], t-2\delta_t} &= -4 + 12\omega - 12\omega^2 + 4\omega^3, \\
\alpha_{x+\delta_l, y}^{[\mu_1], t-2\delta_t} &= -1 - u^2\omega^2 + \frac{1}{2}u^2\omega^3 - \omega v^2 + 3\omega - 3\omega^2 + \omega^3 - \frac{1}{2}\omega c_s^2 + \frac{1}{2}u^2\omega - \omega^3 v^2 + \omega^2 c_s^2 - \frac{1}{2}u\omega - \frac{1}{2}u\omega^3 + 2\omega^2 v^2 - \frac{1}{2}\omega^3 c_s^2 + u\omega^2, \\
\alpha_{x+\delta_l, y}^{[\mu_2], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x-\delta_l, y+\delta_l}^{[\mu_1], t-2\delta_t} &= 1 + 3u^2\omega^2 - \frac{3}{2}u^2\omega^3 - \frac{1}{2}\omega v^2 - 2\omega + \omega^2 - \frac{1}{2}\omega v - 2\omega c_s^2 - \frac{3}{2}u^2\omega - \frac{1}{2}\omega^3 v^2 + 4\omega^2 c_s^2 - \frac{1}{2}u\omega + \omega^2 v - \frac{1}{2}u\omega^3 + \omega^2 v^2 - 2\omega^3 c_s^2 - \frac{1}{2}\omega^3 v + u\omega^2, \\
\alpha_{x-\delta_l, y+\delta_l}^{[\mu_2], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x, y+\delta_l}^{[\mu_1], t-2\delta_t} &= -2u\omega - 2u\omega^3 + 4u\omega^2, \\
\alpha_{x, y+\delta_l}^{[\mu_2], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_1], t-2\delta_t} &= -1 - 3u^2\omega^2 + \frac{3}{2}u^2\omega^3 + \frac{1}{2}\omega v^2 + 2\omega - \omega^2 + \frac{1}{2}\omega v + 2\omega c_s^2 + \frac{3}{2}u^2\omega + \frac{1}{2}\omega^3 v^2 - 4\omega^2 c_s^2 - \frac{1}{2}u\omega - \omega^2 v - \frac{1}{2}u\omega^3 - \omega^2 v^2 + 2\omega^3 c_s^2 + \frac{1}{2}\omega^3 v + u\omega^2, \\
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_2], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x, y-\delta_l}^{[\mu_1], t-3\delta_t} &= -3u\omega^4 + 3u\omega + 9u\omega^3 - 9u\omega^2, \\
\alpha_{x, y-\delta_l}^{[\mu_2], t-3\delta_t} &= 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4, \\
\alpha_{x-\delta_l, y}^{[\mu_1], t-3\delta_t} &= -1 - 6u^2\omega^2 + 6u^2\omega^3 - 2\omega^4 c_s^2 - u\omega^4 + 3\omega - 3\omega^2 + \omega^3 + 2\omega c_s^2 + 2u^2\omega - 6\omega^2 c_s^2 + u\omega + 3u\omega^3 + 6\omega^3 c_s^2 - 2u^2\omega^4 - 3u\omega^2, \\
\alpha_{x-\delta_l, y}^{[\mu_2], t-3\delta_t} &= 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4, \\
\alpha_{x, y}^{[\mu_1], t-3\delta_t} &= -3u\omega^4 + 3u\omega + 9u\omega^3 - 9u\omega^2, \\
\alpha_{x, y}^{[\mu_2], t-3\delta_t} &= 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4, \\
\alpha_{x+\delta_l, y}^{[\mu_1], t-3\delta_t} &= 1 + 6u^2\omega^2 - 6u^2\omega^3 + 2\omega^4 c_s^2 - u\omega^4 - 3\omega + 3\omega^2 - \omega^3 - 2\omega c_s^2 - 2u^2\omega + 6\omega^2 c_s^2 + u\omega + 3u\omega^3 - 6\omega^3 c_s^2 + 2u^2\omega^4 - 3u\omega^2, \\
\alpha_{x+\delta_l, y}^{[\mu_2], t-3\delta_t} &= 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4,
\end{aligned}$$

$$\begin{aligned}\alpha_{x,y+\delta_l}^{[\mu_1],t-3\delta_t} &= -3uw^4 + 3uw + 9uw^3 - 9uw^2, \\ \alpha_{x,y+\delta_l}^{[\mu_2],t-3\delta_t} &= 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4, \\ \alpha_{x,y}^{[\mu_1],t-4\delta_t} &= -4u\omega^5 + 16u\omega^4 - 4u\omega - 24u\omega^3 + 16u\omega^2, \\ \alpha_{x,y}^{[\mu_2],t-4\delta_t} &= -4 + 20\omega - 40\omega^2 + 40\omega^3 + 4\omega^5 - 20\omega^4,\end{aligned}$$

## 2.4 EFDE for $\mu_3$

$$\mu_{3,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_3],t-\ell\delta_t} \mu_{3,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\begin{aligned}\alpha_{x,y-\delta_l}^{[\mu_1],t} &= 1 + \frac{1}{2}\omega v^2 - \omega + \frac{1}{2}\omega v + \frac{1}{2}\omega c_s^2, \\ \alpha_{x,y+\delta_l}^{[\mu_1],t} &= -1 - \frac{1}{2}\omega v^2 + \omega + \frac{1}{2}\omega v - \frac{1}{2}\omega c_s^2, \\ \alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{2}u^2\omega^2 + 2\omega - \omega^2 - \frac{1}{2}\omega c_s^2 - \frac{1}{2}u^2\omega + \frac{1}{2}\omega^2 c_s^2 - \frac{1}{2}u\omega + \frac{1}{2}u\omega^2, \\ \alpha_{x-\delta_l,y-\delta_l}^{[\mu_3],t-\delta_t} &= 1 - 2\omega + \omega^2, \\ \alpha_{x,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 - u^2\omega^2 + \omega v^2 + \omega + 2\omega c_s^2 + u^2\omega - 2\omega^2 c_s^2 - \omega^2 v^2, \\ \alpha_{x,y-\delta_l}^{[\mu_3],t-\delta_t} &= 1 - 2\omega + \omega^2, \\ \alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{2}u^2\omega^2 + 2\omega - \omega^2 - \frac{1}{2}\omega c_s^2 - \frac{1}{2}u^2\omega + \frac{1}{2}\omega^2 c_s^2 + \frac{1}{2}u\omega - \frac{1}{2}u\omega^2, \\ \alpha_{x+\delta_l,y-\delta_l}^{[\mu_3],t-\delta_t} &= 1 - 2\omega + \omega^2, \\ \alpha_{x-\delta_l,y}^{[\mu_1],t-\delta_t} &= 1 - 2\omega + \omega^2, \\ \alpha_{x,y}^{[\mu_1],t-\delta_t} &= \omega v - \omega^2 v, \\ \alpha_{x,y}^{[\mu_3],t-\delta_t} &= 2 - 4\omega + 2\omega^2, \\ \alpha_{x+\delta_l,y}^{[\mu_3],t-\delta_t} &= 1 - 2\omega + \omega^2, \\ \alpha_{x-\delta_l,y+\delta_l}^{[\mu_1],t-\delta_t} &= 1 - \frac{1}{2}u^2\omega^2 - 2\omega + \omega^2 + \frac{1}{2}\omega c_s^2 + \frac{1}{2}u^2\omega - \frac{1}{2}\omega^2 c_s^2 + \frac{1}{2}u\omega - \frac{1}{2}u\omega^2, \\ \alpha_{x-\delta_l,y+\delta_l}^{[\mu_3],t-\delta_t} &= 1 - 2\omega + \omega^2, \\ \alpha_{x,y+\delta_l}^{[\mu_1],t-\delta_t} &= 1 + u^2\omega^2 - \omega v^2 - \omega - 2\omega c_s^2 - u^2\omega + 2\omega^2 c_s^2 + \omega^2 v^2, \\ \alpha_{x,y+\delta_l}^{[\mu_3],t-\delta_t} &= 1 - 2\omega + \omega^2, \\ \alpha_{x+\delta_l,y+\delta_l}^{[\mu_1],t-\delta_t} &= 1 - \frac{1}{2}u^2\omega^2 - 2\omega + \omega^2 + \frac{1}{2}\omega c_s^2 + \frac{1}{2}u^2\omega - \frac{1}{2}\omega^2 c_s^2 - \frac{1}{2}u\omega + \frac{1}{2}u\omega^2, \\ \alpha_{x+\delta_l,y+\delta_l}^{[\mu_3],t-\delta_t} &= 1 - 2\omega + \omega^2,\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_3], t-2\delta_t} &= 1 + u^2\omega^2 - \frac{1}{2}u^2\omega^3 - \frac{3}{2}\omega v^2 - 2\omega + \omega^2 - \frac{1}{2}\omega v - 2\omega c_s^2 - \frac{1}{2}u^2\omega - \frac{3}{2}\omega^3v^2 + 4\omega^2c_s^2 + \frac{1}{2}u\omega + \omega^2v + \\
&\quad \frac{1}{2}u\omega^3 + 3\omega^2v^2 - 2\omega^3c_s^2 - \frac{1}{2}\omega^3v - u\omega^2, \\
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_3], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x, y-\delta_l}^{[\mu_1], t-2\delta_t} &= \\
&\quad 1 - 2u^2\omega^2 + u^2\omega^3 - \frac{1}{2}\omega v^2 - 3\omega + 3\omega^2 - \frac{1}{2}\omega v - \omega^3 + \frac{1}{2}\omega c_s^2 + u^2\omega - \frac{1}{2}\omega^3v^2 - \omega^2c_s^2 + \omega^2v + \omega^2v^2 + \frac{1}{2}\omega^3c_s^2 - \frac{1}{2}\omega^3v, \\
\alpha_{x, y-\delta_l}^{[\mu_3], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x+\delta_l, y-\delta_l}^{[\mu_1], t-2\delta_t} &= 1 + u^2\omega^2 - \frac{1}{2}u^2\omega^3 - \frac{3}{2}\omega v^2 - 2\omega + \omega^2 - \frac{1}{2}\omega v - 2\omega c_s^2 - \frac{1}{2}u^2\omega - \frac{3}{2}\omega^3v^2 + 4\omega^2c_s^2 - \frac{1}{2}u\omega + \omega^2v - \\
&\quad \frac{1}{2}u\omega^3 + 3\omega^2v^2 - 2\omega^3c_s^2 - \frac{1}{2}\omega^3v + u\omega^2, \\
\alpha_{x+\delta_l, y-\delta_l}^{[\mu_3], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x-\delta_l, y}^{[\mu_1], t-2\delta_t} &= -2\omega v + 4\omega^2v - 2\omega^3v, \\
\alpha_{x-\delta_l, y}^{[\mu_3], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x, y}^{[\mu_1], t-2\delta_t} &= -2\omega v + 4\omega^2v - 2\omega^3v, \\
\alpha_{x, y}^{[\mu_3], t-2\delta_t} &= -4 + 12\omega - 12\omega^2 + 4\omega^3, \\
\alpha_{x+\delta_l, y}^{[\mu_1], t-2\delta_t} &= -2\omega v + 4\omega^2v - 2\omega^3v, \\
\alpha_{x+\delta_l, y}^{[\mu_3], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x-\delta_l, y+\delta_l}^{[\mu_1], t-2\delta_t} &= -1 - u^2\omega^2 + \frac{1}{2}u^2\omega^3 + \frac{3}{2}\omega v^2 + 2\omega - \omega^2 - \frac{1}{2}\omega v + 2\omega c_s^2 + \frac{1}{2}u^2\omega + \frac{3}{2}\omega^3v^2 - 4\omega^2c_s^2 - \frac{1}{2}u\omega + \omega^2v - \\
&\quad \frac{1}{2}u\omega^3 - 3\omega^2v^2 + 2\omega^3c_s^2 - \frac{1}{2}\omega^3v + u\omega^2, \\
\alpha_{x-\delta_l, y+\delta_l}^{[\mu_3], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x, y+\delta_l}^{[\mu_1], t-2\delta_t} &= \\
&\quad -1 + 2u^2\omega^2 - u^2\omega^3 + \frac{1}{2}\omega v^2 + 3\omega - 3\omega^2 - \frac{1}{2}\omega v + \omega^3 - \frac{1}{2}\omega c_s^2 - u^2\omega + \frac{1}{2}\omega^3v^2 + \omega^2c_s^2 + \omega^2v - \omega^2v^2 - \frac{1}{2}\omega^3c_s^2 - \frac{1}{2}\omega^3v, \\
\alpha_{x, y+\delta_l}^{[\mu_3], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_1], t-2\delta_t} &= -1 - u^2\omega^2 + \frac{1}{2}u^2\omega^3 + \frac{3}{2}\omega v^2 + 2\omega - \omega^2 - \frac{1}{2}\omega v + 2\omega c_s^2 + \frac{1}{2}u^2\omega + \frac{3}{2}\omega^3v^2 - 4\omega^2c_s^2 + \frac{1}{2}u\omega + \omega^2v + \\
&\quad \frac{1}{2}u\omega^3 - 3\omega^2v^2 + 2\omega^3c_s^2 - \frac{1}{2}\omega^3v - u\omega^2, \\
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_3], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x, y-\delta_l}^{[\mu_1], t-3\delta_t} &= \\
&\quad -1 - \omega^4v + 2\omega v^2 - 2\omega^4c_s^2 + 3\omega - 3\omega^2 + \omega v + \omega^3 - 2\omega^4v^2 + 2\omega c_s^2 + 6\omega^3v^2 - 6\omega^2c_s^2 - 3\omega^2v - 6\omega^2v^2 + 6\omega^3c_s^2 + 3\omega^3v, \\
\alpha_{x, y-\delta_l}^{[\mu_3], t-3\delta_t} &= 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4, \\
\alpha_{x-\delta_l, y}^{[\mu_1], t-3\delta_t} &= -3\omega^4v + 3\omega v - 9\omega^2v + 9\omega^3v, \\
\alpha_{x-\delta_l, y}^{[\mu_3], t-3\delta_t} &= 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4, \\
\alpha_{x, y}^{[\mu_1], t-3\delta_t} &= -3\omega^4v + 3\omega v - 9\omega^2v + 9\omega^3v, \\
\alpha_{x, y}^{[\mu_3], t-3\delta_t} &= 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4, \\
\alpha_{x+\delta_l, y}^{[\mu_1], t-3\delta_t} &= -3\omega^4v + 3\omega v - 9\omega^2v + 9\omega^3v,
\end{aligned}$$

$$\alpha_{x+\delta_l,y}^{[\mu_3],t-3\delta_t} = 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4,$$

$$\alpha_{x,y+\delta_l}^{[\mu_1],t-3\delta_t} =$$

$$1 - \omega^4 v - 2\omega v^2 + 2\omega^4 c_s^2 - 3\omega + 3\omega^2 + \omega v - \omega^3 + 2\omega^4 v^2 - 2\omega c_s^2 - 6\omega^3 v^2 + 6\omega^2 c_s^2 - 3\omega^2 v + 6\omega^2 v^2 - 6\omega^3 c_s^2 + 3\omega^3 v,$$

$$\alpha_{x,y+\delta_l}^{[\mu_3],t-3\delta_t} = 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4,$$

$$\alpha_{x,y}^{[\mu_1],t-4\delta_t} = 16\omega^4 v - 4\omega^5 v - 4\omega v + 16\omega^2 v - 24\omega^3 v,$$

$$\alpha_{x,y}^{[\mu_3],t-4\delta_t} = -4 + 20\omega - 40\omega^2 + 40\omega^3 + 4\omega^5 - 20\omega^4,$$

## 2.5 EFDE for $\mu_4$

$$\mu_{4,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_4],t-\ell\delta_t} \mu_{4,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x-\delta_l,y}^{[\mu_1],t} = 1 - \omega + \frac{1}{2}\omega c_s^2 + \frac{1}{2}u^2\omega + \frac{1}{2}u\omega.$$

$$\alpha_{x+\delta_l,y}^{[\mu_1],t} = 1 - \omega + \frac{1}{2}\omega c_s^2 + \frac{1}{2}u^2\omega - \frac{1}{2}u\omega.$$

$$\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} = -1 - \frac{1}{2}\omega v^2 + 2\omega - \omega^2 - \frac{1}{2}\omega v - \frac{1}{2}\omega c_s^2 + \frac{1}{2}\omega^2 c_s^2 + \frac{1}{2}\omega^2 v + \frac{1}{2}\omega^2 v^2,$$

$$\alpha_{x-\delta_l,y-\delta_l}^{[\mu_4],t-\delta_t} = 1 - 2\omega + \omega^2,$$

$$\alpha_{x,y-\delta_l}^{[\mu_4],t-\delta_t} = 1 - 2\omega + \omega^2,$$

$$\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} = -1 - \frac{1}{2}\omega v^2 + 2\omega - \omega^2 - \frac{1}{2}\omega v - \frac{1}{2}\omega c_s^2 + \frac{1}{2}\omega^2 c_s^2 + \frac{1}{2}\omega^2 v + \frac{1}{2}\omega^2 v^2,$$

$$\alpha_{x+\delta_l,y-\delta_l}^{[\mu_4],t-\delta_t} = 1 - 2\omega + \omega^2,$$

$$\alpha_{x-\delta_l,y}^{[\mu_1],t-\delta_t} = -1 - u^2\omega^2 + \omega v^2 + \omega + 2\omega c_s^2 + u^2\omega - 2\omega^2 c_s^2 - \omega^2 v^2,$$

$$\alpha_{x-\delta_l,y}^{[\mu_4],t-\delta_t} = 1 - 2\omega + \omega^2,$$

$$\alpha_{x,y}^{[\mu_1],t-\delta_t} = -2 + u^2\omega^2 + 4\omega - 2\omega^2 - \omega c_s^2 - u^2\omega + \omega^2 c_s^2,$$

$$\alpha_{x,y}^{[\mu_4],t-\delta_t} = 2 - 4\omega + 2\omega^2,$$

$$\alpha_{x+\delta_l,y}^{[\mu_1],t-\delta_t} = -1 - u^2\omega^2 + \omega v^2 + \omega + 2\omega c_s^2 + u^2\omega - 2\omega^2 c_s^2 - \omega^2 v^2,$$

$$\alpha_{x+\delta_l,y}^{[\mu_4],t-\delta_t} = 1 - 2\omega + \omega^2,$$

$$\alpha_{x-\delta_l,y+\delta_l}^{[\mu_1],t-\delta_t} = -1 - \frac{1}{2}\omega v^2 + 2\omega - \omega^2 + \frac{1}{2}\omega v - \frac{1}{2}\omega c_s^2 + \frac{1}{2}\omega^2 c_s^2 - \frac{1}{2}\omega^2 v + \frac{1}{2}\omega^2 v^2,$$

$$\alpha_{x-\delta_l,y+\delta_l}^{[\mu_4],t-\delta_t} = 1 - 2\omega + \omega^2,$$

$$\alpha_{x,y+\delta_l}^{[\mu_4],t-\delta_t} = 1 - 2\omega + \omega^2,$$

$$\begin{aligned}
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_1], t-\delta_t} &= -1 - \frac{1}{2}\omega v^2 + 2\omega - \omega^2 + \frac{1}{2}\omega v - \frac{1}{2}\omega c_s^2 + \frac{1}{2}\omega^2 c_s^2 - \frac{1}{2}\omega^2 v + \frac{1}{2}\omega^2 v^2, \\
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_4], t-\delta_t} &= 1 - 2\omega + \omega^2, \\
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_1], t-2\delta_t} &= 1 + 3u^2\omega^2 - \frac{3}{2}u^2\omega^3 - \frac{1}{2}\omega v^2 - 2\omega + \omega^2 + \frac{1}{2}\omega v - 2\omega c_s^2 - \frac{3}{2}u^2\omega - \frac{1}{2}\omega^3 v^2 + 4\omega^2 c_s^2 - \frac{1}{2}u\omega - \omega^2 v - \\
&\quad \frac{1}{2}u\omega^3 + \omega^2 v^2 - 2\omega^3 c_s^2 + \frac{1}{2}\omega^3 v + u\omega^2, \\
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_4], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x, y-\delta_l}^{[\mu_1], t-2\delta_t} &= 2 + \omega v^2 - 6\omega + 6\omega^2 + \omega v - 2\omega^3 + \omega c_s^2 + \omega^3 v^2 - 2\omega^2 c_s^2 - 2\omega^2 v - 2\omega^2 v^2 + \omega^3 c_s^2 + \omega^3 v, \\
\alpha_{x, y-\delta_l}^{[\mu_4], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x+\delta_l, y-\delta_l}^{[\mu_1], t-2\delta_t} &= 1 + 3u^2\omega^2 - \frac{3}{2}u^2\omega^3 - \frac{1}{2}\omega v^2 - 2\omega + \omega^2 + \frac{1}{2}\omega v - 2\omega c_s^2 - \frac{3}{2}u^2\omega - \frac{1}{2}\omega^3 v^2 + 4\omega^2 c_s^2 + \frac{1}{2}u\omega - \omega^2 v + \\
&\quad \frac{1}{2}u\omega^3 + \omega^2 v^2 - 2\omega^3 c_s^2 + \frac{1}{2}\omega^3 v - u\omega^2, \\
\alpha_{x+\delta_l, y-\delta_l}^{[\mu_4], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x-\delta_l, y}^{[\mu_1], t-2\delta_t} &= 1 + u^2\omega^2 - \frac{1}{2}u^2\omega^3 + \omega v^2 - 3\omega + 3\omega^2 - \omega^3 + \frac{1}{2}\omega c_s^2 - \frac{1}{2}u^2\omega + \omega^3 v^2 - \omega^2 c_s^2 - \frac{1}{2}u\omega - \frac{1}{2}u\omega^3 - 2\omega^2 v^2 + \frac{1}{2}\omega^3 c_s^2 + u\omega^2, \\
\alpha_{x-\delta_l, y}^{[\mu_4], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x, y}^{[\mu_1], t-2\delta_t} &= 2 + 4u^2\omega^2 - 2u^2\omega^3 - 2\omega v^2 - 4\omega + 2\omega^2 - 4\omega c_s^2 - 2u^2\omega - 2\omega^3 v^2 + 8\omega^2 c_s^2 + 4\omega^2 v^2 - 4\omega^3 c_s^2, \\
\alpha_{x, y}^{[\mu_4], t-2\delta_t} &= -4 + 12\omega - 12\omega^2 + 4\omega^3, \\
\alpha_{x+\delta_l, y}^{[\mu_1], t-2\delta_t} &= 1 + u^2\omega^2 - \frac{1}{2}u^2\omega^3 + \omega v^2 - 3\omega + 3\omega^2 - \omega^3 + \frac{1}{2}\omega c_s^2 - \frac{1}{2}u^2\omega + \omega^3 v^2 - \omega^2 c_s^2 + \frac{1}{2}u\omega + \frac{1}{2}u\omega^3 - 2\omega^2 v^2 + \frac{1}{2}\omega^3 c_s^2 - u\omega^2, \\
\alpha_{x+\delta_l, y}^{[\mu_4], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x-\delta_l, y+\delta_l}^{[\mu_1], t-2\delta_t} &= 1 + 3u^2\omega^2 - \frac{3}{2}u^2\omega^3 - \frac{1}{2}\omega v^2 - 2\omega + \omega^2 - \frac{1}{2}\omega v - 2\omega c_s^2 - \frac{3}{2}u^2\omega - \frac{1}{2}\omega^3 v^2 + 4\omega^2 c_s^2 - \frac{1}{2}u\omega + \omega^2 v - \\
&\quad \frac{1}{2}u\omega^3 + \omega^2 v^2 - 2\omega^3 c_s^2 - \frac{1}{2}\omega^3 v + u\omega^2, \\
\alpha_{x-\delta_l, y+\delta_l}^{[\mu_4], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x, y+\delta_l}^{[\mu_1], t-2\delta_t} &= 2 + \omega v^2 - 6\omega + 6\omega^2 - \omega v - 2\omega^3 + \omega c_s^2 + \omega^3 v^2 - 2\omega^2 c_s^2 + 2\omega^2 v - 2\omega^2 v^2 + \omega^3 c_s^2 - \omega^3 v, \\
\alpha_{x, y+\delta_l}^{[\mu_4], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_1], t-2\delta_t} &= 1 + 3u^2\omega^2 - \frac{3}{2}u^2\omega^3 - \frac{1}{2}\omega v^2 - 2\omega + \omega^2 - \frac{1}{2}\omega v - 2\omega c_s^2 - \frac{3}{2}u^2\omega - \frac{1}{2}\omega^3 v^2 + 4\omega^2 c_s^2 + \frac{1}{2}u\omega + \omega^2 v + \\
&\quad \frac{1}{2}u\omega^3 + \omega^2 v^2 - 2\omega^3 c_s^2 - \frac{1}{2}\omega^3 v - u\omega^2, \\
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_4], t-2\delta_t} &= -2 + 6\omega - 6\omega^2 + 2\omega^3, \\
\alpha_{x, y-\delta_l}^{[\mu_1], t-3\delta_t} &= -2 - 9u^2\omega^2 + \omega^4 v + 9u^2\omega^3 + \omega v^2 - 4\omega^4 c_s^2 + 6\omega - 6\omega^2 - \omega v + 2\omega^3 - \omega^4 v^2 + 4\omega c_s^2 + 3u^2\omega + \\
&\quad 3\omega^3 v^2 - 12\omega^2 c_s^2 + 3\omega^2 v - 3\omega^2 v^2 + 12\omega^3 c_s^2 - 3u^2\omega^4 - 3\omega^3 v, \\
\alpha_{x, y-\delta_l}^{[\mu_4], t-3\delta_t} &= 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4, \\
\alpha_{x-\delta_l, y}^{[\mu_1], t-3\delta_t} &= -1 - 6u^2\omega^2 + 6u^2\omega^3 - 2\omega^4 c_s^2 - u\omega^4 + 3\omega - 3\omega^2 + \omega^3 + 2\omega c_s^2 + 2u^2\omega - 6\omega^2 c_s^2 + u\omega + 3u\omega^3 + \\
&\quad 6\omega^3 c_s^2 - 2u^2\omega^4 - 3u\omega^2, \\
\alpha_{x-\delta_l, y}^{[\mu_4], t-3\delta_t} &= 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_1],t-3\delta_t} &= -2 - 3u^2\omega^2 + 3u^2\omega^3 - 2\omega v^2 + \omega^4 c_s^2 + 8\omega - 12\omega^2 + 8\omega^3 + 2\omega^4 v^2 - \omega c_s^2 + u^2\omega - 6\omega^3 v^2 + 3\omega^2 c_s^2 - 2\omega^4 + 6\omega^2 v^2 - 3\omega^3 c_s^2 - u^2\omega^4, \\
\alpha_{x,y}^{[\mu_4],t-3\delta_t} &= 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4, \\
\alpha_{x+\delta_l,y}^{[\mu_1],t-3\delta_t} &= -1 - 6u^2\omega^2 + 6u^2\omega^3 - 2\omega^4 c_s^2 + u\omega^4 + 3\omega - 3\omega^2 + \omega^3 + 2\omega c_s^2 + 2u^2\omega - 6\omega^2 c_s^2 - u\omega - 3u\omega^3 + 6\omega^3 c_s^2 - 2u^2\omega^4 + 3u\omega^2, \\
\alpha_{x+\delta_l,y}^{[\mu_4],t-3\delta_t} &= 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4, \\
\alpha_{x,y+\delta_l}^{[\mu_1],t-3\delta_t} &= -2 - 9u^2\omega^2 - \omega^4 v + 9u^2\omega^3 + \omega v^2 - 4\omega^4 c_s^2 + 6\omega - 6\omega^2 + \omega v + 2\omega^3 - \omega^4 v^2 + 4\omega c_s^2 + 3u^2\omega + 3\omega^3 v^2 - 12\omega^2 c_s^2 - 3\omega^2 v - 3\omega^2 v^2 + 12\omega^3 c_s^2 - 3u^2\omega^4 + 3\omega^3 v, \\
\alpha_{x,y+\delta_l}^{[\mu_4],t-3\delta_t} &= 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4, \\
\alpha_{x,y}^{[\mu_1],t-4\delta_t} &= 2 + 16u^2\omega^2 - 4\omega^5 c_s^2 - 24u^2\omega^3 + 16\omega^4 c_s^2 - 8\omega + 12\omega^2 - 8\omega^3 - 4\omega c_s^2 - 4u^2\omega + 16\omega^2 c_s^2 + 2\omega^4 - 4u^2\omega^5 - 24\omega^3 c_s^2 + 16u^2\omega^4, \\
\alpha_{x,y}^{[\mu_4],t-4\delta_t} &= -4 + 20\omega - 40\omega^2 + 40\omega^3 + 4\omega^5 - 20\omega^4,
\end{aligned}$$

## 2.6 EFDE for $\mu_5$

$$\mu_{5,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_5],t-\ell\delta_t} \mu_{5,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_1],t} &= 1 + \frac{1}{2}\omega v^2 - \omega + \frac{1}{2}\omega v + \frac{1}{2}\omega c_s^2, \\
\alpha_{x,y+\delta_l}^{[\mu_1],t} &= 1 + \frac{1}{2}\omega v^2 - \omega - \frac{1}{2}\omega v + \frac{1}{2}\omega c_s^2, \\
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{2}u^2\omega^2 + 2\omega - \omega^2 - \frac{1}{2}\omega c_s^2 - \frac{1}{2}u^2\omega + \frac{1}{2}\omega^2 c_s^2 - \frac{1}{2}u\omega + \frac{1}{2}u\omega^2, \\
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_5],t-\delta_t} &= 1 - 2\omega + \omega^2, \\
\alpha_{x,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 - u^2\omega^2 + \omega v^2 + \omega + 2\omega c_s^2 + u^2\omega - 2\omega^2 c_s^2 - \omega^2 v^2, \\
\alpha_{x,y-\delta_l}^{[\mu_5],t-\delta_t} &= 1 - 2\omega + \omega^2, \\
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{2}u^2\omega^2 + 2\omega - \omega^2 - \frac{1}{2}\omega c_s^2 - \frac{1}{2}u^2\omega + \frac{1}{2}\omega^2 c_s^2 + \frac{1}{2}u\omega - \frac{1}{2}u\omega^2, \\
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_5],t-\delta_t} &= 1 - 2\omega + \omega^2, \\
\alpha_{x-\delta_l,y}^{[\mu_1],t-\delta_t} &= 1 - 2\omega + \omega^2, \\
\alpha_{x,y}^{[\mu_1],t-\delta_t} &= -2 - \omega v^2 + 4\omega - 2\omega^2 - \omega c_s^2 + \omega^2 c_s^2 + \omega^2 v^2, \\
\alpha_{x,y}^{[\mu_5],t-\delta_t} &= 2 - 4\omega + 2\omega^2, \\
\alpha_{x+\delta_l,y}^{[\mu_5],t-\delta_t} &= 1 - 2\omega + \omega^2,
\end{aligned}$$

$$\alpha_{x-\delta_l, y+\delta_l}^{[\mu_1], t-\delta_t} = -1 + \frac{1}{2}u^2\omega^2 + 2\omega - \omega^2 - \frac{1}{2}\omega c_s^2 - \frac{1}{2}u^2\omega + \frac{1}{2}\omega^2 c_s^2 - \frac{1}{2}u\omega + \frac{1}{2}u\omega^2,$$

$$\alpha_{x-\delta_l, y+\delta_l}^{[\mu_5], t-\delta_t} = 1 - 2\omega + \omega^2,$$

$$\alpha_{x, y+\delta_l}^{[\mu_1], t-\delta_t} = -1 - u^2\omega^2 + \omega v^2 + \omega + 2\omega c_s^2 + u^2\omega - 2\omega^2 c_s^2 - \omega^2 v^2,$$

$$\alpha_{x, y+\delta_l}^{[\mu_5], t-\delta_t} = 1 - 2\omega + \omega^2,$$

$$\alpha_{x+\delta_l, y+\delta_l}^{[\mu_1], t-\delta_t} = -1 + \frac{1}{2}u^2\omega^2 + 2\omega - \omega^2 - \frac{1}{2}\omega c_s^2 - \frac{1}{2}u^2\omega + \frac{1}{2}\omega^2 c_s^2 + \frac{1}{2}u\omega - \frac{1}{2}u\omega^2,$$

$$\alpha_{x+\delta_l, y+\delta_l}^{[\mu_5], t-\delta_t} = 1 - 2\omega + \omega^2,$$

$$\alpha_{x-\delta_l, y-\delta_l}^{[\mu_1], t-2\delta_t} = 1 + u^2\omega^2 - \frac{1}{2}u^2\omega^3 - \frac{3}{2}\omega v^2 - 2\omega + \omega^2 - \frac{1}{2}\omega v - 2\omega c_s^2 - \frac{1}{2}u^2\omega - \frac{3}{2}\omega^3 v^2 + 4\omega^2 c_s^2 + \frac{1}{2}u\omega + \omega^2 v + \frac{1}{2}u\omega^3 + 3\omega^2 v^2 - 2\omega^3 c_s^2 - \frac{1}{2}\omega^3 v - u\omega^2,$$

$$\alpha_{x-\delta_l, y-\delta_l}^{[\mu_5], t-2\delta_t} = -2 + 6\omega - 6\omega^2 + 2\omega^3,$$

$$\alpha_{x, y-\delta_l}^{[\mu_1], t-2\delta_t} = 1 - 2u^2\omega^2 + u^2\omega^3 - \frac{1}{2}\omega v^2 - 3\omega + 3\omega^2 - \frac{1}{2}\omega v - \omega^3 + \frac{1}{2}\omega c_s^2 + u^2\omega - \frac{1}{2}\omega^3 v^2 - \omega^2 c_s^2 + \omega^2 v + \omega^2 v^2 + \frac{1}{2}\omega^3 c_s^2 - \frac{1}{2}\omega^3 v,$$

$$\alpha_{x, y-\delta_l}^{[\mu_5], t-2\delta_t} = -2 + 6\omega - 6\omega^2 + 2\omega^3,$$

$$\alpha_{x+\delta_l, y-\delta_l}^{[\mu_1], t-2\delta_t} = 1 + u^2\omega^2 - \frac{1}{2}u^2\omega^3 - \frac{3}{2}\omega v^2 - 2\omega + \omega^2 - \frac{1}{2}\omega v - 2\omega c_s^2 - \frac{1}{2}u^2\omega - \frac{3}{2}\omega^3 v^2 + 4\omega^2 c_s^2 - \frac{1}{2}u\omega + \omega^2 v - \frac{1}{2}u\omega^3 + 3\omega^2 v^2 - 2\omega^3 c_s^2 - \frac{1}{2}\omega^3 v + u\omega^2,$$

$$\alpha_{x+\delta_l, y-\delta_l}^{[\mu_5], t-2\delta_t} = -2 + 6\omega - 6\omega^2 + 2\omega^3,$$

$$\alpha_{x-\delta_l, y}^{[\mu_1], t-2\delta_t} = 2 - 2u^2\omega^2 + u^2\omega^3 - 6\omega + 6\omega^2 - 2\omega^3 + \omega c_s^2 + u^2\omega - 2\omega^2 c_s^2 + u\omega + u\omega^3 + \omega^3 c_s^2 - 2u\omega^2,$$

$$\alpha_{x-\delta_l, y}^{[\mu_5], t-2\delta_t} = -2 + 6\omega - 6\omega^2 + 2\omega^3,$$

$$\alpha_{x, y}^{[\mu_1], t-2\delta_t} = 2 + 4u^2\omega^2 - 2u^2\omega^3 - 2\omega v^2 - 4\omega + 2\omega^2 - 4\omega c_s^2 - 2u^2\omega - 2\omega^3 v^2 + 8\omega^2 c_s^2 + 4\omega^2 v^2 - 4\omega^3 c_s^2,$$

$$\alpha_{x, y}^{[\mu_5], t-2\delta_t} = -4 + 12\omega - 12\omega^2 + 4\omega^3,$$

$$\alpha_{x+\delta_l, y}^{[\mu_1], t-2\delta_t} = 2 - 2u^2\omega^2 + u^2\omega^3 - 6\omega + 6\omega^2 - 2\omega^3 + \omega c_s^2 + u^2\omega - 2\omega^2 c_s^2 - u\omega - u\omega^3 + \omega^3 c_s^2 + 2u\omega^2,$$

$$\alpha_{x+\delta_l, y}^{[\mu_5], t-2\delta_t} = -2 + 6\omega - 6\omega^2 + 2\omega^3,$$

$$\alpha_{x-\delta_l, y+\delta_l}^{[\mu_1], t-2\delta_t} = 1 + u^2\omega^2 - \frac{1}{2}u^2\omega^3 - \frac{3}{2}\omega v^2 - 2\omega + \omega^2 + \frac{1}{2}\omega v - 2\omega c_s^2 - \frac{1}{2}u^2\omega - \frac{3}{2}\omega^3 v^2 + 4\omega^2 c_s^2 + \frac{1}{2}u\omega - \omega^2 v + \frac{1}{2}u\omega^3 + 3\omega^2 v^2 - 2\omega^3 c_s^2 + \frac{1}{2}\omega^3 v - u\omega^2,$$

$$\alpha_{x-\delta_l, y+\delta_l}^{[\mu_5], t-2\delta_t} = -2 + 6\omega - 6\omega^2 + 2\omega^3,$$

$$\alpha_{x, y+\delta_l}^{[\mu_1], t-2\delta_t} = 1 - 2u^2\omega^2 + u^2\omega^3 - \frac{1}{2}\omega v^2 - 3\omega + 3\omega^2 + \frac{1}{2}\omega v - \omega^3 + \frac{1}{2}\omega c_s^2 + u^2\omega - \frac{1}{2}\omega^3 v^2 - \omega^2 c_s^2 - \omega^2 v + \omega^2 v^2 + \frac{1}{2}\omega^3 c_s^2 + \frac{1}{2}\omega^3 v,$$

$$\alpha_{x, y+\delta_l}^{[\mu_5], t-2\delta_t} = -2 + 6\omega - 6\omega^2 + 2\omega^3,$$

$$\alpha_{x+\delta_l, y+\delta_l}^{[\mu_1], t-2\delta_t} = 1 + u^2\omega^2 - \frac{1}{2}u^2\omega^3 - \frac{3}{2}\omega v^2 - 2\omega + \omega^2 + \frac{1}{2}\omega v - 2\omega c_s^2 - \frac{1}{2}u^2\omega - \frac{3}{2}\omega^3 v^2 + 4\omega^2 c_s^2 - \frac{1}{2}u\omega - \omega^2 v - \frac{1}{2}u\omega^3 + 3\omega^2 v^2 - 2\omega^3 c_s^2 + \frac{1}{2}\omega^3 v + u\omega^2,$$

$$\alpha_{x+\delta_l, y+\delta_l}^{[\mu_5], t-2\delta_t} = -2 + 6\omega - 6\omega^2 + 2\omega^3,$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_1],t-3\delta_t} &= -1 - \omega^4 v + 2\omega v^2 - 2\omega^4 c_s^2 + 3\omega - 3\omega^2 + \omega v + \omega^3 - 2\omega^4 v^2 + 2\omega c_s^2 + 6\omega^3 v^2 - 6\omega^2 c_s^2 - 3\omega^2 v - 6\omega^2 v^2 + 6\omega^3 c_s^2 + 3\omega^3 v, \\
\alpha_{x,y-\delta_l}^{[\mu_5],t-3\delta_t} &= 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4, \\
\alpha_{x-\delta_l,y}^{[\mu_1],t-3\delta_t} &= -2 - 3u^2\omega^2 + 3u^2\omega^3 + 3\omega v^2 - 4\omega^4 c_s^2 + u\omega^4 + 6\omega - 6\omega^2 + 2\omega^3 - 3\omega^4 v^2 + 4\omega c_s^2 + u^2\omega + 9\omega^3 v^2 - 12\omega^2 c_s^2 - u\omega - 3u\omega^3 - 9\omega^2 v^2 + 12\omega^3 c_s^2 - u^2\omega^4 + 3u\omega^2, \\
\alpha_{x-\delta_l,y}^{[\mu_5],t-3\delta_t} &= 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4, \\
\alpha_{x,y}^{[\mu_1],t-3\delta_t} &= -2 + 6u^2\omega^2 - 6u^2\omega^3 + \omega v^2 + \omega^4 c_s^2 + 8\omega - 12\omega^2 + 8\omega^3 - \omega^4 v^2 - \omega c_s^2 - 2u^2\omega + 3\omega^3 v^2 + 3\omega^2 c_s^2 - 2\omega^4 - 3\omega^2 v^2 - 3\omega^3 c_s^2 + 2u^2\omega^4, \\
\alpha_{x,y}^{[\mu_5],t-3\delta_t} &= 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4, \\
\alpha_{x+\delta_l,y}^{[\mu_1],t-3\delta_t} &= -2 - 3u^2\omega^2 + 3u^2\omega^3 + 3\omega v^2 - 4\omega^4 c_s^2 - u\omega^4 + 6\omega - 6\omega^2 + 2\omega^3 - 3\omega^4 v^2 + 4\omega c_s^2 + u^2\omega + 9\omega^3 v^2 - 12\omega^2 c_s^2 + u\omega + 3u\omega^3 - 9\omega^2 v^2 + 12\omega^3 c_s^2 - u^2\omega^4 - 3u\omega^2, \\
\alpha_{x+\delta_l,y}^{[\mu_5],t-3\delta_t} &= 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4, \\
\alpha_{x,y+\delta_l}^{[\mu_1],t-3\delta_t} &= -1 + \omega^4 v + 2\omega v^2 - 2\omega^4 c_s^2 + 3\omega - 3\omega^2 - \omega v + \omega^3 - 2\omega^4 v^2 + 2\omega c_s^2 + 6\omega^3 v^2 - 6\omega^2 c_s^2 + 3\omega^2 v - 6\omega^2 v^2 + 6\omega^3 c_s^2 - 3\omega^3 v, \\
\alpha_{x,y+\delta_l}^{[\mu_5],t-3\delta_t} &= 3 - 12\omega + 18\omega^2 - 12\omega^3 + 3\omega^4, \\
\alpha_{x,y}^{[\mu_1],t-4\delta_t} &= 2 - 4\omega^5 c_s^2 - 4\omega v^2 + 16\omega^4 c_s^2 - 8\omega + 12\omega^2 - 4\omega^5 v^2 - 8\omega^3 + 16\omega^4 v^2 - 4\omega c_s^2 - 24\omega^3 v^2 + 16\omega^2 c_s^2 + 2\omega^4 + 16\omega^2 v^2 - 24\omega^3 c_s^2, \\
\alpha_{x,y}^{[\mu_5],t-4\delta_t} &= -4 + 20\omega - 40\omega^2 + 40\omega^3 + 4\omega^5 - 20\omega^4,
\end{aligned}$$

### 3 MRT 1: relaxation of $m_{00}, m_{10}, m_{01}, m_{20}, m_{02}$

#### 3.1 Definitions

Matrix  $\mathbf{A} = \mathbf{M}^{-1} \mathbf{S} \mathbf{M}$ :

$$\mathbf{A} = \begin{pmatrix} \omega_0 & -\omega_3 + \omega_0 & \omega_0 - \omega_4 & -\omega_3 + \omega_0 & \omega_0 - \omega_4 \\ 0 & \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 & 0 & -\frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 & 0 \\ 0 & 0 & \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4 & 0 & -\frac{1}{2}\omega_2 + \frac{1}{2}\omega_4 \\ 0 & -\frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 & 0 & \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 & 0 \\ 0 & 0 & -\frac{1}{2}\omega_2 + \frac{1}{2}\omega_4 & 0 & \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4 \end{pmatrix}.$$

where

$$\mathbf{S} = \text{diag}(\omega_0, \omega_1, \omega_2, \omega_3, \omega_4)$$

and

$$\mathbf{M} = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 0 & -1 & 0 \\ 0 & 0 & 1 & 0 & -1 \\ 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 \end{pmatrix}.$$

Matrix  $\mathbf{B}$ :

$$\mathbf{B} = \begin{pmatrix} 0 & -1 + \omega_3 & -1 + \omega_4 & -1 + \omega_3 & -1 + \omega_4 \\ -1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 & 0 & -1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 & -1 + \omega_1 & -1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 \\ -1 + \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4 & -1 + \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4 & 0 & -1 + \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4 & -1 + \omega_2 \\ -1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 & -1 + \omega_1 & -1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 & 0 & -1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 \\ -1 + \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4 & -1 + \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4 & -1 + \omega_2 & -1 + \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4 & 0 \end{pmatrix}.$$

### 3.2 EFDE for $\mu_1$

$$\mu_{1,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l, y+j\delta_l}^{[\mu_1], t-\ell\delta_t} \mu_{x+i\delta_l, y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x,y-\delta_l}^{[\mu_1],t} = 1 - \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2v - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4v^2 + \frac{1}{2}\omega_4c_s^2.$$

$$\alpha_{x-\delta_l,y}^{[\mu_1],t} = 1 - \frac{1}{2}\omega_1 + \frac{1}{2}\omega_1u + \frac{1}{2}u^2\omega_3 + \frac{1}{2}c_s^2\omega_3 - \frac{1}{2}\omega_3.$$

$$\alpha_{x,y}^{[\mu_1],t} = 1 - \omega_4v^2 - u^2\omega_3 - \omega_4c_s^2 - c_s^2\omega_3.$$

$$\alpha_{x+\delta_l,y}^{[\mu_1],t} = 1 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_1u + \frac{1}{2}u^2\omega_3 + \frac{1}{2}c_s^2\omega_3 - \frac{1}{2}\omega_3.$$

$$\alpha_{x,y+\delta_l}^{[\mu_1],t} = 1 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_2v - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4v^2 + \frac{1}{2}\omega_4c_s^2.$$

$$\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} = -1 + \frac{1}{2}\omega_4c_s^2\omega_3 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1v^2 + \frac{1}{4}c_s^2\omega_2\omega_3 + \frac{1}{4}\omega_2u^2\omega_3 - \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_1\omega_2v - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4u^2\omega_3 - \frac{1}{2}\omega_1u + \frac{1}{4}\omega_4\omega_1c_s^2 - \frac{1}{2}\omega_2v + \frac{1}{4}\omega_4\omega_3v^2 - \frac{1}{4}\omega_4\omega_3 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4v^2 - \frac{1}{2}u^2\omega_3 + \frac{1}{4}\omega_4\omega_1u + \frac{1}{4}\omega_1\omega_2u - \frac{1}{2}\omega_4c_s^2 - \frac{1}{2}c_s^2\omega_3 + \frac{1}{2}\omega_3 + \frac{1}{4}\omega_2\omega_3v,$$

$$\alpha_{x,y-\delta_l}^{[\mu_1],t-\delta_t} = -1 - \frac{1}{2}\omega_4c_s^2\omega_3 + \frac{1}{2}\omega_4 - \frac{1}{2}c_s^2\omega_2\omega_3 - \frac{1}{2}\omega_2u^2\omega_3 - \frac{1}{2}\omega_4u^2\omega_3 - \frac{1}{2}\omega_2v + \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4v^2 + u^2\omega_3 - \frac{1}{2}\omega_4c_s^2\omega_2 + \frac{1}{2}\omega_4\omega_2v + \frac{1}{2}\omega_4c_s^2 - \frac{1}{2}\omega_4\omega_2v^2 + c_s^2\omega_3,$$

$$\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} = -1 + \frac{1}{2}\omega_4c_s^2\omega_3 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1v^2 + \frac{1}{4}c_s^2\omega_2\omega_3 + \frac{1}{4}\omega_2u^2\omega_3 - \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_1\omega_2v - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4u^2\omega_3 + \frac{1}{2}\omega_1u + \frac{1}{4}\omega_4\omega_1c_s^2 - \frac{1}{2}\omega_2v + \frac{1}{4}\omega_4\omega_3v^2 - \frac{1}{4}\omega_4\omega_3 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4v^2 - \frac{1}{2}u^2\omega_3 - \frac{1}{4}\omega_4\omega_1u - \frac{1}{4}\omega_1\omega_2u - \frac{1}{2}\omega_4c_s^2 - \frac{1}{2}c_s^2\omega_3 + \frac{1}{2}\omega_3 + \frac{1}{4}\omega_2\omega_3v,$$

$$\alpha_{x-\delta_l,y}^{[\mu_1],t-\delta_t} = -1 - \frac{1}{2}\omega_4c_s^2\omega_3 + \frac{1}{2}\omega_1 - \frac{1}{2}\omega_4\omega_1v^2 + \frac{1}{2}\omega_1u\omega_3 - \frac{1}{2}\omega_1u - \frac{1}{2}\omega_4\omega_1c_s^2 - \frac{1}{2}\omega_4\omega_3v^2 + \omega_4v^2 + \frac{1}{2}u^2\omega_3 - \frac{1}{2}\omega_1u^2\omega_3 + \omega_4c_s^2 + \frac{1}{2}c_s^2\omega_3 + \frac{1}{2}\omega_3 - \frac{1}{2}\omega_1c_s^2\omega_3,$$

$$\alpha_{x,y}^{[\mu_1],t-\delta_t} = -2 - \omega_4\omega_2 + \omega_4 + \omega_1 + \omega_2 - \omega_4v^2 - u^2\omega_3 + \omega_4c_s^2\omega_2 + \omega_1u^2\omega_3 - \omega_4c_s^2 + \omega_4\omega_2v^2 - c_s^2\omega_3 + \omega_3 + \omega_1c_s^2\omega_3 - \omega_1\omega_3,$$

$$\alpha_{x+\delta_l,y}^{[\mu_1],t-\delta_t} = -1 - \frac{1}{2}\omega_4c_s^2\omega_3 + \frac{1}{2}\omega_1 - \frac{1}{2}\omega_4\omega_1v^2 - \frac{1}{2}\omega_1u\omega_3 + \frac{1}{2}\omega_1u - \frac{1}{2}\omega_4\omega_1c_s^2 - \frac{1}{2}\omega_4\omega_3v^2 + \omega_4v^2 + \frac{1}{2}u^2\omega_3 - \frac{1}{2}\omega_1u^2\omega_3 + \omega_4c_s^2 + \frac{1}{2}c_s^2\omega_3 + \frac{1}{2}\omega_3 - \frac{1}{2}\omega_1c_s^2\omega_3,$$

$$\alpha_{x-\delta_l,y+\delta_l}^{[\mu_1],t-\delta_t} = -1 + \frac{1}{2}\omega_4c_s^2\omega_3 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1v^2 + \frac{1}{4}c_s^2\omega_2\omega_3 + \frac{1}{4}\omega_2u^2\omega_3 - \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_1\omega_2v - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4u^2\omega_3 - \frac{1}{2}\omega_1u + \frac{1}{4}\omega_4\omega_1c_s^2 + \frac{1}{2}\omega_2v + \frac{1}{4}\omega_4\omega_3v^2 - \frac{1}{4}\omega_4\omega_3 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4v^2 - \frac{1}{2}u^2\omega_3 + \frac{1}{4}\omega_4\omega_1u + \frac{1}{4}\omega_1\omega_2u - \frac{1}{2}\omega_4c_s^2 - \frac{1}{2}c_s^2\omega_3 + \frac{1}{2}\omega_3 - \frac{1}{4}\omega_2\omega_3v,$$



$$\begin{aligned}
& \frac{1}{2}\omega_4 c_s^2 \omega_2 + \frac{1}{4}\omega_4 \omega_1 u + \frac{1}{2}\omega_4 \omega_2 v + \frac{1}{2}\omega_1 u^2 \omega_3 + \frac{1}{4}\omega_1 \omega_2 u - \frac{1}{2}\omega_4 c_s^2 - \frac{1}{4}\omega_4 \omega_1 c_s^2 \omega_2 + \frac{1}{2}\omega_4 \omega_2 v^2 - \frac{1}{4}\omega_4 c_s^2 \omega_2 \omega_3 - \\
& \frac{1}{2}c_s^2 \omega_3 - \frac{1}{4}\omega_4 \omega_1 \omega_2 v - \frac{1}{2}\omega_3 - \frac{1}{4}\omega_4 \omega_1 u \omega_3 + \frac{1}{4}\omega_2 \omega_3 v + \frac{1}{2}\omega_1 c_s^2 \omega_3 - \frac{1}{4}\omega_1 \omega_2 u \omega_3, \\
\alpha_{x,y-\delta_l}^{[\mu_1],t-3\delta_t} &= -1 - \frac{1}{2}\omega_4 c_s^2 \omega_3 - \frac{1}{2}\omega_4 \omega_1 c_s^2 \omega_2 \omega_3 - \frac{1}{2}\omega_2 \omega_3 + \frac{1}{2}\omega_4 \omega_2 \omega_3 v^2 + \frac{1}{2}\omega_1 \omega_2 \omega_3 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_4 \omega_1 \omega_3 + \omega_1 - \\
& \frac{1}{2}\omega_4 \omega_1 v^2 - \frac{1}{2}\omega_1 \omega_2 + \frac{1}{2}\omega_1 \omega_2 v - \frac{1}{2}\omega_4 \omega_1 + \frac{1}{2}\omega_4 \omega_1 c_s^2 \omega_3 - \frac{1}{2}\omega_4 \omega_2 \omega_3 v - \frac{1}{2}\omega_4 \omega_1 c_s^2 - \frac{1}{2}\omega_2 v - \frac{1}{2}\omega_4 \omega_3 v^2 - \\
& \frac{1}{2}\omega_4 \omega_3 + \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4 v^2 + \frac{1}{2}\omega_4 \omega_1 \omega_2 v^2 - \frac{1}{2}\omega_4 c_s^2 \omega_2 + \frac{1}{2}\omega_4 \omega_1 \omega_2 \omega_3 v + \frac{1}{2}\omega_4 \omega_2 v - \frac{1}{2}\omega_1 \omega_2 \omega_3 v + \frac{1}{2}\omega_4 c_s^2 + \\
& \frac{1}{2}\omega_4 \omega_1 c_s^2 \omega_2 - \frac{1}{2}\omega_4 \omega_2 v^2 + \frac{1}{2}\omega_4 c_s^2 \omega_2 \omega_3 - \frac{1}{2}\omega_4 \omega_1 \omega_2 v + \omega_3 - \frac{1}{2}\omega_4 \omega_1 \omega_2 \omega_3 v^2 + \frac{1}{2}\omega_2 \omega_3 v + \frac{1}{2}\omega_4 \omega_1 \omega_3 v^2 - \omega_1 \omega_3, \\
\alpha_{x-\delta_l,y}^{[\mu_1],t-3\delta_t} &= -1 - \frac{1}{2}\omega_4 c_s^2 \omega_3 - \frac{1}{2}\omega_4 \omega_1 \omega_2 u^2 \omega_3 - \frac{1}{2}\omega_4 \omega_1 c_s^2 \omega_2 \omega_3 - \frac{1}{2}\omega_2 \omega_3 + \frac{1}{2}\omega_1 c_s^2 \omega_2 \omega_3 + \frac{1}{2}\omega_1 \omega_2 u^2 \omega_3 - \omega_4 \omega_2 + \\
& \omega_4 - \frac{1}{2}\omega_4 \omega_1 \omega_2 u + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_4 \omega_1 u^2 \omega_3 - \frac{1}{2}c_s^2 \omega_2 \omega_3 - \frac{1}{2}\omega_2 u^2 \omega_3 + \frac{1}{2}\omega_1 u \omega_3 - \frac{1}{2}\omega_1 \omega_2 - \frac{1}{2}\omega_4 \omega_1 - \frac{1}{2}\omega_4 u^2 \omega_3 + \\
& \frac{1}{2}\omega_4 \omega_1 c_s^2 \omega_3 - \frac{1}{2}\omega_1 u - \frac{1}{2}\omega_4 \omega_3 + \omega_2 + \frac{1}{2}\omega_4 \omega_1 \omega_2 + \frac{1}{2}u^2 \omega_3 + \frac{1}{2}\omega_4 \omega_1 u - \frac{1}{2}\omega_1 u^2 \omega_3 + \frac{1}{2}\omega_1 \omega_2 u + \frac{1}{2}\omega_4 c_s^2 \omega_2 \omega_3 + \\
& \frac{1}{2}c_s^2 \omega_3 + \frac{1}{2}\omega_4 \omega_2 u^2 \omega_3 + \frac{1}{2}\omega_4 \omega_2 \omega_3 + \frac{1}{2}\omega_3 - \frac{1}{2}\omega_4 \omega_1 u \omega_3 + \frac{1}{2}\omega_4 \omega_1 \omega_2 u \omega_3 - \frac{1}{2}\omega_1 c_s^2 \omega_3 - \frac{1}{2}\omega_1 \omega_2 u \omega_3, \\
\alpha_{x,y}^{[\mu_1],t-3\delta_t} &= -1 + 2\omega_4 c_s^2 \omega_3 + \omega_4 \omega_1 \omega_2 u^2 \omega_3 + 2\omega_4 \omega_1 c_s^2 \omega_2 \omega_3 - \omega_2 \omega_3 - \omega_1 c_s^2 \omega_2 \omega_3 - \omega_1 \omega_2 u^2 \omega_3 - \omega_4 \omega_2 \omega_3 v^2 + \omega_1 \omega_2 \omega_3 - \omega_4 \omega_2 + \\
& \omega_4 + \omega_4 \omega_1 \omega_3 + \omega_1 + \omega_4 \omega_1 v^2 - \omega_4 \omega_1 u^2 \omega_3 + c_s^2 \omega_2 \omega_3 + \omega_2 u^2 \omega_3 - \omega_1 \omega_2 - \omega_4 \omega_1 + \omega_4 u^2 \omega_3 - 2\omega_4 \omega_1 c_s^2 \omega_3 + \omega_4 \omega_1 c_s^2 + \\
& \omega_4 \omega_3 v^2 - \omega_4 \omega_3 + \omega_2 - \omega_4 v^2 + \omega_4 \omega_1 \omega_2 - u^2 \omega_3 - \omega_4 \omega_1 \omega_2 v^2 + \omega_4 c_s^2 \omega_2 - \omega_4 \omega_1 \omega_2 \omega_3 + \omega_1 u^2 \omega_3 - \omega_4 c_s^2 - \omega_4 \omega_1 c_s^2 \omega_2 + \\
& \omega_4 \omega_2 v^2 - 2\omega_4 c_s^2 \omega_2 \omega_3 - c_s^2 \omega_3 - \omega_4 \omega_2 \omega_3 + \omega_3 + \omega_4 \omega_1 \omega_2 \omega_3 v^2 - \omega_4 \omega_1 \omega_3 v^2 + \omega_1 c_s^2 \omega_3 - \omega_1 \omega_3, \\
\alpha_{x+\delta_l,y}^{[\mu_1],t-3\delta_t} &= -1 - \frac{1}{2}\omega_4 c_s^2 \omega_3 - \frac{1}{2}\omega_4 \omega_1 \omega_2 u^2 \omega_3 - \frac{1}{2}\omega_4 \omega_1 c_s^2 \omega_2 \omega_3 - \frac{1}{2}\omega_2 \omega_3 + \frac{1}{2}\omega_1 c_s^2 \omega_2 \omega_3 + \frac{1}{2}\omega_1 \omega_2 u^2 \omega_3 - \omega_4 \omega_2 + \\
& \omega_4 + \frac{1}{2}\omega_4 \omega_1 \omega_2 u + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_4 \omega_1 u^2 \omega_3 - \frac{1}{2}c_s^2 \omega_2 \omega_3 - \frac{1}{2}\omega_2 u^2 \omega_3 - \frac{1}{2}\omega_1 u \omega_3 - \frac{1}{2}\omega_1 \omega_2 - \frac{1}{2}\omega_4 \omega_1 - \frac{1}{2}\omega_4 u^2 \omega_3 + \\
& \frac{1}{2}\omega_4 \omega_1 c_s^2 \omega_3 + \frac{1}{2}\omega_1 u - \frac{1}{2}\omega_4 \omega_3 + \omega_2 + \frac{1}{2}\omega_4 \omega_1 \omega_2 + \frac{1}{2}u^2 \omega_3 - \frac{1}{2}\omega_4 \omega_1 u - \frac{1}{2}\omega_1 u^2 \omega_3 - \frac{1}{2}\omega_1 \omega_2 u + \frac{1}{2}\omega_4 c_s^2 \omega_2 \omega_3 + \\
& \frac{1}{2}c_s^2 \omega_3 + \frac{1}{2}\omega_4 \omega_2 u^2 \omega_3 + \frac{1}{2}\omega_4 \omega_2 \omega_3 + \frac{1}{2}\omega_3 + \frac{1}{2}\omega_4 \omega_1 u \omega_3 - \frac{1}{2}\omega_4 \omega_1 \omega_2 u \omega_3 - \frac{1}{2}\omega_1 c_s^2 \omega_3 + \frac{1}{2}\omega_1 \omega_2 u \omega_3, \\
\alpha_{x,y}^{[\mu_1],t-4\delta_t} &= 1 + \omega_2 \omega_3 - \omega_1 \omega_2 \omega_3 + \omega_4 \omega_2 - \omega_4 - \omega_4 \omega_1 \omega_3 - \omega_1 + \omega_1 \omega_2 + \omega_4 \omega_1 + \omega_4 \omega_3 - \omega_2 - \omega_4 \omega_1 \omega_2 + \\
& \omega_4 \omega_1 \omega_2 \omega_3 - \omega_4 \omega_2 \omega_3 - \omega_3 + \omega_1 \omega_3,
\end{aligned}$$

### 3.3 EFDE for $\mu_2$

$$\mu_{2,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_2],t-\ell\delta_t} \mu_{2,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x-\delta_l,y}^{[\mu_1],t} = 1 - \frac{1}{2}\omega_1 + \frac{1}{2}\omega_1 u + \frac{1}{2}u^2 \omega_3 + \frac{1}{2}c_s^2 \omega_3 - \frac{1}{2}\omega_3.$$

$$\alpha_{x+\delta_l,y}^{[\mu_1],t} = -1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_1 u - \frac{1}{2}u^2 \omega_3 - \frac{1}{2}c_s^2 \omega_3 + \frac{1}{2}\omega_3.$$

$$\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} = -1 + \frac{1}{4}\omega_4 c_s^2 \omega_3 - \frac{1}{4}\omega_2 \omega_3 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4 \omega_1 v^2 - \frac{1}{4}\omega_1 \omega_2 + \frac{1}{4}\omega_1 \omega_2 v - \frac{1}{4}\omega_4 \omega_1 + \frac{1}{4}\omega_4 \omega_1 c_s^2 - \\
& \frac{1}{2}\omega_2 v + \frac{1}{4}\omega_4 \omega_3 v^2 - \frac{1}{4}\omega_4 \omega_3 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4 v^2 - \frac{1}{2}\omega_4 c_s^2 + \frac{1}{2}\omega_3 + \frac{1}{4}\omega_2 \omega_3 v,$$

$$\alpha_{x-\delta_l,y-\delta_l}^{[\mu_2],t-\delta_t} = 1 + \frac{1}{4}\omega_2 \omega_3 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_1 \omega_2 + \frac{1}{4}\omega_4 \omega_1 + \frac{1}{4}\omega_4 \omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3,$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_2],t-\delta_t} &= 1 + \frac{1}{2}\omega_4\omega_2 - \frac{3}{2}\omega_4 + \frac{1}{2}\omega_4^2 - \frac{1}{2}\omega_2, \\
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= 1 - \frac{1}{4}\omega_4c_s^2\omega_3 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 - \frac{1}{4}\omega_4\omega_1v^2 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_1\omega_2v + \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_4\omega_1c_s^2 + \frac{1}{2}\omega_2v - \\
&\quad \frac{1}{4}\omega_4\omega_3v^2 + \frac{1}{4}\omega_4\omega_3 - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4v^2 + \frac{1}{2}\omega_4c_s^2 - \frac{1}{2}\omega_3 - \frac{1}{4}\omega_2\omega_3v, \\
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_2],t-\delta_t} &= 1 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3, \\
\alpha_{x-\delta_l,y}^{[\mu_1],t-\delta_t} &= -1 - \frac{1}{2}\omega_4c_s^2\omega_3 + \frac{1}{2}\omega_1 - \frac{1}{2}\omega_4\omega_1v^2 - \frac{1}{2}\omega_4\omega_1c_s^2 - \frac{1}{2}\omega_4\omega_3v^2 + \omega_4v^2 + u^2\omega_3 - \frac{1}{2}\omega_1u^2\omega_3 - \frac{1}{2}c_s^2\omega_3^2 + \\
&\quad \omega_4c_s^2 + c_s^2\omega_3 + \frac{1}{2}\omega_3 - \frac{1}{2}\omega_1c_s^2\omega_3 - \frac{1}{2}u^2\omega_3^2, \\
\alpha_{x-\delta_l,y}^{[\mu_2],t-\delta_t} &= 1 - \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3^2 - \frac{3}{2}\omega_3 + \frac{1}{2}\omega_1\omega_3, \\
\alpha_{x,y}^{[\mu_1],t-\delta_t} &= \omega_1u - \omega_1^2u, \\
\alpha_{x,y}^{[\mu_2],t-\delta_t} &= 2 - 2\omega_1 - 2\omega_2 + \omega_1^2 + \omega_2^2, \\
\alpha_{x+\delta_l,y}^{[\mu_1],t-\delta_t} &= 1 + \frac{1}{2}\omega_4c_s^2\omega_3 - \frac{1}{2}\omega_1 + \frac{1}{2}\omega_4\omega_1v^2 + \frac{1}{2}\omega_4\omega_1c_s^2 + \frac{1}{2}\omega_4\omega_3v^2 - \omega_4v^2 - u^2\omega_3 + \frac{1}{2}\omega_1u^2\omega_3 + \frac{1}{2}c_s^2\omega_3^2 - \\
&\quad \omega_4c_s^2 - c_s^2\omega_3 - \frac{1}{2}\omega_3 + \frac{1}{2}\omega_1c_s^2\omega_3 + \frac{1}{2}u^2\omega_3^2, \\
\alpha_{x+\delta_l,y}^{[\mu_2],t-\delta_t} &= 1 - \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3^2 - \frac{3}{2}\omega_3 + \frac{1}{2}\omega_1\omega_3, \\
\alpha_{x-\delta_l,y+\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{4}\omega_4c_s^2\omega_3 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1v^2 - \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_1\omega_2v - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_1c_s^2 + \\
&\quad \frac{1}{2}\omega_2v + \frac{1}{4}\omega_4\omega_3v^2 - \frac{1}{4}\omega_4\omega_3 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4v^2 - \frac{1}{2}\omega_4c_s^2 + \frac{1}{2}\omega_3 - \frac{1}{4}\omega_2\omega_3v, \\
\alpha_{x-\delta_l,y+\delta_l}^{[\mu_2],t-\delta_t} &= 1 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3, \\
\alpha_{x+\delta_l,y+\delta_l}^{[\mu_1],t-\delta_t} &= 1 - \frac{1}{4}\omega_4c_s^2\omega_3 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 - \frac{1}{4}\omega_4\omega_1v^2 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_1\omega_2v + \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_4\omega_1c_s^2 - \frac{1}{2}\omega_2v - \\
&\quad \frac{1}{4}\omega_4\omega_3v^2 + \frac{1}{4}\omega_4\omega_3 - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4v^2 + \frac{1}{2}\omega_4c_s^2 - \frac{1}{2}\omega_3 + \frac{1}{4}\omega_2\omega_3v, \\
\alpha_{x+\delta_l,y+\delta_l}^{[\mu_2],t-\delta_t} &= 1 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3, \\
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-2\delta_t} &= 1 + \frac{3}{2}\omega_4c_s^2\omega_3 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{4}\omega_1c_s^2\omega_2\omega_3 - \frac{1}{4}\omega_1\omega_2u^2\omega_3 - \frac{1}{4}\omega_4\omega_2\omega_3v^2 - \frac{1}{2}\omega_4 - \frac{1}{4}\omega_4u^2\omega_3^2 - \frac{1}{4}\omega_4\omega_1\omega_2u - \\
&\quad \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1v^2 - \frac{1}{4}\omega_2u^2\omega_3^2 - \frac{1}{4}c_s^2\omega_2\omega_3^2 - \frac{1}{4}\omega_4\omega_1u^2\omega_3 + \frac{3}{4}c_s^2\omega_2\omega_3 + \frac{3}{4}\omega_2u^2\omega_3 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_1\omega_2v + \\
&\quad \frac{1}{4}\omega_4\omega_1 + \frac{5}{4}\omega_4u^2\omega_3 - \frac{1}{4}\omega_4^2\omega_1u - \frac{1}{4}\omega_4\omega_1c_s^2\omega_3 - \frac{1}{2}\omega_1u + \frac{1}{4}\omega_4\omega_2\omega_3v + \frac{1}{4}\omega_4\omega_1c_s^2 - \frac{1}{4}\omega_4c_s^2\omega_3^2 + \frac{1}{2}\omega_2v + \\
&\quad \frac{1}{4}\omega_4\omega_3v^2 + \frac{1}{4}\omega_4\omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4v^2 - \frac{1}{4}\omega_4^2u^2\omega_3 - \frac{3}{2}u^2\omega_3 - \frac{1}{4}\omega_4\omega_1\omega_2v^2 + \frac{1}{2}\omega_4c_s^2\omega_2 + \frac{3}{4}\omega_4\omega_1u - \frac{1}{2}\omega_4\omega_2v + \\
&\quad \frac{1}{2}\omega_1u^2\omega_3 + \frac{1}{2}c_s^2\omega_3^2 + \frac{1}{4}\omega_1\omega_2u - \frac{1}{2}\omega_4c_s^2 - \frac{1}{4}\omega_4\omega_1c_s^2\omega_2 + \frac{1}{2}\omega_4\omega_2v^2 - \frac{1}{2}\omega_4c_s^2\omega_2\omega_3 - \frac{3}{2}c_s^2\omega_3 - \frac{1}{4}\omega_4\omega_2u^2\omega_3 - \\
&\quad \frac{1}{4}\omega_4^2c_s^2\omega_3 + \frac{1}{4}\omega_4\omega_1\omega_2v - \frac{1}{2}\omega_3 - \frac{1}{4}\omega_2\omega_3v + \frac{1}{2}\omega_1c_s^2\omega_3 + \frac{1}{2}u^2\omega_3^2, \\
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_2],t-2\delta_t} &= -2 - \omega_2\omega_3 + \frac{1}{4}\omega_1\omega_2\omega_3 - \frac{1}{2}\omega_4\omega_2 + 2\omega_4 + \frac{1}{4}\omega_4\omega_1\omega_3 + \omega_1 - \frac{1}{2}\omega_1\omega_2 - \omega_4\omega_1 - \frac{1}{2}\omega_3^2 + \frac{1}{4}\omega_2\omega_3^2 + \\
&\quad \frac{1}{2}\omega_4^2 - \frac{3}{2}\omega_4\omega_3 + \omega_2 + \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_4^2\omega_1 + \frac{1}{4}\omega_4\omega_2\omega_3 + 2\omega_3 - \frac{1}{2}\omega_1\omega_3 + \frac{1}{4}\omega_4\omega_3^2, \\
\alpha_{x,y-\delta_l}^{[\mu_1],t-2\delta_t} &= -\frac{1}{2}\omega_4\omega_1^2u + \omega_1u\omega_3 - 2\omega_1u - \frac{1}{2}\omega_1^2\omega_2u + \omega_1^2u + \omega_4\omega_1u + \omega_1\omega_2u - \frac{1}{2}\omega_4\omega_1u\omega_3 - \frac{1}{2}\omega_1\omega_2u\omega_3, \\
\alpha_{x,y-\delta_l}^{[\mu_2],t-2\delta_t} &= \\
&-2 - \frac{1}{2}\omega_2\omega_3 + \frac{1}{2}\omega_1\omega_2\omega_3 + \omega_4 + \frac{1}{2}\omega_4\omega_1^2 + \frac{1}{2}\omega_4\omega_1\omega_3 + 3\omega_1 - \frac{3}{2}\omega_1\omega_2 - \frac{3}{2}\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_3 + \omega_2 + \frac{1}{2}\omega_1^2\omega_2 - \omega_1^2 + \omega_3 - \omega_1\omega_3, \\
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-2\delta_t} &= -1 - \frac{3}{2}\omega_4c_s^2\omega_3 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{4}\omega_1c_s^2\omega_2\omega_3 + \frac{1}{4}\omega_1\omega_2u^2\omega_3 + \frac{1}{4}\omega_4\omega_2\omega_3v^2 + \frac{1}{2}\omega_4 + \frac{1}{4}\omega_4u^2\omega_3^2 - \\
&\quad \frac{1}{4}\omega_4\omega_1\omega_2u + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_4\omega_1v^2 + \frac{1}{4}\omega_2u^2\omega_3^2 + \frac{1}{4}c_s^2\omega_2\omega_3^2 + \frac{1}{4}\omega_4\omega_1u^2\omega_3 - \frac{3}{4}c_s^2\omega_2\omega_3 - \frac{3}{4}\omega_2u^2\omega_3 - \frac{1}{4}\omega_1\omega_2 + \\
&\quad \frac{1}{4}\omega_1\omega_2v - \frac{1}{4}\omega_4\omega_1 - \frac{5}{4}\omega_4u^2\omega_3 - \frac{1}{4}\omega_4^2\omega_1u + \frac{1}{4}\omega_4\omega_1c_s^2\omega_3 - \frac{1}{2}\omega_1u - \frac{1}{4}\omega_4\omega_2\omega_3v - \frac{1}{4}\omega_4\omega_1c_s^2 + \frac{1}{4}\omega_4c_s^2\omega_3^2 - \\
&\quad \frac{1}{2}\omega_2v - \frac{1}{4}\omega_4\omega_3v^2 - \frac{1}{4}\omega_4\omega_3 + \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4v^2 + \frac{1}{4}\omega_4^2u^2\omega_3 + \frac{3}{2}u^2\omega_3 + \frac{1}{4}\omega_4\omega_1\omega_2v^2 - \frac{1}{2}\omega_4c_s^2\omega_2 + \frac{3}{4}\omega_4\omega_1u +
\end{aligned}$$



### 3.4 EFDE for $\mu_3$

$$\mu_{3,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_t, y+j\delta_t}^{[\mu_1], t-\ell\delta_t} \mu_{x+i\delta_t, y+j\delta_t}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_t, y+j\delta_t}^{[\mu_3], t-\ell\delta_t} \mu_{3,x+i\delta_t, y+j\delta_t}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x,y-\delta_t}^{[\mu_1],t} = 1 - \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2v - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4v^2 + \frac{1}{2}\omega_4c_s^2.$$

$$\alpha_{x,y+\delta_t}^{[\mu_1],t} = -1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2v + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4v^2 - \frac{1}{2}\omega_4c_s^2.$$

$$\alpha_{x-\delta_t, y-\delta_t}^{[\mu_1], t-\delta_t} = -1 + \frac{1}{4}\omega_4c_s^2\omega_3 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{4}c_s^2\omega_2\omega_3 + \frac{1}{4}\omega_2u^2\omega_3 - \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4u^2\omega_3 - \frac{1}{2}\omega_1u - \frac{1}{4}\omega_4\omega_3 + \frac{1}{2}\omega_2 - \frac{1}{2}u^2\omega_3 + \frac{1}{4}\omega_4\omega_1u + \frac{1}{4}\omega_1\omega_2u - \frac{1}{2}c_s^2\omega_3 + \frac{1}{2}\omega_3,$$

$$\alpha_{x-\delta_t, y-\delta_t}^{[\mu_3], t-\delta_t} = 1 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3,$$

$$\alpha_{x,y-\delta_t}^{[\mu_1], t-\delta_t} = -1 - \frac{1}{2}\omega_4c_s^2\omega_3 + \frac{1}{2}\omega_4 - \frac{1}{2}\omega_4^2c_s^2 - \frac{1}{2}c_s^2\omega_2\omega_3 - \frac{1}{2}\omega_2u^2\omega_3 - \frac{1}{2}\omega_4u^2\omega_3 - \frac{1}{2}\omega_4^2v^2 + \frac{1}{2}\omega_2 + \omega_4v^2 + u^2\omega_3 - \frac{1}{2}\omega_4c_s^2\omega_2 + \omega_4c_s^2 - \frac{1}{2}\omega_4\omega_2v^2 + c_s^2\omega_3,$$

$$\alpha_{x,y-\delta_t}^{[\mu_3], t-\delta_t} = 1 + \frac{1}{2}\omega_4\omega_2 - \frac{3}{2}\omega_4 + \frac{1}{2}\omega_4^2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x+\delta_t, y-\delta_t}^{[\mu_1], t-\delta_t} = -1 + \frac{1}{4}\omega_4c_s^2\omega_3 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{4}c_s^2\omega_2\omega_3 + \frac{1}{4}\omega_2u^2\omega_3 - \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4u^2\omega_3 + \frac{1}{2}\omega_1u - \frac{1}{4}\omega_4\omega_3 + \frac{1}{2}\omega_2 - \frac{1}{2}u^2\omega_3 - \frac{1}{4}\omega_4\omega_1u - \frac{1}{4}\omega_1\omega_2u - \frac{1}{2}c_s^2\omega_3 + \frac{1}{2}\omega_3,$$

$$\alpha_{x+\delta_t, y-\delta_t}^{[\mu_3], t-\delta_t} = 1 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3,$$

$$\alpha_{x-\delta_t, y}^{[\mu_1], t-\delta_t} = 1 - \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3^2 - \frac{3}{2}\omega_3 + \frac{1}{2}\omega_1\omega_3,$$

$$\alpha_{x,y}^{[\mu_1], t-\delta_t} = \omega_2v - \omega_2^2v,$$

$$\alpha_{x,y}^{[\mu_3], t-\delta_t} = 2 - 2\omega_1 - 2\omega_2 + \omega_1^2 + \omega_2^2,$$

$$\alpha_{x+\delta_t, y}^{[\mu_1], t-\delta_t} = 1 - \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3^2 - \frac{3}{2}\omega_3 + \frac{1}{2}\omega_1\omega_3,$$

$$\alpha_{x-\delta_t, y+\delta_t}^{[\mu_1], t-\delta_t} = 1 - \frac{1}{4}\omega_4c_s^2\omega_3 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 - \frac{1}{4}c_s^2\omega_2\omega_3 - \frac{1}{4}\omega_2u^2\omega_3 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_4u^2\omega_3 + \frac{1}{2}\omega_1u + \frac{1}{4}\omega_4\omega_3 - \frac{1}{2}\omega_2 + \frac{1}{2}u^2\omega_3 - \frac{1}{4}\omega_4\omega_1u - \frac{1}{4}\omega_1\omega_2u + \frac{1}{2}c_s^2\omega_3 - \frac{1}{2}\omega_3,$$

$$\alpha_{x-\delta_t, y+\delta_t}^{[\mu_3], t-\delta_t} = 1 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3,$$

$$\alpha_{x,y+\delta_t}^{[\mu_1], t-\delta_t} = 1 + \frac{1}{2}\omega_4c_s^2\omega_3 - \frac{1}{2}\omega_4 + \frac{1}{2}\omega_4^2c_s^2 + \frac{1}{2}c_s^2\omega_2\omega_3 + \frac{1}{2}\omega_2u^2\omega_3 + \frac{1}{2}\omega_4u^2\omega_3 + \frac{1}{2}\omega_4^2v^2 - \frac{1}{2}\omega_2 - \omega_4v^2 - u^2\omega_3 + \frac{1}{2}\omega_4c_s^2\omega_2 - \omega_4c_s^2 + \frac{1}{2}\omega_4\omega_2v^2 - c_s^2\omega_3,$$

$$\alpha_{x,y+\delta_t}^{[\mu_3], t-\delta_t} = 1 + \frac{1}{2}\omega_4\omega_2 - \frac{3}{2}\omega_4 + \frac{1}{2}\omega_4^2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x+\delta_t, y+\delta_t}^{[\mu_1], t-\delta_t} = 1 - \frac{1}{4}\omega_4c_s^2\omega_3 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 - \frac{1}{4}c_s^2\omega_2\omega_3 - \frac{1}{4}\omega_2u^2\omega_3 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_4u^2\omega_3 - \frac{1}{2}\omega_1u + \frac{1}{4}\omega_4\omega_3 - \frac{1}{2}\omega_2 + \frac{1}{2}u^2\omega_3 + \frac{1}{4}\omega_4\omega_1u + \frac{1}{4}\omega_1\omega_2u + \frac{1}{2}c_s^2\omega_3 - \frac{1}{2}\omega_3,$$

$$\alpha_{x+\delta_t, y+\delta_t}^{[\mu_3], t-\delta_t} = 1 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3,$$

$$\alpha_{x-\delta_t, y-\delta_t}^{[\mu_1], t-2\delta_t} = 1 + \frac{3}{2}\omega_4c_s^2\omega_3 - \frac{1}{4}\omega_2\omega_3^2v + \frac{1}{4}\omega_2\omega_3 - \frac{1}{4}\omega_1c_s^2\omega_2\omega_3 - \frac{1}{4}\omega_1\omega_2u^2\omega_3 - \frac{1}{4}\omega_4\omega_2\omega_3v^2 - \frac{1}{2}\omega_4 + \frac{1}{2}\omega_4^2c_s^2 - \frac{1}{2}\omega_1 + \frac{3}{4}\omega_4\omega_1v^2 - \frac{1}{4}\omega_4\omega_1u^2\omega_3 - \frac{1}{4}\omega_4^2\omega_3v^2 + \frac{1}{4}c_s^2\omega_2\omega_3 + \frac{1}{4}\omega_2u^2\omega_3 - \frac{1}{2}\omega_1u\omega_3 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_1\omega_2v + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4u^2\omega_3 - \frac{1}{4}\omega_4\omega_3v^2 - \frac{1}{2}\omega_4\omega_1c_s^2\omega_3 + \frac{1}{2}\omega_1u + \frac{1}{2}\omega_4^2v^2 + \frac{3}{4}\omega_4\omega_1c_s^2 - \frac{1}{4}\omega_4c_s^2\omega_3^2 - \frac{1}{2}\omega_2v + \frac{5}{4}\omega_4\omega_3v^2 +$$





$$\begin{aligned}
& \frac{1}{2}\omega_1^2\omega_2 - \frac{1}{2}\omega_4^2\omega_1 + \omega_1^2 - \frac{1}{2}\omega_4\omega_2\omega_3 + \frac{1}{2}\omega_4\omega_1^2\omega_3 - 4\omega_3 + \frac{1}{2}\omega_1^2\omega_2\omega_3 + 5\omega_1\omega_3 - \frac{1}{2}\omega_4\omega_3^2 + \frac{1}{2}\omega_4^2\omega_1\omega_3, \\
\alpha_{x,y}^{[\mu_1],t-4\delta_t} &= -\omega_2\omega_3^2v + \omega_4\omega_1^2\omega_2v + \omega_1^2\omega_2\omega_3v - \omega_2^2\omega_3v - \omega_4\omega_1^2\omega_2\omega_3v + \omega_4\omega_1\omega_2^2v + \omega_4^2\omega_1\omega_2v - \omega_4\omega_1\omega_2\omega_3^2v - \omega_4\omega_2^2v + \\
& 5\omega_1\omega_2v + \omega_1\omega_2\omega_3^2v - \omega_4\omega_1\omega_2^2\omega_3v - 6\omega_4\omega_2\omega_3v + \omega_1\omega_2^2\omega_3v - 4\omega_2v - \omega_4^2\omega_2v + \omega_4\omega_2\omega_3^2v + \omega_2^2v - \omega_1^2\omega_2v - \\
& \omega_4^2\omega_1\omega_2\omega_3v + \omega_4\omega_2^2\omega_3v + 7\omega_4\omega_1\omega_2\omega_3v + 5\omega_4\omega_2v - 6\omega_1\omega_2\omega_3v - \omega_1\omega_2^2v - 6\omega_4\omega_1\omega_2v + 5\omega_2\omega_3v + \omega_4^2\omega_2\omega_3v, \\
\alpha_{x,y}^{[\mu_3],t-4\delta_t} &= -4 - \omega_4^2\omega_2\omega_3 - 6\omega_2\omega_3 + \omega_1^2\omega_3 + 7\omega_1\omega_2\omega_3 + \omega_1\omega_2^2 - 6\omega_4\omega_2 + 5\omega_4 + \omega_4\omega_1^2 - \omega_4\omega_2^2\omega_3 + \omega_4^2\omega_1\omega_2\omega_3 + \\
& 7\omega_4\omega_1\omega_3 + 5\omega_1 - \omega_4\omega_1\omega_3^2 + \omega_4\omega_1\omega_2^2\omega_3 - 6\omega_1\omega_2 - \omega_1\omega_2\omega_3^2 + \omega_4\omega_2^2 - \omega_4^2\omega_1\omega_2 - 6\omega_4\omega_1 - \omega_3^2 + \omega_4^2\omega_3 + \omega_4\omega_1^2\omega_2\omega_3 - \\
& \omega_4\omega_1^2\omega_2 + \omega_2\omega_3^2 + \omega_1\omega_3^2 - \omega_4^2 - 6\omega_4\omega_3 + 5\omega_2 + 7\omega_4\omega_1\omega_2 - 8\omega_4\omega_1\omega_2\omega_3 + \omega_1^2\omega_2 - \omega_4\omega_2\omega_3^2 + \omega_4^2\omega_1 - \omega_1^2 - \omega_2^2 + \\
& \omega_4^2\omega_2 - \omega_1\omega_2\omega_3 + 7\omega_4\omega_2\omega_3 - \omega_4\omega_1^2\omega_3 + 5\omega_3 + \omega_4\omega_1\omega_2\omega_3^2 - \omega_4\omega_1\omega_2^2 + \omega_2^2\omega_3 - \omega_1^2\omega_2\omega_3 - 6\omega_1\omega_3 + \omega_4\omega_3^2 - \omega_4^2\omega_1\omega_3,
\end{aligned}$$

### 3.5 EFDE for $\mu_4$

$$\mu_{4,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_4],t-\ell\delta_t} \mu_{4,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\begin{aligned}
\alpha_{x-\delta_l,y}^{[\mu_1],t} &= 1 - \frac{1}{2}\omega_1 + \frac{1}{2}\omega_1u + \frac{1}{2}u^2\omega_3 + \frac{1}{2}c_s^2\omega_3 - \frac{1}{2}\omega_3. \\
\alpha_{x+\delta_l,y}^{[\mu_1],t} &= 1 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_1u + \frac{1}{2}u^2\omega_3 + \frac{1}{2}c_s^2\omega_3 - \frac{1}{2}\omega_3. \\
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{4}\omega_4c_s^2\omega_3 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1v^2 - \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_1\omega_2v - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_1c_s^2 - \\
& \frac{1}{2}\omega_2v + \frac{1}{4}\omega_4\omega_3v^2 - \frac{1}{4}\omega_4\omega_3 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4v^2 - \frac{1}{2}\omega_4c_s^2 + \frac{1}{2}\omega_3 + \frac{1}{4}\omega_2\omega_3v, \\
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_4],t-\delta_t} &= 1 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3, \\
\alpha_{x,y-\delta_l}^{[\mu_4],t-\delta_t} &= 1 + \frac{1}{2}\omega_4\omega_2 - \frac{3}{2}\omega_4 + \frac{1}{2}\omega_4^2 - \frac{1}{2}\omega_2, \\
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{4}\omega_4c_s^2\omega_3 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1v^2 - \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_1\omega_2v - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_1c_s^2 - \\
& \frac{1}{2}\omega_2v + \frac{1}{4}\omega_4\omega_3v^2 - \frac{1}{4}\omega_4\omega_3 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4v^2 - \frac{1}{2}\omega_4c_s^2 + \frac{1}{2}\omega_3 + \frac{1}{4}\omega_2\omega_3v, \\
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_4],t-\delta_t} &= 1 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3, \\
\alpha_{x-\delta_l,y}^{[\mu_1],t-\delta_t} &= -1 - \frac{1}{2}\omega_4c_s^2\omega_3 + \frac{1}{2}\omega_1 - \frac{1}{2}\omega_4\omega_1v^2 - \frac{1}{2}\omega_4\omega_1c_s^2 - \frac{1}{2}\omega_4\omega_3v^2 + \omega_4v^2 + u^2\omega_3 - \frac{1}{2}\omega_1u^2\omega_3 - \frac{1}{2}c_s^2\omega_3^2 + \\
& \omega_4c_s^2 + c_s^2\omega_3 + \frac{1}{2}\omega_3 - \frac{1}{2}\omega_1c_s^2\omega_3 - \frac{1}{2}u^2\omega_3^2, \\
\alpha_{x-\delta_l,y}^{[\mu_4],t-\delta_t} &= 1 - \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3^2 - \frac{3}{2}\omega_3 + \frac{1}{2}\omega_1\omega_3, \\
\alpha_{x,y}^{[\mu_1],t-\delta_t} &= -2 + 3\omega_1 - u^2\omega_3 + \omega_1u^2\omega_3 - \omega_1^2 - c_s^2\omega_3 + \omega_3 + \omega_1c_s^2\omega_3 - \omega_1\omega_3, \\
\alpha_{x,y}^{[\mu_4],t-\delta_t} &= 2 - 2\omega_1 - 2\omega_2 + \omega_1^2 + \omega_2^2, \\
\alpha_{x+\delta_l,y}^{[\mu_1],t-\delta_t} &= -1 - \frac{1}{2}\omega_4c_s^2\omega_3 + \frac{1}{2}\omega_1 - \frac{1}{2}\omega_4\omega_1v^2 - \frac{1}{2}\omega_4\omega_1c_s^2 - \frac{1}{2}\omega_4\omega_3v^2 + \omega_4v^2 + u^2\omega_3 - \frac{1}{2}\omega_1u^2\omega_3 - \frac{1}{2}c_s^2\omega_3^2 + \\
& \omega_4c_s^2 + c_s^2\omega_3 + \frac{1}{2}\omega_3 - \frac{1}{2}\omega_1c_s^2\omega_3 - \frac{1}{2}u^2\omega_3^2, \\
\alpha_{x+\delta_l,y}^{[\mu_4],t-\delta_t} &= 1 - \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3^2 - \frac{3}{2}\omega_3 + \frac{1}{2}\omega_1\omega_3,
\end{aligned}$$

$$\alpha_{x-\delta_1, y+\delta_1}^{[\mu_1], t-\delta_t} = -1 + \frac{1}{4}\omega_4 c_s^2 \omega_3 - \frac{1}{4}\omega_2 \omega_3 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4 \omega_1 v^2 - \frac{1}{4}\omega_1 \omega_2 - \frac{1}{4}\omega_1 \omega_2 v - \frac{1}{4}\omega_4 \omega_1 + \frac{1}{4}\omega_4 \omega_1 c_s^2 + \frac{1}{2}\omega_2 v + \frac{1}{4}\omega_4 \omega_3 v^2 - \frac{1}{4}\omega_4 \omega_3 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4 v^2 - \frac{1}{2}\omega_4 c_s^2 + \frac{1}{2}\omega_3 - \frac{1}{4}\omega_2 \omega_3 v,$$

$$\alpha_{x-\delta_t, y+\delta_t}^{|\mu_4|, t-\delta_t} = 1 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3,$$

$$\alpha_{x,y+\delta_t}^{[\mu_4],t-\delta_t} = 1 + \frac{1}{2}\omega_4\omega_2 - \frac{3}{2}\omega_4 + \frac{1}{2}\omega_4^2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x+\delta_1 y+\delta_1}^{|\mu_1|, t-\delta_t} = -1 + \frac{1}{4}\omega_4 c_s^2 \omega_3 - \frac{1}{4}\omega_2 \omega_3 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4 \omega_1 v^2 - \frac{1}{4}\omega_1 \omega_2 - \frac{1}{4}\omega_1 \omega_2 v - \frac{1}{4}\omega_4 \omega_1 + \frac{1}{4}\omega_4 \omega_1 c_s^2 + \frac{1}{2}\omega_2 v + \frac{1}{4}\omega_4 \omega_3 v^2 - \frac{1}{4}\omega_4 \omega_3 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4 v^2 - \frac{1}{2}\omega_4 c_s^2 + \frac{1}{2}\omega_3 - \frac{1}{4}\omega_2 \omega_3 v,$$

$$\alpha_{x+\delta_t, y+\delta_t}^{|\mu_4|, t-\delta_t} = 1 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3,$$

$$\alpha_{x-\delta_1, y-\delta_1}^{[\mu_1], t-2\delta t} = 1 + \frac{3}{2}\omega_4 c_s^2 \omega_3 + \frac{1}{4}\omega_2 \omega_3 - \frac{1}{4}\omega_1 c_s^2 \omega_2 \omega_3 - \frac{1}{4}\omega_1 \omega_2 u^2 \omega_3 - \frac{1}{4}\omega_4 \omega_2 \omega_3 v^2 - \frac{1}{2}\omega_4 - \frac{1}{4}\omega_4 u^2 \omega_3^2 - \frac{1}{4}\omega_4 \omega_1 \omega_2 u - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4 \omega_1 v^2 - \frac{1}{4}\omega_2 u^2 \omega_3^2 - \frac{1}{4}c_s^2 \omega_2 \omega_3^2 - \frac{1}{4}\omega_4 \omega_1 u^2 \omega_3 + \frac{3}{4}c_s^2 \omega_2 \omega_3 + \frac{3}{4}\omega_2 u^2 \omega_3 + \frac{1}{4}\omega_1 \omega_2 - \frac{1}{4}\omega_1 \omega_2 v + \frac{1}{4}\omega_4 \omega_1 + \frac{5}{4}\omega_4 u^2 \omega_3 - \frac{1}{4}\omega_4^2 \omega_1 u - \frac{1}{4}\omega_4 \omega_1 c_s^2 \omega_3 - \frac{1}{2}\omega_1 u + \frac{1}{4}\omega_4 \omega_2 \omega_3 v + \frac{1}{4}\omega_4 \omega_1 c_s^2 - \frac{1}{4}\omega_4 c_s^2 \omega_3^2 + \frac{1}{2}\omega_2 v + \frac{1}{4}\omega_4 \omega_3 v^2 + \frac{1}{4}\omega_4 \omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4 v^2 - \frac{1}{4}\omega_4^2 u^2 \omega_3 - \frac{3}{2}\omega_2^2 \omega_3 - \frac{1}{4}\omega_4 \omega_1 \omega_2 v^2 + \frac{1}{2}\omega_4 c_s^2 \omega_2 + \frac{3}{4}\omega_4 \omega_1 u - \frac{1}{2}\omega_4 \omega_2 v + \frac{1}{2}\omega_1 u^2 \omega_3 + \frac{1}{2}c_s^2 \omega_3^2 + \frac{1}{4}\omega_1 \omega_2 u - \frac{1}{2}\omega_4 c_s^2 - \frac{1}{4}\omega_4 \omega_1 c_s^2 \omega_2 + \frac{1}{2}\omega_4 \omega_2 v^2 - \frac{1}{2}\omega_4 c_s^2 \omega_2 \omega_3 - \frac{3}{2}c_s^2 \omega_3 - \frac{1}{4}\omega_4 \omega_2 u^2 \omega_3 - \frac{1}{4}\omega_4^2 c_s^2 \omega_3 + \frac{1}{4}\omega_4 \omega_1 \omega_2 v - \frac{1}{2}\omega_3 - \frac{1}{4}\omega_2 \omega_3 v + \frac{1}{2}\omega_1 c_s^2 \omega_3 + \frac{1}{2}u^2 \omega_3^2,$$

$$\alpha_{x-\delta_1, y-\delta_1}^{[\mu_4], t-2\delta_t} = -2 - \omega_2\omega_3 + \frac{1}{4}\omega_1\omega_2\omega_3 - \frac{1}{2}\omega_4\omega_2 + 2\omega_4 + \frac{1}{4}\omega_4\omega_1\omega_3 + \omega_1 - \frac{1}{2}\omega_1\omega_2 - \omega_4\omega_1 - \frac{1}{2}\omega_3^2 + \frac{1}{4}\omega_4^2\omega_3 + \frac{1}{4}\omega_2\omega_3^2 - \frac{1}{2}\omega_4^2 - \frac{3}{2}\omega_4\omega_3 + \omega_2 + \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_4^2\omega_1 + \frac{1}{4}\omega_4\omega_2\omega_3 + 2\omega_3 - \frac{1}{2}\omega_1\omega_3 + \frac{1}{4}\omega_4\omega_3^2,$$

$$\begin{aligned} \alpha_{x,y-\delta_1}^{[\mu_1],t-2\delta_t} = & 2 - \frac{1}{2}\omega_4 c_s^2 \omega_3 + \frac{1}{2}\omega_2 \omega_3 - \frac{1}{2}\omega_1 \omega_2 \omega_3 - \omega_4 - \frac{1}{2}\omega_4 \omega_1^2 - \frac{1}{2}\omega_4 \omega_1 \omega_3 - 3\omega_1 - \frac{3}{2}\omega_4 \omega_1 v^2 + \frac{3}{2}\omega_1 \omega_2 - \\ & \frac{3}{2}\omega_1 \omega_2 v + \frac{3}{2}\omega_4 \omega_1 + \frac{1}{2}\omega_4 \omega_1 c_s^2 \omega_3 - \frac{3}{2}\omega_4 \omega_1 c_s^2 + \omega_2 v - \frac{1}{2}\omega_4 \omega_3 v^2 + \frac{1}{2}\omega_4 \omega_3 - \omega_2 + \omega_4 v^2 + \frac{1}{2}\omega_1^2 \omega_2 v + \\ & \frac{1}{2}\omega_4 \omega_1^2 c_s^2 - \frac{1}{2}\omega_1^2 \omega_2 + \frac{1}{2}\omega_1 \omega_2 \omega_3 v + \omega_1^2 + \omega_4 c_s^2 - \omega_3 + \frac{1}{2}\omega_4 \omega_1^2 v^2 - \frac{1}{2}\omega_2 \omega_3 v + \frac{1}{2}\omega_4 \omega_1 \omega_3 v^2 + \omega_1 \omega_3, \end{aligned}$$

$$\alpha_{x,y-\delta_l}^{[\mu_4],t-2\delta_t} = -2 - \frac{1}{2}\omega_2\omega_3 + \frac{1}{2}\omega_1\omega_2\omega_3 + \omega_4 + \frac{1}{2}\omega_4\omega_1^2 + \frac{1}{2}\omega_4\omega_1\omega_3 + 3\omega_1 - \frac{3}{2}\omega_1\omega_2 - \frac{3}{2}\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_3 + \omega_2 + \frac{1}{2}\omega_1^2\omega_2 - \omega_1^2 + \omega_3 - \omega_1\omega_3,$$

$$\alpha_{x+\delta_1, y-\delta_1}^{[\mu_1], t-2\delta_t} = 1 + \frac{3}{4}w_4c_s^2w_3 + \frac{1}{4}\omega_2w_3 - \frac{1}{4}\omega_1c_s^2\omega_2w_3 - \frac{1}{4}\omega_1w_2u^2w_3 - \frac{1}{4}\omega_4w_2w_3v^2 - \frac{1}{2}\omega_4 - \frac{1}{4}\omega_4u^2w_3^2 + \frac{1}{4}\omega_4\omega_1\omega_2u - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1v^2 - \frac{1}{4}\omega_2u^2w_3^2 - \frac{1}{4}c_s^2\omega_2w_3^2 - \frac{1}{4}\omega_4\omega_1u^2w_3 + \frac{3}{4}c_s^2\omega_2w_3 + \frac{3}{4}\omega_2u^2w_3 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_1\omega_2v + \frac{1}{4}\omega_4\omega_1 + \frac{5}{4}\omega_4u^2w_3 + \frac{1}{4}\omega_4^2\omega_1u - \frac{1}{4}\omega_4\omega_1c_s^2w_3 + \frac{1}{2}\omega_1u + \frac{1}{4}\omega_4\omega_2w_3v + \frac{1}{4}\omega_4\omega_1c_s^2 - \frac{1}{4}\omega_4c_s^2w_3^2 + \frac{1}{2}\omega_2v + \frac{1}{4}\omega_4\omega_3v^2 + \frac{1}{4}\omega_4w_3 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4v^2 - \frac{1}{4}\omega_4^2w_3^2 - \frac{3}{2}u^2w_3 - \frac{1}{4}\omega_4\omega_1w_2v^2 + \frac{1}{2}\omega_4c_s^2\omega_2 - \frac{3}{4}\omega_4\omega_1u - \frac{1}{2}\omega_4\omega_2v + \frac{1}{2}\omega_1u^2w_3 + \frac{1}{2}c_s^2\omega_3^2 - \frac{1}{4}\omega_1\omega_2u - \frac{1}{2}\omega_4c_s^2 - \frac{1}{4}\omega_4\omega_1c_s^2w_2 + \frac{1}{2}\omega_4\omega_2v^2 - \frac{1}{2}\omega_4c_s^2\omega_2w_3 - \frac{3}{2}c_s^2w_3 - \frac{1}{4}\omega_4\omega_2u^2w_3 - \frac{1}{4}\omega_4^2c_s^2w_3 + \frac{1}{4}\omega_4\omega_1\omega_2v - \frac{1}{2}\omega_3 - \frac{1}{4}\omega_2w_3v + \frac{1}{2}\omega_1c_s^2w_3 + \frac{1}{2}u^2w_3^2,$$

$$\alpha_{x+\delta_1, y-\delta_1}^{[\mu_4], t-2\delta_t} = -2 - \omega_2\omega_3 + \frac{1}{4}\omega_1\omega_2\omega_3 - \frac{1}{2}\omega_4\omega_2 + 2\omega_4 + \frac{1}{4}\omega_4\omega_1\omega_3 + \omega_1 - \frac{1}{2}\omega_1\omega_2 - \omega_4\omega_1 - \frac{1}{2}\omega_3^2 + \frac{1}{4}\omega_4^2\omega_3 + \frac{1}{4}\omega_2\omega_3^2 - \frac{1}{2}\omega_4^2 - \frac{3}{2}\omega_4\omega_3 + \omega_2 + \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_4^2\omega_1 + \frac{1}{4}\omega_4\omega_2\omega_3 + 2\omega_3 - \frac{1}{2}\omega_1\omega_3 + \frac{1}{4}\omega_4\omega_3^2,$$

$$\alpha_{x-\delta t, y}^{[\mu_1], t-2\delta t} = 1 - \frac{1}{2}\omega_4 c_s^2 \omega_3 + \frac{1}{2}\omega_2 \omega_3 + \frac{1}{2}\omega_4 \omega_2 \omega_3 v^2 + \omega_4 \omega_2 - \omega_4 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_4 \omega_1 v^2 + c_s^2 \omega_2 \omega_3 + \omega_2 u^2 \omega_3 + \frac{1}{2}\omega_1 \omega_2 + \frac{1}{2}\omega_4 \omega_1 - \frac{1}{2}\omega_1 \omega_2^2 u - \frac{1}{2}\omega_1 u - \frac{1}{2}\omega_4 \omega_1 c_s^2 - \frac{1}{2}\omega_2^2 u^2 \omega_3 - \frac{1}{2}\omega_4 \omega_3 v^2 + \frac{1}{2}\omega_4 \omega_3 - \omega_2 + \omega_4 v^2 - \frac{1}{2}\omega_4 \omega_1 \omega_2 - \frac{1}{2}u^2 \omega_3 + \frac{1}{2}\omega_4 \omega_1 \omega_2 v^2 - \omega_4 c_s^2 \omega_2 - \frac{1}{2}c_s^2 \omega_2^2 \omega_3 + \omega_1 \omega_2 u + \omega_4 c_s^2 + \frac{1}{2}\omega_4 \omega_1 c_s^2 \omega_2 - \omega_4 \omega_2 v^2 + \frac{1}{2}\omega_4 c_s^2 \omega_2 \omega_3 - \frac{1}{2}c_s^2 \omega_3 - \frac{1}{2}\omega_4 \omega_2 \omega_3 - \frac{1}{2}\omega_3,$$

$$\alpha_{x-\delta_t,y}^{[\mu_4],t-2\delta_t} = -2 - \frac{3}{2}\omega_2\omega_3 + \frac{1}{2}\omega_1\omega_2^2 - \omega_4\omega_2 + \omega_4 + \omega_1 - \frac{3}{2}\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_3 + 3\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2 - \omega_2^2 + \frac{1}{2}\omega_4\omega_2\omega_3 + \omega_3 + \frac{1}{2}\omega_2^2\omega_3,$$

$$\alpha_{x,y}^{[\mu_1,t-2\delta_t]} = 2 + \omega_4 c_s^2 \omega_3 - \omega_1^2 c_s^2 \omega_3 - 3\omega_1 + 3\omega_4 \omega_1 v^2 - \omega_4 \omega_1 c_s^2 \omega_3 + 3\omega_4 \omega_1 c_s^2 - \omega_1^2 u^2 \omega_3 + \omega_4 \omega_3 v^2 - 2\omega_4 v^2 - \omega_4 \omega_1^2 c_s^2 - 2u^2 \omega_3 - \omega_1 c_s^2 \omega_3^2 + 3\omega_1 u^2 \omega_3 + c_s^2 \omega_3^2 + \omega_1^2 - 2\omega_4 c_s^2 - 2c_s^2 \omega_3 - \omega_1 u^2 \omega_3^2 - \omega_3 - \omega_4 \omega_1^2 v^2 - \omega_4 \omega_1 \omega_3 v^2 + 3\omega_1 c_s^2 \omega_3 + u^2 \omega_3^2 + \omega_1 \omega_3,$$

$$\alpha_{x,y}^{[\mu_4],t-2\delta t} = -4 + \omega_1^2 \omega_3 - 4\omega_4 \omega_2 + 3\omega_4 + 3\omega_1 + \omega_4 \omega_2^2 - \omega_3^2 + \omega_1 \omega_3^2 - \omega_4^2 + 3\omega_2 - \omega_1^2 - \omega_2^2 + \omega_4^2 \omega_2 + 3\omega_3 - 4\omega_1 \omega_3,$$

$$\alpha_{x+\delta_t,y}^{[\mu_1,t-2\delta_t]} = 1 - \frac{1}{2}\omega_4 c_s^2 \omega_3 + \frac{1}{2}\omega_2 \omega_3 + \frac{1}{2}\omega_4 \omega_2 \omega_3 v^2 + \omega_4 \omega_2 - \omega_4 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_4 \omega_1 v^2 + c_s^2 \omega_2 \omega_3 + \omega_2 u^2 \omega_3 + \frac{1}{2}\omega_1 \omega_2 + \frac{1}{2}\omega_4 \omega_1 + \frac{1}{2}\omega_1 \omega_2^2 u + \frac{1}{2}\omega_1 u - \frac{1}{2}\omega_4 \omega_1 c_s^2 - \frac{1}{2}\omega_2^2 u^2 \omega_3 - \frac{1}{2}\omega_4 \omega_3 v^2 + \frac{1}{2}\omega_4 \omega_3 - \omega_2 + \omega_4 v^2 - \frac{1}{2}\omega_4 \omega_1 \omega_2 - \frac{1}{2}u^2 \omega_3 + \frac{1}{2}\omega_4 \omega_1 \omega_2 v^2 - \omega_4 c_s^2 \omega_2 - \frac{1}{2}c_s^2 \omega_2^2 \omega_3 - \omega_1 \omega_2 u + \omega_4 c_s^2 + \frac{1}{2}\omega_4 \omega_1 c_s^2 \omega_2 - \omega_4 \omega_2 v^2 + \frac{1}{2}\omega_4 c_s^2 \omega_2 \omega_3 - \frac{1}{2}c_s^2 \omega_3 - \frac{1}{2}\omega_4 \omega_2 \omega_3 - \frac{1}{2}\omega_3,$$

$$\alpha_{x+\delta_t,y}^{[\mu_4],t-2\delta_t} = -2 - \frac{3}{2}\omega_2\omega_3 + \frac{1}{2}\omega_1\omega_2^2 - \omega_4\omega_2 + \omega_4 + \omega_1 - \frac{3}{2}\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_3 + 3\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2 - \omega_2^2 + \frac{1}{2}\omega_4\omega_2\omega_3 + \omega_3 + \frac{1}{2}\omega_2^2\omega_3,$$

$$\alpha_{x-\delta_1 y+\delta_1}^{[\mu_1], t-2\delta_t} = 1 + \frac{3}{2} w_4 c_s^2 w_3 + \frac{1}{4} w_2 w_3 - \frac{1}{4} w_1 c_s^2 w_2 w_3 - \frac{1}{4} w_1 w_2 u^2 w_3 - \frac{1}{4} w_4 w_2 w_3 v^2 - \frac{1}{2} w_4 - \frac{1}{4} w_4 u^2 w_2^2 - \frac{1}{4} w_4 w_1 w_2 u - \frac{1}{2} w_1 + \frac{1}{4} w_4 w_1 v^2 - \frac{1}{4} w_2 u^2 w_3^2 - \frac{1}{4} c_s^2 w_2 w_3^2 - \frac{1}{4} w_4 w_1 u^2 w_3 + \frac{3}{4} c_s^2 w_2 w_3 + \frac{3}{4} w_2 u^2 w_3 + \frac{1}{4} w_1 w_2 + \frac{1}{4} w_1 w_2 v + \frac{1}{4} w_4 w_1 + \frac{5}{4} w_4 u^2 w_3 - \frac{1}{4} w_4^2 w_1 u - \frac{1}{4} w_4 w_1 c_s^2 w_3 - \frac{1}{2} w_1 u - \frac{1}{4} w_4 w_2 w_3 v + \frac{1}{4} w_4 w_1 c_s^2 - \frac{1}{4} w_4 c_s^2 w_3^2 - \frac{1}{2} w_2 v + \frac{1}{4} w_4 w_3 v^2 + \frac{1}{4} w_4 w_3 - \frac{1}{2} w_2 - \frac{1}{2} w_4 v^2 - \frac{1}{4} w_4^2 u^2 w_3 - \frac{3}{2} u^2 w_3 - \frac{1}{4} w_4 w_1 w_2 v^2 + \frac{1}{2} w_4 c_s^2 w_2 + \frac{3}{4} w_4 w_1 u + \frac{1}{2} w_4 w_2 v + \frac{1}{2} w_1 u^2 w_3 + \frac{3}{2} c_s^2 w_3^2 + \frac{1}{4} w_1 w_2 u - \frac{1}{2} w_4 c_s^2 - \frac{1}{4} w_4 w_1 c_s^2 w_2 + \frac{1}{2} w_4 w_2 v^2 - \frac{1}{2} w_4 c_s^2 w_2 w_3 - \frac{3}{2} c_s^2 w_3 - \frac{1}{4} w_4 w_2 u^2 w_3 - \frac{1}{4} w_4 c_s^2 w_3 - \frac{1}{4} w_4 w_1 w_2 v - \frac{1}{2} w_3 + \frac{1}{4} w_2 w_3 v + \frac{1}{2} w_1 c_s^2 w_3 + \frac{1}{2} u^2 w_3^2,$$

$$\alpha_{x-\delta_1, y+\delta_1}^{[\mu_4], t-2\delta_t} = -2 - \omega_2 \omega_3 + \frac{1}{4} \omega_1 \omega_2 \omega_3 - \frac{1}{2} \omega_4 \omega_2 + 2\omega_4 + \frac{1}{4} \omega_4 \omega_1 \omega_3 + \omega_1 - \frac{1}{2} \omega_1 \omega_2 - \omega_4 \omega_1 - \frac{1}{2} \omega_3^2 + \frac{1}{4} \omega_4^2 \omega_3 + \frac{1}{4} \omega_2 \omega_3^2 - \frac{1}{2} \omega_4^2 - \frac{3}{2} \omega_4 \omega_3 + \omega_2 + \frac{1}{4} \omega_4 \omega_1 \omega_2 + \frac{1}{4} \omega_4^2 \omega_1 + \frac{1}{4} \omega_4 \omega_2 \omega_3 + 2\omega_3 - \frac{1}{2} \omega_1 \omega_3 + \frac{1}{4} \omega_4 \omega_3^2,$$

$$\begin{aligned} \alpha_{x,y+\delta_1}^{[\mu_1],t-2\delta_t} = & 2 - \frac{1}{2}\omega_4 c_s^2 \omega_3 + \frac{1}{2}\omega_2 \omega_3 - \frac{1}{2}\omega_1 \omega_2 \omega_3 - \omega_4 - \frac{1}{2}\omega_4 \omega_1^2 - \frac{1}{2}\omega_4 \omega_1 \omega_3 - 3\omega_1 - \frac{3}{2}\omega_4 \omega_1 v^2 + \frac{3}{2}\omega_1 \omega_2 + \\ & \frac{3}{2}\omega_1 \omega_2 v + \frac{3}{2}\omega_4 \omega_1 + \frac{1}{2}\omega_4 \omega_1 c_s^2 \omega_3 - \frac{3}{2}\omega_4 \omega_1 c_s^2 - \omega_2 v - \frac{1}{2}\omega_4 \omega_3 v^2 + \frac{1}{2}\omega_4 \omega_3 - \omega_2 + \omega_4 v^2 - \frac{1}{2}\omega_1^2 \omega_2 v + \\ & \frac{1}{2}\omega_4 \omega_1^2 c_s^2 - \frac{1}{2}\omega_1^2 \omega_2 - \frac{1}{2}\omega_1 \omega_2 \omega_3 v + \omega_1^2 + \omega_4 c_s^2 - \omega_3 + \frac{1}{2}\omega_4 \omega_1^2 v^2 + \frac{1}{2}\omega_2 \omega_3 v + \frac{1}{2}\omega_4 \omega_1 \omega_3 v^2 + \omega_1 \omega_3, \end{aligned}$$

$$\alpha_{x,y+\delta_t}^{[\mu_4],t-2\delta_t} = -2 - \frac{1}{2}\omega_2\omega_3 + \frac{1}{2}\omega_1\omega_2\omega_3 + \omega_4 + \frac{1}{2}\omega_4\omega_1^2 + \frac{1}{2}\omega_4\omega_1\omega_3 + 3\omega_1 - \frac{3}{2}\omega_1\omega_2 - \frac{3}{2}\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_3 + \omega_2 + \frac{1}{2}\omega_1^2\omega_2 - \omega_1^2 + \omega_3 - \omega_1\omega_3,$$

$$\alpha_{x+\delta_1, y+\delta_1}^{[\mu_1], t-2\delta_t} = 1 + \frac{3}{2}\omega_4 c_s^2 \omega_3 + \frac{1}{4}\omega_2 \omega_3 - \frac{1}{4}\omega_1 c_s^2 \omega_2 \omega_3 - \frac{1}{4}\omega_1 \omega_2 u^2 \omega_3 - \frac{1}{4}\omega_4 \omega_2 \omega_3 v^2 - \frac{1}{2}\omega_4 - \frac{1}{4}\omega_4 u^2 \omega_3^2 + \frac{1}{4}\omega_4 \omega_1 \omega_2 u - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4 \omega_1 v^2 - \frac{1}{4}\omega_2 u^2 \omega_3^2 - \frac{1}{4}\omega_3^2 \omega_2 \omega_3^2 - \frac{1}{4}\omega_4 \omega_1 u^2 \omega_3 + \frac{3}{4}\omega_3^2 \omega_2 \omega_3 + \frac{3}{4}\omega_2 u^2 \omega_3 + \frac{1}{4}\omega_1 \omega_2 + \frac{1}{4}\omega_1 \omega_2 v + \frac{1}{4}\omega_4 \omega_1 + \frac{5}{4}\omega_4 u^2 \omega_3 + \frac{1}{4}\omega_4^2 \omega_1 u - \frac{1}{4}\omega_4 \omega_1 c_s^2 \omega_3 + \frac{1}{2}\omega_1 u - \frac{1}{4}\omega_4 \omega_2 \omega_3 v + \frac{1}{4}\omega_4 \omega_1 c_s^2 - \frac{1}{4}\omega_4 c_s^2 \omega_3^2 - \frac{1}{2}\omega_2 v + \frac{1}{4}\omega_4 \omega_3 v^2 + \frac{1}{4}\omega_4 \omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4 v^2 - \frac{1}{4}\omega_4^2 u^2 \omega_3 - \frac{3}{2}\omega_2 \omega_3 - \frac{1}{4}\omega_4 \omega_1 \omega_2 v^2 + \frac{1}{2}\omega_4 c_s^2 \omega_2 - \frac{3}{4}\omega_4 \omega_1 u + \frac{1}{2}\omega_4 \omega_2 v + \frac{1}{2}\omega_1 u^2 \omega_3 + \frac{1}{2}c_s^2 \omega_3^2 - \frac{1}{4}\omega_1 \omega_2 u - \frac{1}{2}\omega_4 c_s^2 - \frac{1}{4}\omega_4 \omega_1 c_s^2 \omega_2 + \frac{1}{2}\omega_4 \omega_2 v^2 - \frac{1}{2}\omega_4 c_s^2 \omega_2 \omega_3 - \frac{3}{2}c_s^2 \omega_3 - \frac{1}{4}\omega_4 \omega_2 u^2 \omega_3 - \frac{1}{4}\omega_4^2 c_s^2 \omega_3 - \frac{1}{4}\omega_4 \omega_1 \omega_2 v - \frac{1}{2}\omega_3 + \frac{1}{4}\omega_2 \omega_3 v + \frac{1}{2}\omega_1 c_s^2 \omega_3 + \frac{1}{2}u^2 \omega_3^2,$$

$$\alpha_{x+\delta_i, y+\delta_i}^{[4], t-2\delta_t} = -2 - \omega_2\omega_3 + \frac{1}{4}\omega_1\omega_2\omega_3 - \frac{1}{2}\omega_4\omega_2 + 2\omega_4 + \frac{1}{4}\omega_4\omega_1\omega_3 + \omega_1 - \frac{1}{2}\omega_1\omega_2 - \omega_4\omega_1 - \frac{1}{2}\omega_3^2 + \frac{1}{4}\omega_4^2\omega_3 + \frac{1}{4}\omega_2\omega_3^2 - \frac{1}{2}\omega_4^2 - \frac{3}{2}\omega_4\omega_3 + \omega_2 + \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_4^2\omega_1 + \frac{1}{4}\omega_4\omega_2\omega_3 + 2\omega_3 - \frac{1}{2}\omega_1\omega_3 + \frac{1}{4}\omega_4\omega_3^2,$$

$$\begin{aligned} \alpha_{x,y-\delta_1}^{[\mu_1],t-3\delta_t} = & -2 - 3\omega_4 c_s^2 w_3 - \frac{1}{2}\omega_4 w_1 w_2 u^2 w_3 - \omega_4 w_1 c_s^2 w_2 w_3 - \frac{1}{2}\omega_4 w_1^2 c_s^2 w_2 - \frac{1}{2}\omega_2 w_3 - \frac{1}{2}\omega_4 w_1 c_s^2 w_3^2 + \\ & 2w_1 c_s^2 w_2 w_3 + 2w_1 w_2 u^2 w_3 + \frac{1}{2}\omega_4 w_1^2 w_2 v + \frac{1}{2}\omega_4 w_2 w_3 v^2 + \frac{1}{2}\omega_1 w_2 w_3 + \omega_4 + \omega_1^2 c_s^2 w_3 + \frac{1}{2}\omega_4 w_1^2 + \frac{1}{2}\omega_4 u^2 w_3^2 + \\ & \frac{1}{2}\omega_4 w_1 w_3 + 3\omega_1 - \frac{3}{2}\omega_4 w_1 v^2 + \frac{1}{2}\omega_2 u^2 w_3^2 + \frac{1}{2}c_s^2 w_2 w_3^2 + 3\omega_4 w_1 u^2 w_3 - \frac{1}{2}\omega_4 w_1 u^2 w_3^2 - \frac{3}{2}c_s^2 w_2 w_3 - \frac{3}{2}\omega_2 u^2 w_3 - \\ & \frac{3}{2}\omega_1 w_2 + \frac{3}{2}\omega_1 w_2 v - \frac{3}{2}\omega_4 w_1 - \frac{5}{2}\omega_4 u^2 w_3 - \frac{1}{2}\omega_1 w_2 u^2 w_3^2 - \frac{1}{2}\omega_1 c_s^2 w_2 w_3^2 + \frac{7}{2}\omega_4 w_1 c_s^2 w_3 - \frac{1}{2}\omega_4 w_2 w_3 v - \\ & \frac{1}{2}\omega_4 w_1^2 w_2 v^2 - \frac{3}{2}\omega_4 w_1 c_s^2 + \frac{1}{2}\omega_4 c_s^2 w_3^2 - w_2 v + w_1^2 u^2 w_3 - \frac{1}{2}\omega_4 w_3 v^2 - \frac{1}{2}\omega_4 w_3 + w_2 - \frac{1}{2}\omega_1^2 c_s^2 w_2 w_3 - \\ & \frac{1}{2}\omega_1^2 w_2 u^2 w_3 + w_4 v^2 + \frac{1}{2}\omega_4 u^2 w_3 - \frac{1}{2}\omega_1^2 w_2 v + \frac{1}{2}\omega_4 w_1^2 c_s^2 + 3u^2 w_3 + w_1 c_s^2 w_3^2 + \frac{3}{2}\omega_4 w_1 w_2 v^2 - w_4 c_s^2 w_2 - \\ & \frac{1}{2}\omega_2^2 w_1 u^2 w_3 + \frac{1}{2}\omega_4 w_1 w_2 w_3 v - \frac{1}{2}\omega_4 w_1^2 c_s^2 w_3 + w_4 w_2 v - 4w_1 u^2 w_3 + \frac{1}{2}\omega_1^2 w_2 - c_s^2 w_3^2 - \frac{1}{2}\omega_1 w_2 w_3 v - w_1^2 + w_4 c_s^2 + \\ & \frac{3}{2}\omega_4 w_1 c_s^2 w_2 - w_4 w_2 v^2 + w_4 c_s^2 w_2 w_3 + 3c_s^2 w_3 + w_1 u^2 w_3^2 + \frac{1}{2}\omega_4 w_2 u^2 w_3 + \frac{1}{2}\omega_4^2 c_s^2 w_3 - \frac{3}{2}\omega_4 w_1 w_2 v + w_3 - \\ & \frac{1}{2}\omega_4 w_1 w_2 w_3 v^2 + \frac{1}{2}\omega_4 w_1^2 v^2 + \frac{1}{2}\omega_2 w_3 v + \frac{1}{2}\omega_4 w_1 w_3 v^2 - 4w_1 c_s^2 w_3 - u^2 w_3^2 - w_1 w_3 - \frac{1}{2}\omega_4 w_1^2 u^2 w_3 - \frac{1}{2}\omega_4^2 w_1 c_s^2 w_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y-\delta_t}^{[\mu_4],t-3\delta_t} = & 3 + 2\omega_2\omega_3 - \omega_1^2\omega_3 - \frac{5}{2}\omega_1\omega_2\omega_3 + \frac{1}{2}\omega_4\omega_2 - \frac{5}{2}\omega_4 - \frac{1}{2}\omega_4\omega_1^2 - \frac{7}{2}\omega_4\omega_1\omega_3 - 4\omega_1 + \frac{1}{2}\omega_4\omega_1\omega_3^2 + 2\omega_1\omega_2 + \\ & \frac{1}{2}\omega_1\omega_2\omega_3^2 + 3\omega_4\omega_1 + \omega_3 - \frac{1}{2}\omega_4^2\omega_3 - \frac{1}{2}\omega_2\omega_3^2 - \omega_1\omega_3^2 + \frac{1}{2}\omega_4^2 + 3\omega_4\omega_3 - \frac{3}{2}\omega_2 - \frac{1}{2}\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2\omega_3 - \\ & \frac{1}{2}\omega_1^2\omega_2 - \frac{1}{2}\omega_4^2\omega_1 + \omega_1^2 - \frac{1}{2}\omega_4\omega_2\omega_3 + \frac{1}{2}\omega_4\omega_1^2\omega_3 - 4\omega_3 + \frac{1}{2}\omega_1^2\omega_2\omega_3 + 5\omega_1\omega_3 - \frac{1}{2}\omega_4\omega_3^2 + \frac{1}{2}\omega_4^2\omega_1\omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_i,y}^{[\mu_1],t-3\delta_t} = & -1 - \frac{5}{2}\omega_4 c_s^2 \omega_3 - \frac{1}{2}\omega_4 \omega_1 \omega_2 u^2 \omega_3 - \frac{1}{2}\omega_4 \omega_1 c_s^2 \omega_2 \omega_3 - \frac{1}{2}\omega_4 u^2 u^2 \omega_3 - \frac{1}{2}\omega_2 \omega_3 + \frac{1}{2}\omega_1 c_s^2 \omega_2 \omega_3 + \\ & \frac{1}{2}\omega_1 \omega_2 u^2 \omega_3 - \frac{1}{2}\omega_4 c_s^2 \omega_2^2 \omega_3 - \omega_4 \omega_2 + \omega_4 + \frac{1}{2}\omega_4 u^2 \omega_3^2 + 2\omega_4 \omega_1 \omega_2 u + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_2 u^2 \omega_3^2 + \frac{1}{2}c_s^2 \omega_2 \omega_3^2 + \\ & \frac{1}{2}\omega_4 \omega_1 u^2 \omega_3 - \frac{5}{2}c_s^2 \omega_2 \omega_3 - \frac{5}{2}\omega_2 u^2 \omega_3 - \frac{1}{2}\omega_1 \omega_2 - \frac{1}{2}\omega_4 \omega_1 - \frac{5}{2}\omega_4 u^2 \omega_3 + \frac{1}{2}\omega_1 \omega_2^2 u - \frac{1}{2}\omega_4^2 c_s^2 \omega_2 \omega_3 - \frac{1}{2}\omega_4^2 \omega_2 u^2 \omega_3 + \end{aligned}$$

$$\begin{aligned} & \frac{1}{2}\omega_4^2\omega_1u + \frac{1}{2}\omega_4\omega_1c_s^2\omega_3 + \omega_1u + \frac{1}{2}\omega_4c_s^2\omega_3^2 + \frac{1}{2}\omega_2^2u^2\omega_3 - \frac{1}{2}\omega_4\omega_3 + \omega_2 + \frac{1}{2}\omega_4^2u^2\omega_3 + \frac{1}{2}\omega_4\omega_1\omega_2 + 2u^2\omega_3 - \\ & \frac{1}{2}\omega_4^2\omega_1\omega_2u + \frac{1}{2}c_s^2\omega_2^2\omega_3 - \frac{3}{2}\omega_4\omega_1u - \frac{1}{2}\omega_4\omega_2u^2\omega_3^2 - \frac{1}{2}\omega_1u^2\omega_3 - \frac{1}{2}\omega_4c_s^2\omega_2\omega_3^2 - \frac{1}{2}c_s^2\omega_3^2 - \frac{3}{2}\omega_1\omega_2u + \\ & 3\omega_4c_s^2\omega_2\omega_3 + 2c_s^2\omega_3 + 3\omega_4\omega_2u^2\omega_3 + \frac{1}{2}\omega_4\omega_2\omega_3 + \frac{1}{2}\omega_4^2c_s^2\omega_3 - \frac{1}{2}\omega_4\omega_1\omega_2^2u + \frac{1}{2}\omega_3 - \frac{1}{2}\omega_1c_s^2\omega_3 - \frac{1}{2}u^2\omega_3^2, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_t, y}^{[\mu_4], t-3\delta_t} = & 3 + \frac{1}{2}\omega_4^2\omega_2\omega_3 + 3\omega_2\omega_3 - \frac{1}{2}\omega_1\omega_2\omega_3 - \frac{1}{2}\omega_1\omega_2^2 + 5\omega_4\omega_2 - 4\omega_4 + \frac{1}{2}\omega_4\omega_2^2\omega_3 - \frac{1}{2}\omega_4\omega_1\omega_3 - \frac{3}{2}\omega_1 + 2\omega_1\omega_2 - \\ & \omega_4\omega_2^2 + \frac{1}{2}\omega_4^2\omega_1\omega_2 + 2\omega_4\omega_1 + \frac{1}{2}\omega_3^2 - \frac{1}{2}\omega_4^2\omega_3 - \frac{1}{2}\omega_2\omega_3^2 + \omega_4^2 + 3\omega_4\omega_3 - 4\omega_2 - \frac{5}{2}\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2\omega_3 + \\ & \frac{1}{2}\omega_4\omega_2\omega_3^2 - \frac{1}{2}\omega_4^2\omega_1 + \omega_2^2 - \omega_4^2\omega_2 - \frac{7}{2}\omega_4\omega_2\omega_3 - \frac{5}{2}\omega_3 + \frac{1}{2}\omega_4\omega_1\omega_2^2 - \frac{1}{2}\omega_2\omega_3 + \frac{1}{2}\omega_1\omega_3 - \frac{1}{2}\omega_4\omega_3^2, \end{aligned}$$

$$\begin{aligned} \alpha_{x, y}^{[\mu_1], t-3\delta_t} = & -2 + \omega_4c_s^2\omega_3 + \omega_4\omega_1c_s^2\omega_2\omega_3 + \omega_4\omega_1^2c_s^2\omega_2 - \omega_2\omega_3 + 2\omega_1c_s^2\omega_2\omega_3 + 2\omega_1\omega_2u^2\omega_3 - \omega_4\omega_2\omega_3v^2 + \omega_1\omega_2\omega_3 - 2\omega_4\omega_2 + \\ & 2\omega_4 + \omega_4\omega_1^2 + \omega_4\omega_1\omega_3 + 3\omega_1 + 3\omega_4\omega_1v^2 - 2c_s^2\omega_2\omega_3 - 2\omega_2u^2\omega_3 - 3\omega_1\omega_2 - 3\omega_4\omega_1 - \omega_4\omega_1c_s^2\omega_3 + \omega_4\omega_1^2\omega_2v^2 + \\ & 3\omega_4\omega_1c_s^2 - \omega_4\omega_1^2\omega_2 + \omega_2^2u^2\omega_3 + \omega_4\omega_3v^2 - \omega_4\omega_3 + 2\omega_2 - 2\omega_4v^2 + 3\omega_4\omega_1\omega_2 - \omega_4\omega_1^2c_s^2 + u^2\omega_3 - 3\omega_4\omega_1\omega_2v^2 + \\ & 2\omega_4c_s^2\omega_2 - \omega_4\omega_1\omega_2\omega_3 + c_s^2\omega_2^2\omega_3 - \omega_1u^2\omega_3 + \omega_1^2\omega_2 - \omega_1^2 - 2\omega_4c_s^2 - 3\omega_4\omega_1c_s^2\omega_2 + 2\omega_4\omega_2v^2 - \omega_4c_s^2\omega_2\omega_3 + \\ & c_s^2\omega_3 + \omega_4\omega_2\omega_3 + \omega_3 + \omega_4\omega_1\omega_2\omega_3v^2 - \omega_4\omega_1^2v^2 - \omega_1\omega_2u^2\omega_3 - \omega_4\omega_1\omega_3v^2 - \omega_1c_s^2\omega_3 - \omega_1\omega_3 - \omega_1c_s^2\omega_2^2\omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x, y}^{[\mu_4], t-3\delta_t} = & 3 + 3\omega_2\omega_3 - 3\omega_1\omega_2\omega_3 - \omega_1\omega_2^2 + 2\omega_4\omega_2 - 2\omega_4 - \omega_4\omega_1 - \omega_4\omega_1\omega_3 - 4\omega_1 + 5\omega_1\omega_2 + 3\omega_4\omega_1 + \omega_4\omega_1^2\omega_2 + \\ & \omega_4\omega_3 - 4\omega_2 - 3\omega_4\omega_1\omega_2 + \omega_4\omega_1\omega_2\omega_3 - \omega_1^2\omega_2 + \omega_1^2 + \omega_2^2 + \omega_1\omega_2^2\omega_3 - \omega_4\omega_2\omega_3 - 2\omega_3 - \omega_2^2\omega_3 + 2\omega_1\omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_t, y}^{[\mu_1], t-3\delta_t} = & -1 - \frac{5}{2}\omega_4c_s^2\omega_3 - \frac{1}{2}\omega_4\omega_1\omega_2u^2\omega_3 - \frac{1}{2}\omega_4\omega_1c_s^2\omega_2\omega_3 - \frac{1}{2}\omega_4\omega_2^2u^2\omega_3 - \frac{1}{2}\omega_2\omega_3 + \frac{1}{2}\omega_1c_s^2\omega_2\omega_3 + \\ & \frac{1}{2}\omega_1\omega_2u^2\omega_3 - \frac{1}{2}\omega_4c_s^2\omega_2\omega_3 - \omega_4\omega_2 + \omega_4 + \frac{1}{2}\omega_4u^2\omega_3^2 - 2\omega_4\omega_1\omega_2u + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_2u^2\omega_3^2 + \frac{1}{2}c_s^2\omega_2\omega_3^2 + \\ & \frac{1}{2}\omega_4\omega_1u^2\omega_3 - \frac{5}{2}c_s^2\omega_2\omega_3 - \frac{5}{2}\omega_2u^2\omega_3 - \frac{1}{2}\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_1 - \frac{5}{2}\omega_4u^2\omega_3 - \frac{1}{2}\omega_1\omega_2^2u - \frac{1}{2}\omega_4^2c_s^2\omega_2\omega_3 - \frac{1}{2}\omega_4^2\omega_2u^2\omega_3 - \\ & \frac{1}{2}\omega_4^2\omega_1u + \frac{1}{2}\omega_4\omega_1c_s^2\omega_3 - \omega_1u + \frac{1}{2}\omega_4c_s^2\omega_3^2 + \frac{1}{2}\omega_2^2u^2\omega_3 - \frac{1}{2}\omega_4\omega_3 + \omega_2 + \frac{1}{2}\omega_4^2u^2\omega_3 + \frac{1}{2}\omega_4\omega_1\omega_2 + 2u^2\omega_3 + \\ & \frac{1}{2}\omega_4^2\omega_1\omega_2u + \frac{1}{2}c_s^2\omega_2^2\omega_3 + \frac{3}{2}\omega_4\omega_1u - \frac{1}{2}\omega_4\omega_2u^2\omega_3^2 - \frac{1}{2}\omega_1u^2\omega_3 - \frac{1}{2}\omega_4c_s^2\omega_2\omega_3^2 - \frac{1}{2}c_s^2\omega_3^2 + \frac{3}{2}\omega_1\omega_2u + \\ & 3\omega_4c_s^2\omega_2\omega_3 + 2c_s^2\omega_3 + 3\omega_4\omega_2u^2\omega_3 + \frac{1}{2}\omega_4\omega_2\omega_3 + \frac{1}{2}\omega_4^2c_s^2\omega_3 + \frac{1}{2}\omega_4\omega_1\omega_2^2u + \frac{1}{2}\omega_3 - \frac{1}{2}\omega_1c_s^2\omega_3 - \frac{1}{2}u^2\omega_3^2, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_t, y}^{[\mu_4], t-3\delta_t} = & 3 + \frac{1}{2}\omega_4^2\omega_2\omega_3 + 3\omega_2\omega_3 - \frac{1}{2}\omega_1\omega_2\omega_3 - \frac{1}{2}\omega_1\omega_2^2 + 5\omega_4\omega_2 - 4\omega_4 + \frac{1}{2}\omega_4\omega_2^2\omega_3 - \frac{1}{2}\omega_4\omega_1\omega_3 - \frac{3}{2}\omega_1 + 2\omega_1\omega_2 - \\ & \omega_4\omega_2^2 + \frac{1}{2}\omega_4^2\omega_1\omega_2 + 2\omega_4\omega_1 + \frac{1}{2}\omega_3^2 - \frac{1}{2}\omega_4^2\omega_3 - \frac{1}{2}\omega_2\omega_3^2 + \omega_4^2 + 3\omega_4\omega_3 - 4\omega_2 - \frac{5}{2}\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2\omega_3 + \\ & \frac{1}{2}\omega_4\omega_2\omega_3^2 - \frac{1}{2}\omega_4^2\omega_1 + \omega_2^2 - \omega_4^2\omega_2 - \frac{7}{2}\omega_4\omega_2\omega_3 - \frac{5}{2}\omega_3 + \frac{1}{2}\omega_4\omega_1\omega_2^2 - \frac{1}{2}\omega_2\omega_3 + \frac{1}{2}\omega_1\omega_3 - \frac{1}{2}\omega_4\omega_3^2, \end{aligned}$$

$$\begin{aligned} \alpha_{x, y+\delta_t}^{[\mu_1], t-3\delta_t} = & -2 - 3\omega_4c_s^2\omega_3 - \frac{1}{2}\omega_4\omega_1\omega_2u^2\omega_3 - \omega_4\omega_1c_s^2\omega_2\omega_3 - \frac{1}{2}\omega_4\omega_1^2c_s^2\omega_2 - \frac{1}{2}\omega_2\omega_3 - \frac{1}{2}\omega_4\omega_1c_s^2\omega_3^2 + \\ & 2\omega_1c_s^2\omega_2\omega_3 + 2\omega_1\omega_2u^2\omega_3 - \frac{1}{2}\omega_4\omega_1^2\omega_2v + \frac{1}{2}\omega_4\omega_2\omega_3v^2 + \frac{1}{2}\omega_1\omega_2\omega_3 + \omega_4 + \omega_1^2c_s^2\omega_3 + \frac{1}{2}\omega_4\omega_1^2 + \frac{1}{2}\omega_4u^2\omega_3^2 + \\ & \frac{1}{2}\omega_4\omega_1\omega_3 + 3\omega_1 - \frac{3}{2}\omega_4\omega_1v^2 + \frac{1}{2}\omega_2u^2\omega_3^2 + \frac{1}{2}c_s^2\omega_2\omega_3^2 + 3\omega_4\omega_1u^2\omega_3 - \frac{1}{2}\omega_4\omega_1u^2\omega_3^2 - \frac{3}{2}c_s^2\omega_2\omega_3 - \frac{3}{2}\omega_2u^2\omega_3 - \\ & \frac{3}{2}\omega_1\omega_2 - \frac{3}{2}\omega_1\omega_2v - \frac{3}{2}\omega_4\omega_1 - \frac{5}{2}\omega_4u^2\omega_3 - \frac{1}{2}\omega_1\omega_2u^2\omega_3^2 - \frac{1}{2}\omega_1c_s^2\omega_2\omega_3^2 + \frac{7}{2}\omega_4\omega_1c_s^2\omega_3 + \frac{1}{2}\omega_4\omega_2\omega_3v - \\ & \frac{1}{2}\omega_4\omega_1^2\omega_2v^2 - \frac{3}{2}\omega_4\omega_1c_s^2 + \frac{1}{2}\omega_4c_s^2\omega_3^2 + \omega_2v + \omega_1^2u^2\omega_3 - \frac{1}{2}\omega_4\omega_3v^2 - \frac{1}{2}\omega_4\omega_3 + \omega_2 - \frac{1}{2}\omega_1^2c_s^2\omega_2\omega_3 - \\ & \frac{1}{2}\omega_1^2\omega_2u^2\omega_3 + \omega_4v^2 + \frac{1}{2}\omega_4^2u^2\omega_3 + \frac{1}{2}\omega_1^2\omega_2v + \frac{1}{2}\omega_4\omega_1^2c_s^2 + 3u^2\omega_3 + \omega_1c_s^2\omega_3^2 + \frac{3}{2}\omega_4\omega_1\omega_2v^2 - \omega_4c_s^2\omega_2 - \\ & \frac{1}{2}\omega_4^2\omega_1u^2\omega_3 - \frac{1}{2}\omega_4\omega_1\omega_2\omega_3v - \frac{1}{2}\omega_4\omega_1^2c_s^2\omega_3 - \omega_4\omega_2v - 4\omega_1u^2\omega_3 + \frac{1}{2}\omega_1^2\omega_2 - c_s^2\omega_3^2 + \frac{1}{2}\omega_1\omega_2\omega_3v - \omega_1^2 + \omega_4c_s^2 + \\ & \frac{3}{2}\omega_4\omega_1c_s^2\omega_2 - \omega_4\omega_2v^2 + \omega_4c_s^2\omega_2\omega_3 + 3c_s^2\omega_3 + \omega_1u^2\omega_3^2 + \frac{1}{2}\omega_4\omega_2u^2\omega_3 + \frac{1}{2}\omega_4^2c_s^2\omega_3 + \frac{3}{2}\omega_4\omega_1\omega_2v + \omega_3 - \\ & \frac{1}{2}\omega_4\omega_1\omega_2\omega_3v^2 + \frac{1}{2}\omega_4\omega_1^2v^2 - \frac{1}{2}\omega_2\omega_3v + \frac{1}{2}\omega_4\omega_1\omega_3v^2 - 4\omega_1c_s^2\omega_3 - u^2\omega_3^2 - \omega_1\omega_3 - \frac{1}{2}\omega_4\omega_1^2u^2\omega_3 - \frac{1}{2}\omega_4^2\omega_1c_s^2\omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x, y+\delta_t}^{[\mu_4], t-3\delta_t} = & 3 + 2\omega_2\omega_3 - \omega_1^2\omega_3 - \frac{5}{2}\omega_1\omega_2\omega_3 + \frac{1}{2}\omega_4\omega_2 - \frac{5}{2}\omega_4 - \frac{1}{2}\omega_4\omega_1^2 - \frac{7}{2}\omega_4\omega_1\omega_3 - 4\omega_1 + \frac{1}{2}\omega_4\omega_1\omega_3^2 + 2\omega_1\omega_2 + \\ & \frac{1}{2}\omega_1\omega_2\omega_3^2 + 3\omega_4\omega_1 + \omega_3^2 - \frac{1}{2}\omega_4^2\omega_3 - \frac{1}{2}\omega_2\omega_3^2 - \omega_1\omega_3^2 + \frac{1}{2}\omega_4^2 + 3\omega_4\omega_3 - \frac{3}{2}\omega_2 - \frac{1}{2}\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2\omega_3 - \\ & \frac{1}{2}\omega_1^2\omega_2 - \frac{1}{2}\omega_4^2\omega_1 + \omega_1^2 - \frac{1}{2}\omega_4\omega_2\omega_3 + \frac{1}{2}\omega_4\omega_1^2\omega_3 - 4\omega_3 + \frac{1}{2}\omega_1^2\omega_2\omega_3 + 5\omega_1\omega_3 - \frac{1}{2}\omega_4\omega_3^2 + \frac{1}{2}\omega_4^2\omega_1\omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x, y}^{[\mu_1], t-4\delta_t} = & 2 + 5\omega_4c_s^2\omega_3 + 7\omega_4\omega_1\omega_2u^2\omega_3 + 7\omega_4\omega_1c_s^2\omega_2\omega_3 + \omega_4\omega_2^2u^2\omega_3 + \omega_2\omega_3 + \omega_4\omega_1c_s^2\omega_3^2 - 6\omega_1c_s^2\omega_2\omega_3 - 6\omega_1\omega_2u^2\omega_3 - \\ & \omega_1\omega_2\omega_3 + \omega_4c_s^2\omega_2\omega_3 + 2\omega_4\omega_2 - 2\omega_4 - \omega_1^2c_s^2\omega_3 - \omega_4\omega_2^2 - \omega_4u^2\omega_3^2 - \omega_4^2\omega_1c_s^2\omega_2\omega_3 - \omega_4^2\omega_1\omega_2u^2\omega_3 - \omega_4\omega_1\omega_3 - 3\omega_1 - \\ & \omega_2u^2\omega_3^2 - c_s^2\omega_2\omega_3^2 - 6\omega_4\omega_1u^2\omega_3 + \omega_4\omega_1u^2\omega_3^2 + 5c_s^2\omega_2\omega_3 + 5\omega_2u^2\omega_3 + 3\omega_1\omega_2 + 3\omega_4\omega_1 + 5\omega_4u^2\omega_3 + \omega_4^2c_s^2\omega_2\omega_3 + \\ & \omega_4^2\omega_2u^2\omega_3 + \omega_1\omega_2u^2\omega_3^2 + \omega_1c_s^2\omega_2\omega_3^2 - 6\omega_4\omega_1c_s^2\omega_3 - \omega_4\omega_1c_s^2\omega_2\omega_3^2 + \omega_4\omega_1^2\omega_2 - \omega_4c_s^2\omega_3^2 - \omega_4\omega_1\omega_2u^2\omega_3^2 - \\ & \omega_1^2u^2\omega_3 - \omega_2^2u^2\omega_3 + \omega_4\omega_3 - 2\omega_2 + \omega_1^2c_s^2\omega_2\omega_3 + \omega_1^2\omega_2u^2\omega_3 - \omega_4^2u^2\omega_3 - 3\omega_4\omega_1\omega_2 - 4u^2\omega_3 - \omega_1c_s^2\omega_3^2 - \\ & \omega_4\omega_1\omega_2u^2\omega_3 - \omega_4\omega_1^2c_s^2\omega_2\omega_3 + \omega_4\omega_1u^2\omega_3 + \omega_4\omega_1\omega_2\omega_3 - c_s^2\omega_2\omega_3 + \omega_4\omega_1^2c_s^2\omega_3 + \omega_4\omega_2u^2\omega_3^2 + 5\omega_1u^2\omega_3 - \\ & \omega_1^2\omega_2 + \omega_4c_s^2\omega_2\omega_3^2 + c_s^2\omega_3^2 + \omega_1^2 - 6\omega_4c_s^2\omega_2\omega_3 - 4c_s^2\omega_3 - \omega_1u^2\omega_3^2 - 6\omega_4\omega_2u^2\omega_3 - \omega_4\omega_2\omega_3 - \omega_4\omega_1\omega_2^2u^2\omega_3 - \end{aligned}$$

$$\begin{aligned} & \omega_4^2 c_s^2 \omega_3 - \omega_3 + \omega_1 \omega_2^2 u^2 \omega_3 - \omega_4 \omega_1 c_s^2 \omega_2^2 \omega_3 + 5 \omega_1 c_s^2 \omega_3 + u^2 \omega_3^2 + \omega_1 \omega_3 + \omega_4 \omega_1^2 u^2 \omega_3 + \omega_1 c_s^2 \omega_2^2 \omega_3 + \omega_4^2 \omega_1 c_s^2 \omega_3, \\ & \alpha_{x,y}^{[\mu_4],t-4\delta_t} = -4 - \omega_4^2 \omega_2 \omega_3 - 6 \omega_2 \omega_3 + \omega_1^2 \omega_3 + 7 \omega_1 \omega_2 \omega_3 + \omega_1 \omega_2^2 - 6 \omega_4 \omega_2 + 5 \omega_4 + \omega_4 \omega_1^2 - \omega_4 \omega_2^2 \omega_3 + \omega_4^2 \omega_1 \omega_2 \omega_3 + 7 \omega_4 \omega_1 \omega_3 + 5 \omega_1 - \omega_4 \omega_1 \omega_3^2 + \omega_4 \omega_1 \omega_2^2 \omega_3 - 6 \omega_1 \omega_2 - \omega_1 \omega_2 \omega_3^2 + \omega_4 \omega_2^2 - \omega_4^2 \omega_1 \omega_2 - 6 \omega_4 \omega_1 - \omega_3^2 + \omega_4^2 \omega_3 + \omega_4 \omega_1^2 \omega_2 \omega_3 - \omega_4 \omega_1^2 \omega_2 + \omega_2 \omega_3^2 + \omega_1 \omega_3^2 - \omega_4^2 - 6 \omega_4 \omega_3 + 5 \omega_2 + 7 \omega_4 \omega_1 \omega_2 - 8 \omega_4 \omega_1 \omega_2 \omega_3 + \omega_1^2 \omega_2 - \omega_4 \omega_2 \omega_3^2 + \omega_4^2 \omega_1 - \omega_1^2 - \omega_2^2 + \omega_4^2 \omega_2 - \omega_1 \omega_2 \omega_3 + 7 \omega_4 \omega_2 \omega_3 - \omega_4 \omega_1^2 \omega_3 + 5 \omega_3 + \omega_4 \omega_1 \omega_2 \omega_3^2 - \omega_4 \omega_1 \omega_2^2 + \omega_2^2 \omega_3 - \omega_1^2 \omega_2 \omega_3 - 6 \omega_1 \omega_3 + \omega_4 \omega_3^2 - \omega_4^2 \omega_1 \omega_3, \end{aligned}$$

### 3.6 EFDE for $\mu_5$

$$\mu_{5,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_t,y+j\delta_t}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_t,y+j\delta_t}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_t,y+j\delta_t}^{[\mu_5],t-\ell\delta_t} \mu_{5,x+i\delta_t,y+j\delta_t}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x,y-\delta_t}^{[\mu_1],t} = 1 - \frac{1}{2} \omega_4 + \frac{1}{2} \omega_2 v - \frac{1}{2} \omega_2 + \frac{1}{2} \omega_4 v^2 + \frac{1}{2} \omega_4 c_s^2.$$

$$\alpha_{x,y+\delta_t}^{[\mu_1],t} = 1 - \frac{1}{2} \omega_4 - \frac{1}{2} \omega_2 v - \frac{1}{2} \omega_2 + \frac{1}{2} \omega_4 v^2 + \frac{1}{2} \omega_4 c_s^2.$$

$$\begin{aligned} \alpha_{x-\delta_t,y-\delta_t}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{4} \omega_4 c_s^2 \omega_3 - \frac{1}{4} \omega_2 \omega_3 + \frac{1}{2} \omega_4 + \frac{1}{2} \omega_1 + \frac{1}{4} c_s^2 \omega_2 \omega_3 + \frac{1}{4} \omega_2 u^2 \omega_3 - \frac{1}{4} \omega_1 \omega_2 - \frac{1}{4} \omega_4 \omega_1 + \frac{1}{4} \omega_4 u^2 \omega_3 - \frac{1}{2} \omega_1 u - \frac{1}{4} \omega_4 \omega_3 + \frac{1}{2} \omega_2 - \frac{1}{2} u^2 \omega_3 + \frac{1}{4} \omega_4 \omega_1 u + \frac{1}{4} \omega_1 \omega_2 u - \frac{1}{2} c_s^2 \omega_3 + \frac{1}{2} \omega_3, \end{aligned}$$

$$\alpha_{x-\delta_t,y-\delta_t}^{[\mu_5],t-\delta_t} = 1 + \frac{1}{4} \omega_2 \omega_3 - \frac{1}{2} \omega_4 - \frac{1}{2} \omega_1 + \frac{1}{4} \omega_1 \omega_2 + \frac{1}{4} \omega_4 \omega_1 + \frac{1}{4} \omega_4 \omega_3 - \frac{1}{2} \omega_2 - \frac{1}{2} \omega_3,$$

$$\begin{aligned} \alpha_{x,y-\delta_t}^{[\mu_1],t-\delta_t} &= -1 - \frac{1}{2} \omega_4 c_s^2 \omega_3 + \frac{1}{2} \omega_4 - \frac{1}{2} \omega_4^2 c_s^2 - \frac{1}{2} c_s^2 \omega_2 \omega_3 - \frac{1}{2} \omega_2 u^2 \omega_3 - \frac{1}{2} \omega_4 u^2 \omega_3 - \frac{1}{2} \omega_4^2 v^2 + \frac{1}{2} \omega_2 + \omega_4 v^2 + u^2 \omega_3 - \frac{1}{2} \omega_4 c_s^2 \omega_2 + \omega_4 c_s^2 - \frac{1}{2} \omega_4 \omega_2 v^2 + c_s^2 \omega_3, \end{aligned}$$

$$\alpha_{x,y-\delta_t}^{[\mu_5],t-\delta_t} = 1 + \frac{1}{2} \omega_4 \omega_2 - \frac{3}{2} \omega_4 + \frac{1}{2} \omega_4^2 - \frac{1}{2} \omega_2,$$

$$\begin{aligned} \alpha_{x+\delta_t,y-\delta_t}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{4} \omega_4 c_s^2 \omega_3 - \frac{1}{4} \omega_2 \omega_3 + \frac{1}{2} \omega_4 + \frac{1}{2} \omega_1 + \frac{1}{4} c_s^2 \omega_2 \omega_3 + \frac{1}{4} \omega_2 u^2 \omega_3 - \frac{1}{4} \omega_1 \omega_2 - \frac{1}{4} \omega_4 \omega_1 + \frac{1}{4} \omega_4 u^2 \omega_3 + \frac{1}{2} \omega_1 u - \frac{1}{4} \omega_4 \omega_3 + \frac{1}{2} \omega_2 - \frac{1}{2} u^2 \omega_3 - \frac{1}{4} \omega_4 \omega_1 u - \frac{1}{4} \omega_1 \omega_2 u - \frac{1}{2} c_s^2 \omega_3 + \frac{1}{2} \omega_3, \end{aligned}$$

$$\alpha_{x+\delta_t,y-\delta_t}^{[\mu_5],t-\delta_t} = 1 + \frac{1}{4} \omega_2 \omega_3 - \frac{1}{2} \omega_4 - \frac{1}{2} \omega_1 + \frac{1}{4} \omega_1 \omega_2 + \frac{1}{4} \omega_4 \omega_1 + \frac{1}{4} \omega_4 \omega_3 - \frac{1}{2} \omega_2 - \frac{1}{2} \omega_3,$$

$$\alpha_{x-\delta_t,y}^{[\mu_1],t-\delta_t} = 1 - \frac{1}{2} \omega_1 + \frac{1}{2} \omega_3^2 - \frac{3}{2} \omega_3 + \frac{1}{2} \omega_1 \omega_3,$$

$$\alpha_{x,y}^{[\mu_1],t-\delta_t} = -2 - \omega_4 \omega_2 + \omega_4 + 3 \omega_2 - \omega_4 v^2 + \omega_4 c_s^2 \omega_2 - \omega_4 c_s^2 + \omega_4 \omega_2 v^2 - \omega_2^2,$$

$$\alpha_{x,y}^{[\mu_5],t-\delta_t} = 2 - 2 \omega_1 - 2 \omega_2 + \omega_1^2 + \omega_2^2,$$

$$\alpha_{x+\delta_t,y}^{[\mu_5],t-\delta_t} = 1 - \frac{1}{2} \omega_1 + \frac{1}{2} \omega_3^2 - \frac{3}{2} \omega_3 + \frac{1}{2} \omega_1 \omega_3,$$

$$\begin{aligned} \alpha_{x-\delta_t,y+\delta_t}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{4} \omega_4 c_s^2 \omega_3 - \frac{1}{4} \omega_2 \omega_3 + \frac{1}{2} \omega_4 + \frac{1}{2} \omega_1 + \frac{1}{4} c_s^2 \omega_2 \omega_3 + \frac{1}{4} \omega_2 u^2 \omega_3 - \frac{1}{4} \omega_1 \omega_2 - \frac{1}{4} \omega_4 \omega_1 + \frac{1}{4} \omega_4 u^2 \omega_3 - \frac{1}{2} \omega_1 u - \frac{1}{4} \omega_4 \omega_3 + \frac{1}{2} \omega_2 - \frac{1}{2} u^2 \omega_3 + \frac{1}{4} \omega_4 \omega_1 u + \frac{1}{4} \omega_1 \omega_2 u - \frac{1}{2} c_s^2 \omega_3 + \frac{1}{2} \omega_3, \end{aligned}$$

$$\alpha_{x-\delta_t,y+\delta_t}^{[\mu_5],t-\delta_t} = 1 + \frac{1}{4} \omega_2 \omega_3 - \frac{1}{2} \omega_4 - \frac{1}{2} \omega_1 + \frac{1}{4} \omega_1 \omega_2 + \frac{1}{4} \omega_4 \omega_1 + \frac{1}{4} \omega_4 \omega_3 - \frac{1}{2} \omega_2 - \frac{1}{2} \omega_3,$$

$$\begin{aligned} \alpha_{x,y+\delta_t}^{[\mu_1],t-\delta_t} &= -1 - \frac{1}{2} \omega_4 c_s^2 \omega_3 + \frac{1}{2} \omega_4 - \frac{1}{2} \omega_4^2 c_s^2 - \frac{1}{2} c_s^2 \omega_2 \omega_3 - \frac{1}{2} \omega_2 u^2 \omega_3 - \frac{1}{2} \omega_4 u^2 \omega_3 - \frac{1}{2} \omega_4^2 v^2 + \frac{1}{2} \omega_2 + \omega_4 v^2 + u^2 \omega_3 - \frac{1}{2} \omega_4 c_s^2 \omega_2 + \omega_4 c_s^2 - \frac{1}{2} \omega_4 \omega_2 v^2 + c_s^2 \omega_3, \end{aligned}$$

$$\alpha_{x,y+\delta_t}^{[\mu_5],t-\delta_t} = 1 + \frac{1}{2}\omega_4\omega_2 - \frac{3}{2}\omega_4 + \frac{1}{2}\omega_4^2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x+\delta_1 y+\delta_2}^{[\mu_1], t-\delta_t} = -1 + \frac{1}{4}\omega_4 c_s^2 \omega_3 - \frac{1}{4}\omega_2 \omega_3 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{4}c_s^2 \omega_2 \omega_3 + \frac{1}{4}\omega_2 u^2 \omega_3 - \frac{1}{4}\omega_1 \omega_2 - \frac{1}{4}\omega_4 \omega_1 + \frac{1}{4}\omega_4 u^2 \omega_3 + \frac{1}{2}\omega_1 u - \frac{1}{4}\omega_4 \omega_3 + \frac{1}{2}\omega_2 - \frac{1}{2}u^2 \omega_3 - \frac{1}{4}\omega_4 \omega_1 u - \frac{1}{4}\omega_1 \omega_2 u - \frac{1}{2}c_s^2 \omega_3 + \frac{1}{2}\omega_3,$$

$$\alpha_{x+\delta_t, y+\delta_t}^{|\mu_5|, t-\delta_t} = 1 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3,$$

$$\alpha_{x-\delta_1, y-\delta_1}^{|\mu_1|, t-2\delta_t} = 1 + \frac{3}{2}\omega_4 c_s^2 \omega_3 - \frac{1}{4}\omega_2 \omega_3^2 v + \frac{1}{4}\omega_2 \omega_3 - \frac{1}{4}\omega_1 c_s^2 \omega_2 \omega_3 - \frac{1}{4}\omega_1 \omega_2 u^2 \omega_3 - \frac{1}{4}\omega_4 \omega_2 \omega_3 v^2 - \frac{1}{2}\omega_4 + \frac{1}{2}\omega_4^2 c_s^2 - \frac{1}{2}\omega_1 + \frac{3}{4}\omega_4 \omega_1 v^2 - \frac{1}{4}\omega_4 \omega_1 u^2 \omega_3 - \frac{1}{4}\omega_4^2 \omega_3 v^2 + \frac{1}{4}c_s^2 \omega_2 \omega_3 + \frac{1}{4}\omega_2 u^2 \omega_3 - \frac{1}{2}\omega_1 u \omega_3 + \frac{1}{4}\omega_1 \omega_2 + \frac{1}{4}\omega_1 \omega_2 v + \frac{1}{4}\omega_4 \omega_1 + \frac{1}{4}\omega_4 u^2 \omega_3 - \frac{1}{4}\omega_4 \omega_3^2 v^2 - \frac{1}{2}\omega_4 \omega_1 c_s^2 \omega_3 + \frac{1}{2}\omega_1 u + \frac{1}{2}\omega_4^2 v^2 + \frac{3}{4}\omega_4 \omega_1 c_s^2 - \frac{1}{4}\omega_4 c_s^2 \omega_3^2 - \frac{1}{2}\omega_2 v + \frac{5}{4}\omega_4 \omega_3 v^2 + \frac{1}{4}\omega_4 \omega_3 - \frac{1}{2}\omega_2 - \frac{3}{2}\omega_4 v^2 - \frac{1}{2}u^2 \omega_3 - \frac{1}{4}\omega_4 \omega_1 \omega_2 v^2 + \frac{1}{2}\omega_4 c_s^2 \omega_2 - \frac{1}{4}\omega_4 \omega_1 u + \frac{1}{2}\omega_1 u^2 \omega_3 - \frac{1}{4}\omega_1 \omega_2 \omega_3 v - \frac{1}{4}\omega_1 \omega_2 u - \frac{1}{4}\omega_4^2 \omega_1 c_s^2 - \frac{3}{2}\omega_4 c_s^2 - \frac{1}{4}\omega_4 \omega_1 c_s^2 \omega_2 + \frac{1}{2}\omega_4 \omega_2 v^2 - \frac{1}{4}\omega_4 c_s^2 \omega_2 \omega_3 - \frac{1}{2}c_s^2 \omega_3 - \frac{1}{4}\omega_4^2 c_s^2 \omega_3 - \frac{1}{2}\omega_3 + \frac{1}{4}\omega_4 \omega_1 u \omega_3 + \frac{3}{4}\omega_2 \omega_3 v - \frac{1}{4}\omega_4 \omega_1 \omega_3 v^2 + \frac{1}{2}\omega_1 c_s^2 \omega_3 - \frac{1}{4}\omega_4^2 \omega_1 v^2 + \frac{1}{4}\omega_1 \omega_2 u \omega_3,$$

$$\alpha_{x-\delta_t, y-\delta_t}^{[\mu_5], t-2\delta_t} = -2 - \omega_2\omega_3 + \frac{1}{4}\omega_1\omega_2\omega_3 - \frac{1}{2}\omega_4\omega_2 + 2\omega_4 + \frac{1}{4}\omega_4\omega_1\omega_3 + \omega_1 - \frac{1}{2}\omega_1\omega_2 - \omega_4\omega_1 - \frac{1}{2}\omega_3^2 + \frac{1}{4}\omega_4^2\omega_3 + \frac{1}{4}\omega_2\omega_3^2 - \frac{1}{2}\omega_4^2 - \frac{3}{2}\omega_4\omega_3 + \omega_2 + \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_4^2\omega_1 + \frac{1}{4}\omega_4\omega_2\omega_3 + 2\omega_3 - \frac{1}{2}\omega_1\omega_3 + \frac{1}{4}\omega_4\omega_3^2,$$

$$\begin{aligned} \alpha_{x,y-\delta_t}^{[\mu_1],t-2\delta_t} = & 1 - \frac{1}{2}\omega_4 c_s^2 \omega_3 + \frac{1}{2}\omega_2 \omega_3 + \frac{1}{2}\omega_1 c_s^2 \omega_2 \omega_3 + \frac{1}{2}\omega_1 \omega_2 u^2 \omega_3 - \frac{1}{2}\omega_1 \omega_2 \omega_3 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_4 \omega_1 \omega_3 - \omega_1 + \omega_4 \omega_1 v^2 + \\ & \frac{1}{2}\omega_4 \omega_1 u^2 \omega_3 - \frac{1}{2}c_s^2 \omega_2 \omega_3 - \frac{1}{2}\omega_2 u^2 \omega_3 + \frac{1}{2}\omega_1 \omega_2 + \omega_1 \omega_2 v + \frac{1}{2}\omega_4 \omega_1 - \frac{1}{2}\omega_4 u^2 \omega_3 + \frac{1}{2}\omega_4 \omega_1 c_s^2 \omega_3 + \omega_4 \omega_1 c_s^2 - \frac{1}{2}\omega_2 v + \\ & \frac{1}{2}\omega_4 \omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4 v^2 - \frac{1}{2}\omega_1^2 \omega_2 v - \frac{1}{2}\omega_4 \omega_1^2 c_s^2 + u^2 \omega_3 - \omega_1 u^2 \omega_3 - \frac{1}{2}\omega_4 c_s^2 + c_s^2 \omega_3 - \omega_3 - \frac{1}{2}\omega_4 \omega_1^2 v^2 - \omega_1 c_s^2 \omega_3 + \omega_1 \omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y-\delta_t}^{[\mu_5],t-2\delta_t} = & -2 - \frac{1}{2}\omega_2\omega_3 + \frac{1}{2}\omega_1\omega_2\omega_3 + \omega_4 + \frac{1}{2}\omega_4\omega_1^2 + \frac{1}{2}\omega_4\omega_1\omega_3 + 3\omega_1 - \frac{3}{2}\omega_1\omega_2 - \frac{3}{2}\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_3 + \omega_2 + \frac{1}{2}\omega_1^2\omega_2 - \omega_1^2 + \omega_3 - \omega_1\omega_3, \end{aligned}$$

$$\alpha_{x+\delta_i, y-\delta_i}^{[\mu_1], t-2\delta_t} = 1 + \frac{3}{2}\omega_4 c_s^2 \omega_3 - \frac{1}{4}\omega_2 \omega_3^2 v + \frac{1}{4}\omega_2 \omega_3 - \frac{1}{4}\omega_1 c_s^2 \omega_2 \omega_3 - \frac{1}{4}\omega_1 \omega_2 u^2 \omega_3 - \frac{1}{4}\omega_4 \omega_2 \omega_3 v^2 - \frac{1}{2}\omega_4 + \frac{1}{2}\omega_4^2 c_s^2 - \frac{1}{2}\omega_1 + \frac{3}{4}\omega_4 \omega_1 v^2 - \frac{1}{4}\omega_4 \omega_1 u^2 \omega_3 - \frac{1}{4}\omega_4^2 \omega_3 v^2 + \frac{1}{4}c_s^2 \omega_2 \omega_3 + \frac{1}{4}\omega_2 u^2 \omega_3 + \frac{1}{2}\omega_1 u \omega_3 + \frac{1}{4}\omega_1 \omega_2 + \frac{1}{4}\omega_1 \omega_2 v + \frac{1}{4}\omega_4 \omega_1 + \frac{1}{4}\omega_4 u^2 \omega_3 - \frac{1}{4}\omega_4 \omega_3^2 v^2 - \frac{1}{2}\omega_4 \omega_1 c_s^2 \omega_3 - \frac{1}{2}\omega_1 u + \frac{1}{2}\omega_4^2 v^2 + \frac{3}{4}\omega_4 \omega_1 c_s^2 - \frac{1}{4}\omega_4 c_s^2 \omega_3^2 - \frac{1}{2}\omega_2 v + \frac{5}{4}\omega_4 \omega_3 v^2 + \frac{1}{4}\omega_4 \omega_3 - \frac{1}{2}\omega_2 - \frac{3}{2}\omega_4 v^2 - \frac{1}{2}u^2 \omega_3 - \frac{1}{4}\omega_4 \omega_1 \omega_2 v^2 + \frac{1}{2}\omega_4 c_s^2 \omega_2 + \frac{1}{4}\omega_4 \omega_1 u + \frac{1}{2}\omega_1 u^2 \omega_3 - \frac{1}{4}\omega_1 \omega_2 \omega_3 v + \frac{1}{4}\omega_1 \omega_2 u - \frac{1}{4}\omega_4^2 \omega_1 c_s^2 - \frac{3}{2}\omega_4 c_s^2 - \frac{1}{4}\omega_4 \omega_1 c_s^2 \omega_2 + \frac{1}{2}\omega_4 \omega_2 v^2 - \frac{1}{4}\omega_4 c_s^2 \omega_2 \omega_3 - \frac{1}{2}c_s^2 \omega_3 - \frac{1}{4}\omega_4^2 c_s^2 \omega_3 - \frac{1}{2}\omega_3 - \frac{1}{4}\omega_4 \omega_1 u \omega_3 + \frac{3}{4}\omega_2 \omega_3 v - \frac{1}{4}\omega_4 \omega_1 \omega_3 v^2 + \frac{1}{2}\omega_1 c_s^2 \omega_3 - \frac{1}{4}\omega_4^2 \omega_1 v^2 - \frac{1}{4}\omega_1 \omega_2 u \omega_3,$$

$$\alpha_{x+\delta_1, y-\delta_1}^{[\mu_5], t-2\delta_t} = -2 - \omega_2\omega_3 + \frac{1}{4}\omega_1\omega_2\omega_3 - \frac{1}{2}\omega_4\omega_2 + 2\omega_4 + \frac{1}{4}\omega_4\omega_1\omega_3 + \omega_1 - \frac{1}{2}\omega_1\omega_2 - \omega_4\omega_1 - \frac{1}{2}\omega_3^2 + \frac{1}{4}\omega_4^2\omega_3 + \frac{1}{4}\omega_2\omega_3^2 - \frac{1}{2}\omega_4^2 - \frac{3}{2}\omega_4\omega_3 + \omega_2 + \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_4^2\omega_1 + \frac{1}{4}\omega_4\omega_2\omega_3 + 2\omega_3 - \frac{1}{2}\omega_1\omega_3 + \frac{1}{4}\omega_4\omega_3^2,$$

$$\alpha_{x-\delta_1,y}^{[\mu_1],t-2\delta_t} = 2 - \frac{1}{2}w_4c_s^2\omega_3 + \frac{3}{2}\omega_2\omega_3 - \frac{1}{2}\omega_1\omega_2^2 + w_4\omega_2 - w_4 + \frac{1}{2}\omega_4\omega_1\omega_2u - \omega_1 - \frac{3}{2}c_s^2\omega_2\omega_3 - \frac{3}{2}\omega_2u^2\omega_3 + \frac{3}{2}\omega_1\omega_2 + \frac{1}{2}\omega_4\omega_1 - \frac{1}{2}\omega_4u^2\omega_3 + \frac{1}{2}\omega_1\omega_2^2u + \omega_1u + \frac{1}{2}\omega_2^2u^2\omega_3 + \frac{1}{2}\omega_4\omega_3 - 3\omega_2 - \frac{1}{2}\omega_4\omega_1\omega_2 + u^2\omega_3 + \frac{1}{2}c_s^2\omega_2^2\omega_3 - \frac{1}{2}\omega_4\omega_1u - \frac{3}{2}\omega_1\omega_2u + \omega_2^2 + \frac{1}{2}\omega_4c_s^2\omega_2\omega_3 + c_s^2\omega_3 + \frac{1}{2}\omega_4\omega_2u^2\omega_3 - \frac{1}{2}\omega_4\omega_2\omega_3 - \omega_3 - \frac{1}{2}\omega_2^2\omega_3,$$

$$\alpha_{x-\delta_t,y}^{[\mu_5],t-2\delta_t} = -2 - \frac{3}{2}\omega_2\omega_3 + \frac{1}{2}\omega_1\omega_2^2 - \omega_4\omega_2 + \omega_4 + \omega_1 - \frac{3}{2}\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_3 + 3\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2 - \omega_2^2 + \frac{1}{2}\omega_4\omega_2\omega_3 + \omega_3 + \frac{1}{2}\omega_2^2\omega_3,$$

$$\alpha_{x,y}^{[\mu_1],t-\delta_t} = 2 + \omega_4 c_s^2 \omega_3 - \omega_4^2 \omega_2 v^2 + \omega_4 \omega_2 - \omega_4 + \omega_4^2 c_s^2 - \omega_4 \omega_2^2 v^2 + 3 c_s^2 \omega_2 \omega_3 + 3 \omega_2 u^2 \omega_3 + \omega_4 u^2 \omega_3 + \omega_4^2 v^2 - \omega_4^2 c_s^2 \omega_2 - \omega_2^2 u^2 \omega_3 - 3 \omega_2 - 2 \omega_4 v^2 - 2 u^2 \omega_3 + 3 \omega_4 c_s^2 \omega_2 - c_s^2 \omega_2^2 \omega_3 - 2 \omega_4 c_s^2 + 3 \omega_4 \omega_2 v^2 + \omega_2^2 - \omega_4 c_s^2 \omega_2 \omega_3 - 2 c_s^2 \omega_3 - \omega_4 \omega_2 u^2 \omega_3 - \omega_4 c_s^2 \omega_2^2,$$

$$\alpha_{x,y}^{[\mu_5],t-2\delta_t} = -4 + \omega_1^2 \omega_3 - 4 \omega_4 \omega_2 + 3 \omega_4 + 3 \omega_1 + \omega_4 \omega_2^2 - \omega_3^2 + \omega_1 \omega_3^2 - \omega_4^2 + 3 \omega_2 - \omega_1^2 - \omega_2^2 + \omega_4^2 \omega_2 + 3 \omega_3 - 4 \omega_1 \omega_3,$$

$$\begin{aligned} \alpha_{x+\delta t, y}^{[\mu_1], t-2\delta t} = & 2 - \frac{1}{2}\omega_4 c_s^2 \omega_3 + \frac{3}{2}\omega_2 \omega_3 - \frac{1}{2}\omega_1 \omega_2^2 + \omega_4 \omega_2 - \omega_4 - \frac{1}{2}\omega_4 \omega_1 \omega_2 u - \omega_1 - \frac{3}{2}c_s^2 \omega_2 \omega_3 - \frac{3}{2}\omega_2 u^2 \omega_3 + \frac{3}{2}\omega_1 \omega_2 + \\ & \frac{1}{2}\omega_4 \omega_1 - \frac{1}{2}\omega_4 u^2 \omega_3 - \frac{1}{2}\omega_1 \omega_2^2 u - \omega_1 u + \frac{1}{2}\omega_2^2 u^2 \omega_3 + \frac{1}{2}\omega_4 \omega_3 - 3\omega_2 - \frac{1}{2}\omega_4 \omega_1 \omega_2 + u^2 \omega_3 + \frac{1}{2}c_s^2 \omega_2^2 \omega_3 + \\ & \frac{1}{2}\omega_4 \omega_1 u + \frac{3}{2}\omega_1 \omega_2 u + \omega_2^2 + \frac{1}{2}\omega_4 c_s^2 \omega_2 \omega_3 + c_s^2 \omega_3 + \frac{1}{2}\omega_4 \omega_2 u^2 \omega_3 - \frac{1}{2}\omega_4 \omega_2 \omega_3 - \omega_3 - \frac{1}{2}\omega_2^2 \omega_3, \end{aligned}$$

$$\alpha_{x+\delta_l,y}^{[\mu_5],t-2\delta_t} =$$



$$\omega_4\omega_2^2 + \frac{1}{2}\omega_4^2\omega_1\omega_2 + 2\omega_4\omega_1 + \frac{1}{2}\omega_3^2 - \frac{1}{2}\omega_4^2\omega_3 - \frac{1}{2}\omega_2\omega_3^2 + \omega_4^2 + 3\omega_4\omega_3 - 4\omega_2 - \frac{5}{2}\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2\omega_3 + \frac{1}{2}\omega_4\omega_2\omega_3^2 - \frac{1}{2}\omega_4^2\omega_1 + \omega_2^2 - \omega_4^2\omega_2 - \frac{7}{2}\omega_4\omega_2\omega_3 - \frac{5}{2}\omega_3 + \frac{1}{2}\omega_4\omega_1\omega_2^2 - \frac{1}{2}\omega_2^2\omega_3 + \frac{1}{2}\omega_1\omega_3 - \frac{1}{2}\omega_4\omega_3^2,$$

$$\alpha_{x,y}^{[\mu_1],t-3\delta_t} = -2 + \omega_4c_s^2\omega_3 + \omega_4\omega_1\omega_2u^2\omega_3 + \omega_4\omega_1c_s^2\omega_2\omega_3 - \omega_4\omega_1^2c_s^2\omega_2 - 3\omega_2\omega_3 - 3\omega_1c_s^2\omega_2\omega_3 - 3\omega_1\omega_2u^2\omega_3 + 3\omega_1\omega_2\omega_3 + \omega_1\omega_2^2 - \omega_4\omega_2 + \omega_4 + \omega_4\omega_1\omega_3 + 2\omega_1 - 2\omega_4\omega_1v^2 - \omega_4\omega_1u^2\omega_3 + 3c_s^2\omega_2\omega_3 + 3\omega_2u^2\omega_3 - 3\omega_1\omega_2 - \omega_4\omega_1 + \omega_4u^2\omega_3 - \omega_4\omega_1c_s^2\omega_3 - \omega_4\omega_1^2\omega_2v^2 - 2\omega_4\omega_1c_s^2 - \omega_2^2u^2\omega_3 - \omega_4\omega_3 + 3\omega_2 + \omega_4v^2 + \omega_4\omega_1\omega_2 + \omega_4\omega_1^2c_s^2 - 2u^2\omega_3 + 2\omega_4\omega_1\omega_2v^2 - \omega_4c_s^2\omega_2 - \omega_4\omega_1\omega_2\omega_3 - c_s^2\omega_2^2\omega_3 + 2\omega_1u^2\omega_3 + \omega_4c_s^2 + 2\omega_4\omega_1c_s^2\omega_2 - \omega_4\omega_2v^2 - \omega_2^2 - \omega_4c_s^2\omega_2\omega_3 - 2c_s^2\omega_3 - \omega_1\omega_2^2\omega_3 - \omega_4\omega_2u^2\omega_3 + \omega_4\omega_2\omega_3 + 2\omega_3 + \omega_4\omega_1^2v^2 + \omega_1\omega_2^2u^2\omega_3 + \omega_2^2\omega_3 + 2\omega_1c_s^2\omega_2\omega_3 - 2\omega_1\omega_3 + \omega_1c_s^2\omega_2^2\omega_3,$$

$$\alpha_{x,y}^{[\mu_5],t-3\delta_t} = 3 + 3\omega_2\omega_3 - 3\omega_1\omega_2\omega_3 - \omega_1\omega_2^2 + 2\omega_4\omega_2 - 2\omega_4 - \omega_4\omega_1^2 - \omega_4\omega_1\omega_3 - 4\omega_1 + 5\omega_1\omega_2 + 3\omega_4\omega_1 + \omega_4\omega_1^2\omega_2 + \omega_4\omega_3 - 4\omega_2 - 3\omega_4\omega_1\omega_2 + \omega_4\omega_1\omega_2\omega_3 - \omega_1^2\omega_2 + \omega_2^2 + \omega_1\omega_2^2\omega_3 - \omega_4\omega_2\omega_3 - 2\omega_3 - \omega_2^2\omega_3 + 2\omega_1\omega_3,$$

$$\alpha_{x+\delta_l,y}^{[\mu_1],t-3\delta_t} = -2 - 3\omega_4c_s^2\omega_3 - \frac{1}{2}\omega_4\omega_1\omega_2u^2\omega_3 - \omega_4\omega_1c_s^2\omega_2\omega_3 + \omega_4^2\omega_2v^2 - \frac{3}{2}\omega_2\omega_3 + \frac{3}{2}\omega_1c_s^2\omega_2\omega_3 + \frac{3}{2}\omega_1\omega_2u^2\omega_3 + 3\omega_4\omega_2\omega_3v^2 - \frac{1}{2}\omega_4c_s^2\omega_2\omega_3 + \frac{1}{2}\omega_1\omega_2^2 - \omega_4\omega_2 + \omega_4 - \omega_4^2c_s^2 + \omega_4\omega_2^2v^2 + \frac{1}{2}\omega_4\omega_1\omega_2u - \frac{1}{2}\omega_1\omega_2^2u\omega_3 + \omega_1 - \frac{1}{2}\omega_4^2\omega_1\omega_2v^2 - \frac{3}{2}\omega_4\omega_1v^2 + \frac{1}{2}\omega_4\omega_1u^2\omega_3 - \frac{1}{2}\omega_4\omega_1\omega_2^2v^2 + \frac{1}{2}\omega_4^2\omega_3v^2 - \frac{3}{2}c_s^2\omega_2\omega_3 - \frac{3}{2}\omega_2u^2\omega_3 - \omega_1u\omega_3 - \frac{3}{2}\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1c_s^2\omega_2 - \frac{1}{2}\omega_4\omega_1 - \frac{1}{2}\omega_4u^2\omega_3 + \frac{1}{2}\omega_1\omega_2^2u - \frac{1}{2}\omega_4^2c_s^2\omega_2\omega_3 + \frac{1}{2}\omega_4\omega_3^2v^2 + \omega_4\omega_1c_s^2\omega_3 + \omega_1u - \omega_4^2v^2 + \omega_4^2c_s^2\omega_2 - \frac{3}{2}\omega_4\omega_1c_s^2 + \frac{1}{2}\omega_4c_s^2\omega_3^2 + \frac{1}{2}\omega_2^2u^2\omega_3 - \frac{5}{2}\omega_4\omega_3v^2 - \frac{1}{2}\omega_4\omega_2\omega_3v^2 - \frac{1}{2}\omega_4\omega_3 + 3\omega_2 + 3\omega_4v^2 + \frac{1}{2}\omega_4\omega_1\omega_2 + u^2\omega_3 + 2\omega_4\omega_1\omega_2v^2 - 4\omega_4c_s^2\omega_2 + \frac{1}{2}c_s^2\omega_2^2\omega_3 - \frac{1}{2}\omega_4\omega_1u - \frac{1}{2}\omega_4\omega_1c_s^2\omega_2^2 - \omega_1u^2\omega_3 - \frac{1}{2}\omega_4c_s^2\omega_2\omega_3^2 - \frac{3}{2}\omega_1\omega_2u + \frac{1}{2}\omega_4^2\omega_1c_s^2 + 3\omega_4c_s^2 + 2\omega_4\omega_1c_s^2\omega_2 - 4\omega_4\omega_2v^2 - \omega_2^2 + \frac{7}{2}\omega_4c_s^2\omega_2\omega_3 + c_s^2\omega_3 + \frac{1}{2}\omega_4\omega_2u^2\omega_3 + \frac{1}{2}\omega_4\omega_2\omega_3 + \frac{1}{2}\omega_4^2c_s^2\omega_3 + \omega_4c_s^2\omega_2^2 - \frac{1}{2}\omega_4\omega_2^2\omega_3v^2 + \omega_3 - \frac{1}{2}\omega_4\omega_1\omega_2\omega_3v^2 + \frac{1}{2}\omega_4\omega_1u\omega_3 - \frac{1}{2}\omega_1\omega_2^2u^2\omega_3 - \frac{1}{2}\omega_4\omega_1\omega_2u\omega_3 + \frac{1}{2}\omega_4\omega_1\omega_3v^2 + \frac{1}{2}\omega_2^2\omega_3 - \omega_1c_s^2\omega_3 + \frac{1}{2}\omega_4\omega_1v^2 + \frac{3}{2}\omega_1\omega_2u\omega_3 - \frac{1}{2}\omega_1c_s^2\omega_2\omega_3 - \frac{1}{2}\omega_4\omega_2\omega_3v^2,$$

$$\alpha_{x+\delta_l,y}^{[\mu_5],t-3\delta_t} = 3 + \frac{1}{2}\omega_4^2\omega_2\omega_3 + 3\omega_2\omega_3 - \frac{1}{2}\omega_1\omega_2\omega_3 - \frac{1}{2}\omega_1\omega_2^2 + 5\omega_4\omega_2 - 4\omega_4 + \frac{1}{2}\omega_4\omega_2^2\omega_3 - \frac{1}{2}\omega_4\omega_1\omega_3 - \frac{3}{2}\omega_1 + 2\omega_1\omega_2 - \omega_4\omega_2^2 + \frac{1}{2}\omega_4^2\omega_1\omega_2 + 2\omega_4\omega_1 + \frac{1}{2}\omega_3^2 - \frac{1}{2}\omega_4^2\omega_3 - \frac{1}{2}\omega_2\omega_3^2 + \omega_4^2 + 3\omega_4\omega_3 - 4\omega_2 - \frac{5}{2}\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2\omega_3 + \frac{1}{2}\omega_4\omega_2\omega_3^2 - \frac{1}{2}\omega_4^2\omega_1 + \omega_2^2 - \omega_4^2\omega_2 - \frac{7}{2}\omega_4\omega_2\omega_3 - \frac{5}{2}\omega_3 + \frac{1}{2}\omega_4\omega_1\omega_2^2 - \frac{1}{2}\omega_2^2\omega_3 + \frac{1}{2}\omega_1\omega_3 - \frac{1}{2}\omega_4\omega_3^2,$$

$$\alpha_{x,y+\delta_l}^{[\mu_1],t-3\delta_t} = -1 - \frac{5}{2}\omega_4c_s^2\omega_3 - \frac{1}{2}\omega_4\omega_1\omega_2^2v^2 - \frac{1}{2}\omega_4\omega_1c_s^2\omega_2\omega_3 - \frac{1}{2}\omega_2\omega_3^2v - \frac{1}{2}\omega_4\omega_1c_s^2\omega_3^2 + \frac{1}{2}\omega_4\omega_2\omega_3v^2 + \frac{1}{2}\omega_1\omega_2\omega_3 + \frac{1}{2}\omega_4 - \frac{1}{2}\omega_4^2c_s^2 - \frac{1}{2}\omega_4\omega_1^2\omega_3v^2 + \frac{1}{2}\omega_4\omega_1\omega_3 + \omega_1 - \frac{5}{2}\omega_4\omega_1v^2 + \frac{1}{2}\omega_4^2\omega_3v^2 - \frac{1}{2}\omega_1\omega_2 + \frac{3}{2}\omega_1\omega_2v - \frac{1}{2}\omega_4\omega_1 + \frac{1}{2}\omega_1\omega_2\omega_3^2v + \frac{1}{2}\omega_4\omega_3^2v^2 + 3\omega_4\omega_1c_s^2\omega_3 - \frac{1}{2}\omega_4^2v^2 - \frac{5}{2}\omega_4\omega_1c_s^2 + \frac{1}{2}\omega_4c_s^2\omega_3^2 - \omega_2v - \frac{1}{2}\omega_4^2\omega_1\omega_3v^2 - \frac{5}{2}\omega_4\omega_3v^2 - \frac{1}{2}\omega_4\omega_3 + \frac{1}{2}\omega_2 + 2\omega_4v^2 - \frac{1}{2}\omega_1\omega_2v - \frac{1}{2}\omega_4\omega_1c_s^2 + \frac{1}{2}\omega_4\omega_1\omega_2v^2 - \frac{1}{2}\omega_4c_s^2\omega_2 - \frac{1}{2}\omega_4\omega_1^2c_s^2\omega_3 - 2\omega_1\omega_2\omega_3v + \frac{1}{2}\omega_4^2\omega_1c_s^2 + 2\omega_4c_s^2 + \frac{1}{2}\omega_4\omega_1c_s^2\omega_2 - \frac{1}{2}\omega_4\omega_2v^2 + \frac{1}{2}\omega_4c_s^2\omega_2\omega_3 + \frac{1}{2}\omega_4^2c_s^2\omega_3 + w_3 - \frac{1}{2}\omega_4\omega_1\omega_2\omega_3v^2 + \frac{1}{2}\omega_4\omega_1^2v^2 + \frac{3}{2}\omega_2\omega_3v + 3\omega_4\omega_1\omega_3v^2 + \frac{1}{2}\omega_4\omega_1v^2 - \omega_1\omega_3 - \frac{1}{2}\omega_4\omega_1c_s^2\omega_3,$$

$$\alpha_{x,y+\delta_l}^{[\mu_5],t-3\delta_t} = 3 + 2\omega_2\omega_3 - \omega_1^2\omega_3 - \frac{5}{2}\omega_1\omega_2\omega_3 + \frac{1}{2}\omega_4\omega_2 - \frac{5}{2}\omega_4 - \frac{1}{2}\omega_4\omega_1^2 - \frac{7}{2}\omega_4\omega_1\omega_3 - 4\omega_1 + \frac{1}{2}\omega_4\omega_1\omega_3^2 + 2\omega_1\omega_2 + \frac{1}{2}\omega_1\omega_2\omega_3^2 + 3\omega_4\omega_1 + \omega_3^2 - \frac{1}{2}\omega_4^2\omega_3 - \frac{1}{2}\omega_2\omega_3^2 - \omega_1\omega_3^2 + \frac{1}{2}\omega_4^2 + 3\omega_4\omega_3 - \frac{3}{2}\omega_2 - \frac{1}{2}\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_1\omega_2\omega_3 + \frac{1}{2}\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 + \omega_2^2 - \frac{1}{2}\omega_4\omega_2\omega_3 + \frac{1}{2}\omega_4\omega_1^2\omega_3 + 5\omega_1\omega_3 - \frac{1}{2}\omega_4\omega_3^2 + \frac{1}{2}\omega_4^2\omega_1\omega_3,$$

$$\alpha_{x,y}^{[\mu_1],t-4\delta_t} = 2 + 5\omega_4c_s^2\omega_3 + \omega_4\omega_1\omega_2^2v^2 + 7\omega_4\omega_1c_s^2\omega_2\omega_3 - \omega_4^2\omega_2v^2 + \omega_4\omega_1^2c_s^2\omega_2 + 3\omega_2\omega_3 + \omega_4\omega_1c_s^2\omega_3^2 - \omega_4\omega_1\omega_2\omega_3v^2 - 6\omega_4\omega_2\omega_3v^2 - 3\omega_1\omega_2\omega_3 + \omega_4c_s^2\omega_2\omega_3 - \omega_1\omega_2^2 + \omega_4\omega_2 - \omega_4 + \omega_4^2c_s^2 - \omega_4\omega_2^2v^2 + \omega_4\omega_1^2\omega_3v^2 - \omega_4\omega_1c_s^2\omega_2\omega_3 - \omega_4\omega_1\omega_2v^2 + 5\omega_4\omega_1v^2 - \omega_4\omega_1\omega_2\omega_3v^2 - \omega_4\omega_1^2\omega_2\omega_3v^2 + \omega_4\omega_1\omega_2^2v^2 - \omega_4^2\omega_3v^2 + 3\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_1c_s^2\omega_2 + \omega_4\omega_1\omega_2\omega_3v^2 + 3\omega_4\omega_1c_s^2\omega_2 - \omega_4\omega_1\omega_2\omega_3v^2 - \omega_4\omega_1\omega_2v^2 + \omega_4\omega_1\omega_2\omega_3v^2 + 5\omega_4\omega_3v^2 + \omega_4\omega_2\omega_3v^2 + \omega_4\omega_3 - 3\omega_2 - 4\omega_4v^2 - \omega_4\omega_1\omega_2 - \omega_4\omega_1^2c_s^2 - \omega_4\omega_1^2c_s^2\omega_2\omega_3 - 6\omega_4\omega_1\omega_2v^2 + 5\omega_4c_s^2\omega_2 + \omega_4\omega_1\omega_2\omega_3 + \omega_4\omega_1^2c_s^2\omega_2 + \omega_4\omega_1\omega_2\omega_3v^2 - \omega_4\omega_1\omega_2\omega_3v^2 - \omega_4\omega_1\omega_2v^2 + \omega_2^2 - 6\omega_4c_s^2\omega_2\omega_3 + \omega_1\omega_2^2\omega_3 - \omega_4\omega_2\omega_3 - \omega_4c_s^2\omega_2^2 + \omega_4\omega_2\omega_3v^2 - 2\omega_3 + 7\omega_4\omega_1\omega_2\omega_3v^2 - \omega_4\omega_1^2v^2 - \omega_4\omega_1c_s^2\omega_2\omega_3 - 6\omega_4\omega_1\omega_3v^2 - \omega_2^2\omega_3 - \omega_4\omega_1\omega_2\omega_3v^2 - \omega_4\omega_1v^2 + 2\omega_1\omega_3 + \omega_4\omega_2\omega_3v^2 + \omega_4\omega_1c_s^2\omega_3,$$

$$\alpha_{x,y}^{[\mu_5],t-4\delta_t} = -4 - \omega_4^2\omega_2\omega_3 - 6\omega_2\omega_3 + \omega_1^2\omega_3 + 7\omega_1\omega_2\omega_3 + \omega_1\omega_2^2 - 6\omega_4\omega_2 + 5\omega_4 + \omega_4\omega_1^2 - \omega_4\omega_2^2\omega_3 + \omega_4^2\omega_1\omega_2\omega_3 + 7\omega_4\omega_1\omega_3 + 5\omega_1 - \omega_4\omega_1\omega_3^2 + \omega_4\omega_1\omega_2^2\omega_3 - 6\omega_1\omega_2 - \omega_1\omega_2\omega_3^2 + \omega_4\omega_2^2 - \omega_4^2\omega_1\omega_2 - 6\omega_4\omega_1 - \omega_3^2 + \omega_4^2\omega_3 + \omega_4\omega_1^2\omega_2\omega_3 - \omega_4\omega_1^2\omega_2 + \omega_2\omega_3^2 + \omega_1\omega_3^2 - \omega_4^2 - 6\omega_4\omega_3 + 5\omega_2 + 7\omega_4\omega_1\omega_2 - 8\omega_4\omega_1\omega_2\omega_3 + \omega_1\omega_2 - \omega_4\omega_2\omega_3^2 + \omega_4^2\omega_1 - \omega_1^2 - \omega_2^2 + \omega_4\omega_2\omega_2 - \omega_1\omega_2\omega_3 + 7\omega_4\omega_2\omega_3 - \omega_4\omega_1^2\omega_3 + 5\omega_3 + \omega_4\omega_1\omega_2\omega_3^2 - \omega_4\omega_1\omega_2^2 + \omega_2\omega_3 - \omega_1\omega_2\omega_3 + \omega_4\omega_2\omega_3v^2 + \omega_4\omega_1c_s^2\omega_3,$$

## 4 MRT 2: relaxation of $m_{00}, m_{10}, m_{01}, m_{20} + m_{02}, m_{20} - m_{02}$

### 4.1 Definitions

Matrix  $\mathbf{A} = \mathbf{M}^{-1}\mathbf{SM}$ :

$$\mathbf{A} = \begin{pmatrix} \omega_0 & -\omega_3 + \omega_0 & -\omega_3 + \omega_0 & -\omega_3 + \omega_0 & -\omega_3 + \omega_0 \\ 0 & \frac{1}{4}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3 & -\frac{1}{4}\omega_4 + \frac{1}{4}\omega_3 & \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3 & -\frac{1}{4}\omega_4 + \frac{1}{4}\omega_3 \\ 0 & -\frac{1}{4}\omega_4 + \frac{1}{4}\omega_3 & \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3 + \frac{1}{2}\omega_2 & -\frac{1}{4}\omega_4 + \frac{1}{4}\omega_3 & \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3 - \frac{1}{2}\omega_2 \\ 0 & \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3 & -\frac{1}{4}\omega_4 + \frac{1}{4}\omega_3 & \frac{1}{4}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3 & -\frac{1}{4}\omega_4 + \frac{1}{4}\omega_3 \\ 0 & -\frac{1}{4}\omega_4 + \frac{1}{4}\omega_3 & \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3 - \frac{1}{2}\omega_2 & \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3 & \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3 + \frac{1}{2}\omega_2 \end{pmatrix}.$$

where

$$\mathbf{S} = \text{diag}(\omega_0, \omega_1, \omega_2, \omega_3, \omega_4)$$

and

$$\mathbf{M} = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 0 & -1 & 0 \\ 0 & 0 & 1 & 0 & -1 \\ 0 & 1 & 1 & 1 & 1 \\ 0 & 1 & -1 & 1 & -1 \end{pmatrix}$$

Matrix  $\mathbf{B}$ :

$$\mathbf{B} = \begin{pmatrix} 0 & -1 + \omega_3 & -1 + \omega_3 & -1 + \omega_3 & -1 + \omega_3 \\ -1 + \frac{1}{4}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3 & 0 & -1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 & -1 + \omega_1 & -1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 \\ -1 + \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3 + \frac{1}{2}\omega_2 & -1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2 & 0 & -1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2 & -1 + \omega_2 \\ -1 + \frac{1}{4}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3 & -1 + \omega_1 & -1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 & 0 & -1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 \\ -1 + \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3 + \frac{1}{2}\omega_2 & -1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2 & -1 + \omega_2 & -1 + \frac{1}{2}\omega_2 & 0 \end{pmatrix}.$$

### 4.2 EFDE for $\mu_1$

$$\mu_{1,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l, y+j\delta_l}^{[\mu_1], t-\ell\delta_t} \mu_{x+i\delta_l, y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x,y-\delta_l}^{[\mu_1], t} = 1 - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_2 v + \frac{1}{4}v^2\omega_4 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_3 u^2 - \frac{1}{4}\omega_4 - \frac{1}{4}\omega_4 u^2 + \frac{1}{4}v^2\omega_3 + \frac{1}{2}\omega_3 c_s^2.$$

$$\alpha_{x-\delta_l, y}^{[\mu_1], t} = 1 - \frac{1}{4}v^2\omega_4 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_3 u^2 + \frac{1}{2}\omega_1 u - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4 u^2 + \frac{1}{4}v^2\omega_3 + \frac{1}{2}\omega_3 c_s^2.$$

$$\alpha_{x,y}^{[\mu_1], t} = 1 - \omega_3 u^2 - v^2\omega_3 - 2\omega_3 c_s^2.$$

$$\alpha_{x+\delta_l, y}^{[\mu_1], t} = 1 - \frac{1}{4}v^2\omega_4 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_3 u^2 - \frac{1}{2}\omega_1 u - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4 u^2 + \frac{1}{4}v^2\omega_3 + \frac{1}{2}\omega_3 c_s^2.$$

$$\alpha_{x,y+\delta_l}^{[\mu_1], t} = 1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_4 c_s^2 - \frac{1}{2}\omega_2 v + \frac{1}{4}v^2\omega_4 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_3 u^2 - \frac{1}{4}\omega_4 - \frac{1}{4}\omega_4 u + \frac{1}{4}v^2\omega_3 + \frac{1}{2}\omega_3 c_s^2.$$

$$\alpha_{x-\delta_l, y-\delta_l}^{[\mu_1], t-\delta_t} = -1 + \frac{1}{2}\omega_2 + \frac{1}{4}\omega_2 v\omega_1 - \frac{1}{8}\omega_4\omega_1 u^2 - \frac{1}{8}\omega_2\omega_3 - \frac{1}{2}\omega_2 v + \frac{1}{4}\omega_2 v\omega_4 + \frac{1}{8}\omega_2 v^2\omega_3 + \frac{1}{4}\omega_2\omega_3 c_s^2 + \frac{1}{8}\omega_2\omega_4 c_s^2 + \frac{1}{2}\omega_3 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{4}\omega_2\omega_1 u + \frac{1}{2}\omega_3\omega_4 c_s^2 - \frac{1}{2}\omega_3 u^2 + \frac{1}{4}\omega_4\omega_1 u + \frac{1}{8}\omega_2\omega_3 u^2 + \frac{1}{8}\omega_3\omega_1 u^2 - \frac{1}{2}\omega_1 u - \frac{1}{8}\omega_3\omega_1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_3\omega_4 - \frac{1}{8}\omega_2 v^2\omega_4 + \frac{1}{4}\omega_3\omega_4 u^2 + \frac{1}{4}v^2\omega_3\omega_4 - \frac{1}{2}v^2\omega_3 - \frac{1}{4}\omega_2\omega_1 - \omega_3 c_s^2 + \frac{1}{8}v^2\omega_3\omega_1 - \frac{1}{8}\omega_2\omega_4 + \frac{1}{4}\omega_3 c_s^2 \omega_1,$$





$$\begin{aligned}
& \frac{1}{4}\omega_3\omega_4u^2 - \frac{1}{4}\omega_2v^2\omega_4\omega_1 + \frac{1}{4}\omega_4u + \frac{1}{8}\omega_2\omega_3\omega_4^2u^2 + \frac{1}{4}v^2\omega_3 - \frac{1}{2}\omega_2\omega_1 + \frac{1}{2}\omega_3c_s^2 + \frac{1}{8}\omega_2\omega_4^2u - \frac{1}{4}v^2\omega_3\omega_1 + \\
& \frac{1}{4}\omega_2\omega_4c_s^2 + \frac{1}{2}\omega_3\omega_1u + \frac{1}{8}\omega_2\omega_4\omega_1u^2 - \frac{3}{4}\omega_2\omega_4 + \frac{3}{8}\omega_3\omega_4\omega_1u^2 + \frac{1}{8}\omega_4^2c_s^2 - \frac{1}{2}\omega_3c_s^2\omega_1, \\
\alpha_{x,y}^{[\mu_1],t-3\delta_t} &= -1 - \frac{1}{4}\omega_2\omega_4^2c_s^2 + \omega_2 + \frac{7}{8}\omega_2v^2\omega_3\omega_4\omega_1 - \omega_2v^2\omega_3\omega_1 + \frac{1}{4}\omega_4\omega_1u^2 - \frac{1}{4}\omega_4c_s^2 - 2\omega_2\omega_3c_s^2\omega_1 - \omega_2\omega_3 - \\
& \frac{7}{8}\omega_2v^2\omega_3\omega_4 + \frac{7}{8}\omega_2\omega_3\omega_4\omega_1u^2 + \frac{1}{8}\omega_2v^2\omega_4^2\omega_1 + \omega_2v^2\omega_3 + \frac{1}{8}\omega_2\omega_4^2\omega_1u^2 - \frac{7}{8}\omega_2\omega_3\omega_4u^2 + 2\omega_2\omega_3c_s^2 - \frac{1}{4}\omega_4^2u + \\
& \frac{7}{8}\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_2\omega_4u + \frac{7}{8}\omega_2\omega_3\omega_4 - \frac{1}{8}\omega_2\omega_4^2\omega_1 + \frac{1}{4}\omega_2\omega_4^2c_s^2\omega_1 + \frac{1}{8}v^2\omega_4^2 + \frac{7}{4}\omega_2\omega_3\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_2\omega_4u^2 + \omega_3 - \omega_4\omega_1 + \\
& \frac{1}{8}\omega_4^2u^2 + \frac{1}{4}\omega_4c_s^2\omega_1 + \omega_2\omega_3\omega_1 + \frac{7}{4}\omega_3\omega_4c_s^2 - \omega_3u^2 - \omega_2\omega_3\omega_1u^2 + \frac{1}{8}\omega_2\omega_4^2 + \omega_2\omega_3u^2 - \frac{7}{8}\omega_2\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_2\omega_4c_s^2\omega_1 - \\
& \frac{1}{8}\omega_4^2 + \omega_3\omega_1u^2 - \frac{7}{8}\omega_3\omega_4c_s^2\omega_1 - \omega_3\omega_1 + \omega_4 + \omega_2\omega_4\omega_1 - \frac{1}{4}\omega_4^2c_s^2\omega_1 - \frac{1}{8}\omega_2\omega_4^2u^2 - \frac{1}{8}\omega_2v^2\omega_4^2 + \omega_1 - \frac{7}{8}\omega_3\omega_4 + \\
& \frac{1}{8}\omega_4^2\omega_1 - \frac{1}{4}\omega_4u^2 - \frac{1}{8}\omega_4^2\omega_1u^2 + \frac{7}{8}\omega_3\omega_4u^2 - \frac{7}{8}\omega_2\omega_3\omega_4\omega_1 - \frac{1}{8}v^2\omega_4^2\omega_1 + \frac{7}{8}v^2\omega_3\omega_4 + \frac{1}{4}\omega_4u - \frac{7}{8}v^2\omega_3\omega_4\omega_1 - v^2\omega_3 - \\
& \omega_2\omega_1 - 2\omega_3c_s^2 + \frac{1}{4}\omega_2\omega_4^2u + v^2\omega_3\omega_1 + \frac{1}{4}\omega_2\omega_4c_s^2 - \frac{1}{4}\omega_2\omega_4\omega_1u^2 - \omega_2\omega_4 - \frac{7}{8}\omega_3\omega_4\omega_1u^2 + \frac{1}{4}\omega_4^2c_s^2 + 2\omega_3c_s^2\omega_1, \\
\alpha_{x+\delta_l,y}^{[\mu_1],t-3\delta_t} &= -1 - \frac{1}{8}\omega_2\omega_4^2c_s^2 + \omega_2 + \frac{1}{4}\omega_2v^2\omega_3\omega_1 - \frac{1}{8}\omega_4\omega_1u^2 + \frac{1}{2}\omega_2\omega_3\omega_1u - \frac{1}{4}\omega_4c_s^2 + \frac{1}{2}\omega_2\omega_3c_s^2\omega_1 - \frac{3}{4}\omega_2\omega_3 + \\
& \frac{1}{8}\omega_2v^2\omega_3\omega_4 - \frac{3}{8}\omega_2\omega_3\omega_4\omega_1u^2 + \frac{1}{8}\omega_3\omega_4^2u^2 - \frac{1}{4}\omega_2v^2\omega_3 + \frac{3}{8}\omega_2\omega_3\omega_4u^2 - \frac{1}{2}\omega_2\omega_3c_s^2 - \frac{1}{8}\omega_4^2u + \frac{1}{4}v^2\omega_4\omega_1 - \\
& \frac{1}{4}v^2\omega_4 - \frac{1}{4}\omega_2\omega_4u + \frac{3}{8}\omega_2\omega_3\omega_4 + \frac{1}{8}v^2\omega_4^2 - \frac{3}{8}\omega_2\omega_3\omega_4c_s^2\omega_1 + \frac{3}{4}\omega_3 - \frac{3}{8}\omega_2\omega_3\omega_4\omega_1u - \frac{1}{4}\omega_4\omega_1 + \frac{1}{8}\omega_3\omega_4u + \\
& \frac{1}{4}\omega_2\omega_3\omega_4u - \frac{1}{8}\omega_2\omega_3\omega_4^2c_s^2 + \frac{1}{8}\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_2\omega_3\omega_1 - \frac{1}{2}\omega_2\omega_1u - \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_3u^2 - \frac{3}{8}\omega_4\omega_1u + \frac{1}{4}\omega_2\omega_3\omega_1u^2 + \\
& \frac{1}{8}\omega_2\omega_4^2 + \frac{3}{8}\omega_3\omega_4\omega_1u - \frac{1}{4}\omega_2\omega_3u^2 + \frac{1}{2}\omega_2\omega_3\omega_4c_s^2 + \frac{1}{8}\omega_3\omega_4^2c_s^2 - \frac{1}{8}\omega_2\omega_4c_s^2\omega_1 - \frac{1}{8}\omega_4^2 - \frac{1}{4}\omega_3\omega_1u^2 + \frac{3}{8}\omega_2\omega_4\omega_1u + \\
& \frac{1}{8}\omega_1u + \frac{3}{8}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_3\omega_1 + \frac{3}{4}\omega_4 + \frac{1}{4}\omega_2\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4u - \frac{1}{8}\omega_2v^2\omega_4^2 + \frac{1}{2}\omega_1 - \frac{3}{8}\omega_3\omega_4 - \frac{1}{8}\omega_2\omega_3\omega_4^2u + \\
& \frac{1}{4}\omega_2v^2\omega_4 - \frac{3}{8}\omega_3\omega_4u^2 - \frac{1}{4}\omega_2v^2\omega_4\omega_1 - \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{4}\omega_4u - \frac{1}{8}\omega_2\omega_3\omega_4^2u^2 + \frac{1}{4}v^2\omega_3 - \frac{1}{2}\omega_2\omega_1 + \frac{1}{2}\omega_3c_s^2 + \\
& \frac{1}{8}\omega_2\omega_4^2u - \frac{1}{4}v^2\omega_3\omega_1 + \frac{1}{4}\omega_2\omega_4c_s^2 - \frac{1}{2}\omega_3\omega_1u + \frac{1}{8}\omega_2\omega_4\omega_1u^2 - \frac{3}{4}\omega_2\omega_4 + \frac{3}{8}\omega_3\omega_4\omega_1u^2 + \frac{1}{8}\omega_4^2c_s^2 - \frac{1}{2}\omega_3c_s^2\omega_1, \\
\alpha_{x,y+\delta_l}^{[\mu_1],t-3\delta_t} &= -1 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_2v^2\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_2v\omega_4\omega_1 + \frac{1}{4}\omega_2v^2\omega_3\omega_1 - \frac{1}{2}\omega_2v\omega_1 + \frac{1}{2}\omega_4\omega_1u^2 - \frac{1}{4}\omega_4c_s^2 + \frac{1}{2}\omega_2\omega_3c_s^2\omega_1 - \\
& \frac{1}{4}\omega_2\omega_3 + \frac{1}{2}\omega_2v^2\omega_3\omega_4 + \frac{1}{2}\omega_2v - \frac{1}{2}\omega_2v\omega_4 - \frac{1}{4}\omega_2v^2\omega_3 - \frac{1}{2}\omega_2\omega_3c_s^2 - \frac{1}{4}\omega_4^2u - \frac{1}{4}v^2\omega_4\omega_1 + \frac{1}{8}\omega_3\omega_4\omega_1 + \frac{1}{4}v^2\omega_4 + \\
& \frac{1}{8}v^2\omega_4^2 - \frac{1}{2}\omega_2\omega_3\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_2\omega_4u^2 + \frac{3}{4}\omega_3 - \frac{3}{4}\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4^2u + \frac{1}{8}\omega_4^2u^2 + \frac{1}{4}\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_2\omega_3\omega_1 - \frac{1}{2}\omega_3\omega_4c_s^2 + \\
& \frac{1}{4}\omega_3u^2 + \frac{1}{4}\omega_2\omega_3\omega_1u^2 - \frac{1}{4}\omega_2\omega_3u^2 + \frac{1}{2}\omega_2\omega_3\omega_4c_s^2 - \frac{1}{8}\omega_4^2 - \frac{1}{4}\omega_3\omega_1u^2 - \frac{1}{2}\omega_2v\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 - \\
& \frac{3}{4}\omega_3\omega_1 + \frac{3}{4}\omega_4 + \frac{1}{4}\omega_2\omega_4\omega_1 - \frac{1}{4}\omega_4^2c_s^2\omega_1 - \frac{1}{4}\omega_3\omega_4u + \omega_1 - \frac{3}{8}\omega_3\omega_4 + \frac{1}{8}\omega_4^2\omega_1 - \frac{1}{2}\omega_4u^2 - \frac{1}{2}\omega_2v\omega_3 - \frac{1}{4}\omega_2v^2\omega_4 - \\
& \frac{1}{8}\omega_4^2\omega_1u^2 + \frac{1}{8}\omega_3\omega_4u^2 + \frac{1}{2}\omega_2v\omega_3\omega_1 + \frac{1}{4}\omega_2v^2\omega_4\omega_1 - \frac{1}{8}v^2\omega_4^2\omega_1 - \frac{5}{8}\omega_2v^2\omega_3\omega_4 + \frac{1}{4}\omega_4u + \frac{5}{8}\omega_2v^2\omega_3\omega_4\omega_1 + \frac{1}{4}v^2\omega_3 - \\
& \frac{1}{2}\omega_2\omega_1 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{4}v^2\omega_3\omega_1 - \frac{1}{4}\omega_2\omega_4\omega_1u^2 + \frac{1}{2}\omega_2v\omega_3\omega_4 - \frac{1}{4}\omega_2\omega_4 - \frac{1}{8}\omega_3\omega_4\omega_1u^2 + \frac{1}{4}\omega_4^2c_s^2 - \frac{1}{2}\omega_3c_s^2\omega_1, \\
\alpha_{x,y}^{[\mu_1],t-4\delta_t} &= 1 + \frac{1}{4}\omega_2\omega_4^2c_s^2 - \omega_2 + \frac{1}{8}\omega_2v^2\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_4\omega_1u^2 + \frac{1}{4}\omega_4c_s^2 + \omega_2\omega_3 - \frac{1}{8}\omega_2v^2\omega_3\omega_4 - \frac{1}{8}\omega_2\omega_3\omega_4\omega_1u^2 - \\
& \frac{1}{8}\omega_2v^2\omega_4^2\omega_1 - \frac{1}{8}\omega_2\omega_4^2\omega_1u^2 + \frac{1}{8}\omega_2\omega_3\omega_4u^2 + \frac{1}{4}\omega_4^2u - \frac{7}{8}\omega_3\omega_4\omega_1 + \frac{1}{4}\omega_2\omega_4u - \frac{7}{8}\omega_2\omega_3\omega_4 + \frac{1}{8}\omega_2\omega_4^2\omega_1 - \\
& \frac{1}{4}\omega_2\omega_4^2c_s^2\omega_1 - \frac{1}{8}v^2\omega_4^2 - \frac{1}{2}\omega_2\omega_4u^2 - \omega_3 + \omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4^2u - \frac{1}{8}\omega_4^2u^2 - \frac{1}{4}\omega_2\omega_3\omega_4u - \frac{1}{4}\omega_4c_s^2\omega_1 - \omega_2\omega_3\omega_1 - \\
& \frac{1}{8}\omega_2\omega_4^2 + \frac{1}{4}\omega_2\omega_4c_s^2\omega_1 + \frac{1}{8}\omega_4^2 + \omega_3\omega_1 - \omega_4 - \omega_2\omega_4\omega_1 + \frac{1}{4}\omega_4^2c_s^2\omega_1 + \frac{1}{8}\omega_2\omega_4^2u^2 + \frac{1}{4}\omega_3\omega_4u + \frac{1}{8}\omega_2v^2\omega_4^2 - \omega_1 + \\
& \frac{1}{8}\omega_3\omega_4 - \frac{1}{8}\omega_4^2\omega_1 + \frac{1}{4}\omega_2\omega_3\omega_4u^2 + \frac{1}{4}\omega_4u^2 + \frac{1}{8}\omega_4^2\omega_1u^2 - \frac{1}{8}\omega_3\omega_4u^2 + \frac{7}{8}\omega_2\omega_3\omega_4\omega_1 + \frac{1}{8}v^2\omega_4^2\omega_1 + \frac{1}{8}\omega_2v^2\omega_3\omega_4 - \\
& \frac{1}{4}\omega_4u - \frac{1}{8}v^2\omega_3\omega_4\omega_1 + \omega_2\omega_1 - \frac{1}{4}\omega_2\omega_4^2u - \frac{1}{4}\omega_2\omega_4c_s^2 + \frac{1}{4}\omega_2\omega_4\omega_1u^2 + \omega_2\omega_4 + \frac{1}{8}\omega_3\omega_4\omega_1u^2 - \frac{1}{4}\omega_4^2c_s^2,
\end{aligned}$$

### 4.3 EFDE for $\mu_2$

$$\mu_{2,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_2],t-\ell\delta_t} \mu_{2,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x-\delta_l,y}^{[\mu_1],t} = 1 - \frac{1}{4}v^2\omega_4 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_3u^2 + \frac{1}{2}\omega_1u - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4u^2 + \frac{1}{4}v^2\omega_3 + \frac{1}{2}\omega_3c_s^2.$$

$$\alpha_{x+\delta_l,y}^{[\mu_1],t} = -1 + \frac{1}{4}v^2\omega_4 + \frac{1}{4}\omega_3 - \frac{1}{4}\omega_3u^2 + \frac{1}{2}\omega_1u + \frac{1}{4}\omega_4 + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_4u^2 - \frac{1}{4}v^2\omega_3 - \frac{1}{2}\omega_3c_s^2.$$



$$\alpha_{x,y-\delta_l}^{[\mu_1],t-2\delta_t} = \omega_2\omega_1u + 2\omega_4\omega_1u + \omega_1^2u - \frac{1}{2}\omega_2\omega_1^2u - \frac{1}{2}\omega_2\omega_4\omega_1u - 2\omega_1u - \frac{1}{2}\omega_4\omega_1^2u - \frac{1}{2}\omega_4^2\omega_1u,$$

$$\alpha_{x,y-\delta_l}^{[\mu_2],t-2\delta_t} = -2 + \omega_2 + \frac{1}{2}\omega_4\omega_1^2 - \frac{5}{2}\omega_4\omega_1 - \frac{1}{2}\omega_4^2 + 2\omega_4 - \omega_1^2 + \frac{1}{2}\omega_2\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_1^2 + 3\omega_1 + \frac{1}{2}\omega_4^2\omega_1 - \frac{3}{2}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_4,$$

$$\begin{aligned} \alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-2\delta_t} = & -1 + \frac{1}{2}\omega_2 + \frac{1}{4}\omega_2v^2\omega_3\omega_1 + \frac{1}{4}\omega_2v\omega_1 + \frac{1}{4}\omega_3^2\omega_4u^2 - \frac{1}{8}\omega_4\omega_1u^2 - \frac{1}{4}\omega_2\omega_3\omega_1u + \frac{1}{2}\omega_2\omega_3c_s^2\omega_1 + \\ & \frac{1}{8}\omega_2v^2\omega_3\omega_4 - \frac{1}{2}\omega_2v + \frac{1}{4}\omega_3\omega_4^2u^2 + \frac{1}{8}\omega_2\omega_4 - \frac{5}{8}\omega_2v^2\omega_3 - \frac{1}{8}\omega_3^2\omega_1u + \frac{3}{8}\omega_2\omega_3\omega_4u^2 - \frac{5}{4}\omega_2\omega_3c_s^2 + \frac{1}{8}v^2\omega_4\omega_1 - \\ & \frac{1}{2}v^2\omega_4 - \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{8}v^2\omega_4^2 - \frac{1}{8}\omega_2\omega_4u^2 + \frac{1}{4}\omega_3 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{8}\omega_2v^2\omega_3^2 - \frac{1}{8}\omega_4^2u^2 + \frac{1}{8}\omega_2\omega_3^2u^2 + \frac{1}{4}\omega_2\omega_1u - \\ & \frac{3}{2}\omega_3\omega_4c_s^2 + \omega_3u^2 + \frac{1}{8}\omega_4\omega_1u + \frac{1}{4}\omega_2\omega_3\omega_1u^2 - \frac{1}{8}\omega_3\omega_4\omega_1u - \frac{5}{8}\omega_2\omega_3u^2 + \frac{1}{2}\omega_2\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_3\omega_4^2c_s^2 - \frac{1}{8}\omega_4^2 - \\ & \frac{1}{4}\omega_3^2u^2 - \frac{3}{8}\omega_3\omega_1u^2 - \frac{1}{2}\omega_1u + \frac{1}{4}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{8}\omega_3\omega_1 + \frac{1}{4}\omega_3\omega_4c_s^2 - \frac{1}{4}v^2\omega_3^2 + \frac{3}{4}\omega_4 - \frac{1}{8}\omega_2v\omega_3^2 + \frac{1}{2}\omega_1 - \\ & \frac{1}{8}\omega_3\omega_4 + \frac{5}{8}\omega_4u^2 + \frac{5}{8}\omega_2v\omega_3 + \frac{1}{8}\omega_2v^2\omega_4 - \frac{11}{8}\omega_3\omega_4u^2 - \frac{1}{4}\omega_2v\omega_3\omega_1 - \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{4}\omega_2\omega_3^2c_s^2 + v^2\omega_3 - \frac{1}{4}\omega_2\omega_1 + \\ & 2\omega_3c_s^2 - \frac{3}{8}v^2\omega_3\omega_1 + \frac{5}{8}\omega_3\omega_1u - \frac{1}{8}\omega_2\omega_4 + \frac{1}{4}\omega_3\omega_4\omega_1u^2 - \frac{3}{4}\omega_3c_s^2\omega_1, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_l,y-\delta_l}^{[\mu_2],t-2\delta_t} = & -2 + \omega_2 - \frac{9}{8}\omega_2\omega_3 + \frac{3}{8}\omega_3\omega_4\omega_1 + \frac{3}{8}\omega_2\omega_3\omega_4 + \frac{5}{2}\omega_3 - \frac{3}{8}\omega_4\omega_1 + \frac{1}{4}\omega_3^2\omega_4 + \frac{1}{8}\omega_2\omega_3^2 - \frac{1}{2}\omega_3^2 + \frac{1}{2}\omega_2\omega_3\omega_1 + \\ & \frac{1}{8}\omega_3^2\omega_1 - \frac{1}{4}\omega_4^2 - \frac{9}{8}\omega_3\omega_1 + \frac{3}{2}\omega_4 + \omega_1 - \frac{7}{4}\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_1 - \frac{3}{8}\omega_2\omega_4, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_l,y}^{[\mu_1],t-2\delta_t} = & 1 + \frac{1}{8}\omega_2\omega_4^2c_s^2 - \omega_2 + \frac{1}{4}\omega_2v^2\omega_3\omega_1 + \frac{1}{4}\omega_2^2v^2\omega_4 + \frac{1}{8}\omega_4\omega_1u^2 + \frac{1}{4}\omega_4c_s^2 + \frac{1}{2}\omega_2\omega_3c_s^2\omega_1 - \frac{1}{4}\omega_2^2\omega_4 + \\ & \frac{1}{4}\omega_2v^2\omega_3\omega_4 + \frac{1}{4}\omega_2\omega_3\omega_4u^2 + \frac{1}{8}\omega_4^2u - \frac{1}{4}v^2\omega_4\omega_1 + \frac{3}{4}v^2\omega_4 + \frac{1}{4}\omega_2\omega_4u - \frac{1}{4}\omega_2\omega_3\omega_4 - \frac{1}{4}v^2\omega_4^2 + \frac{3}{4}\omega_2\omega_4u^2 - \\ & \frac{1}{4}\omega_2^2\omega_3u^2 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{8}\omega_4^2u^2 - \frac{1}{8}\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_2\omega_3\omega_1 + \omega_2\omega_1u - \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_3u^2 + \frac{1}{8}\omega_4\omega_1u + \\ & \frac{1}{4}\omega_2\omega_3\omega_1u^2 - \frac{1}{4}\omega_2\omega_4^2 + \frac{1}{2}\omega_2\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_2\omega_4u^2 + \frac{1}{8}\omega_2\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{4}\omega_3\omega_1u^2 - \frac{1}{8}\omega_2\omega_4\omega_1u - \frac{1}{2}\omega_1u + \\ & \frac{1}{4}\omega_3\omega_1 - \frac{1}{2}\omega_2\omega_1u - \frac{5}{4}\omega_4 - \frac{1}{4}\omega_2\omega_4\omega_1 - \frac{1}{8}\omega_2\omega_4^2u^2 + \frac{1}{4}\omega_2v^2\omega_4^2 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{2}\omega_4u^2 - \omega_2v^2\omega_4 - \\ & \frac{1}{4}\omega_3\omega_4u^2 + \frac{1}{4}\omega_2v^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_3\omega_4 - \frac{1}{4}\omega_4u + \frac{1}{4}v^2\omega_3 + \frac{1}{2}\omega_2\omega_1 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{8}\omega_2\omega_4^2u - \frac{1}{4}v^2\omega_3\omega_1 - \\ & \frac{1}{2}\omega_2^2\omega_3c_s^2 - \frac{1}{4}\omega_2\omega_4c_s^2 - \frac{1}{8}\omega_2\omega_4\omega_1u^2 - \frac{1}{4}\omega_2^2v^2\omega_3 + \frac{3}{2}\omega_2\omega_4 + \frac{1}{4}\omega_2^2\omega_3 - \frac{1}{8}\omega_4^2c_s^2 - \frac{1}{2}\omega_3c_s^2\omega_1, \end{aligned}$$

$$\alpha_{x-\delta_l,y}^{[\mu_2],t-2\delta_t} = -2 + 3\omega_2 + \frac{1}{2}\omega_2^2\omega_4 + \frac{1}{2}\omega_2^2\omega_1 - \frac{1}{2}\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_4^2 - \frac{1}{2}\omega_4^2 + 2\omega_4 + \frac{1}{2}\omega_2\omega_4\omega_1 + \omega_1 - \omega_2^2 - \frac{3}{2}\omega_2\omega_1 - \frac{5}{2}\omega_2\omega_4,$$

$$\alpha_{x,y}^{[\mu_1],t-2\delta_t} = -\omega_3\omega_1^2u - \frac{1}{2}\omega_3^2\omega_1u + \frac{1}{2}\omega_4\omega_1u + \omega_1^2u - \frac{1}{2}\omega_3\omega_4\omega_1u - 2\omega_1u + \frac{5}{2}\omega_3\omega_1u,$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_2],t-2\delta_t} = & -4 + 3\omega_2 - \frac{7}{2}\omega_2\omega_3 + \frac{1}{2}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_3\omega_4 + 5\omega_3 - \frac{1}{2}\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_3^2 - \omega_3^2 + \frac{1}{2}\omega_3^2\omega_1 - \frac{7}{2}\omega_3\omega_1 + \omega_4 - \\ & \omega_1^2 + 3\omega_1 - \omega_3\omega_4 - \omega_2^2 + \omega_3\omega_1^2 - \frac{1}{2}\omega_2\omega_4 + \omega_2^2\omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_l,y}^{[\mu_1],t-2\delta_t} = & -1 - \frac{1}{8}\omega_2\omega_4^2c_s^2 + \omega_2 - \frac{1}{4}\omega_2v^2\omega_3\omega_1 - \frac{1}{4}\omega_2^2v^2\omega_4 - \frac{1}{8}\omega_4\omega_1u^2 - \frac{1}{4}\omega_4c_s^2 - \frac{1}{2}\omega_2\omega_3c_s^2\omega_1 + \frac{1}{4}\omega_2^2\omega_4 - \\ & \frac{1}{4}\omega_2v^2\omega_3\omega_4 - \frac{1}{4}\omega_2\omega_3\omega_4u^2 - \frac{1}{8}\omega_4^2u + \frac{1}{4}v^2\omega_4\omega_1 - \frac{3}{4}v^2\omega_4 - \frac{1}{4}\omega_2\omega_4u + \frac{1}{4}\omega_2\omega_3\omega_4 + \frac{1}{4}v^2\omega_4^2 - \frac{3}{4}\omega_2\omega_4u^2 + \\ & \frac{1}{4}\omega_2^2\omega_3u^2 + \frac{1}{4}\omega_3 - \frac{1}{4}\omega_4\omega_1 - \frac{1}{8}\omega_4^2u^2 + \frac{1}{8}\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_2\omega_3\omega_1 + \omega_2\omega_1u + \frac{1}{2}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_3u^2 - \frac{1}{8}\omega_4\omega_1u - \\ & \frac{1}{4}\omega_2\omega_3\omega_1u^2 + \frac{1}{4}\omega_2\omega_4^2 - \frac{1}{2}\omega_2\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_2\omega_4u^2 - \frac{1}{8}\omega_2\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_4^2 + \frac{1}{4}\omega_3\omega_1u^2 + \frac{1}{8}\omega_2\omega_4\omega_1u - \frac{1}{2}\omega_1u - \\ & \frac{1}{4}\omega_3\omega_1 - \frac{1}{2}\omega_2\omega_1u + \frac{5}{4}\omega_4 + \frac{1}{4}\omega_2\omega_4\omega_1 + \frac{1}{8}\omega_2\omega_4^2u^2 - \frac{1}{4}\omega_2v^2\omega_4^2 + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_3\omega_4 + \frac{1}{2}\omega_4u^2 + \omega_2v^2\omega_4 + \\ & \frac{1}{4}\omega_3\omega_4u^2 - \frac{1}{4}\omega_2v^2\omega_4\omega_1 + \frac{1}{4}v^2\omega_3\omega_4 + \frac{1}{4}\omega_4u - \frac{1}{4}v^2\omega_3 - \frac{1}{2}\omega_2\omega_1 - \frac{1}{2}\omega_3c_s^2 + \frac{1}{8}\omega_2\omega_4^2u + \frac{1}{4}v^2\omega_3\omega_1 + \\ & \frac{1}{2}\omega_2^2\omega_3c_s^2 + \frac{1}{4}\omega_2\omega_4c_s^2 + \frac{1}{8}\omega_2\omega_4\omega_1u^2 + \frac{1}{4}\omega_2^2v^2\omega_3 - \frac{3}{2}\omega_2\omega_4 - \frac{1}{4}\omega_2^2\omega_3 + \frac{1}{8}\omega_4^2c_s^2 + \frac{1}{2}\omega_3c_s^2\omega_1, \end{aligned}$$

$$\alpha_{x+\delta_l,y}^{[\mu_2],t-2\delta_t} = -2 + 3\omega_2 + \frac{1}{2}\omega_2^2\omega_4 + \frac{1}{2}\omega_2^2\omega_1 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_2\omega_4^2 - \frac{1}{4}\omega_4^2 + \frac{3}{2}\omega_4 + \frac{1}{4}\omega_2\omega_4\omega_1 + \omega_1 - \omega_2^2 - \frac{3}{2}\omega_2\omega_1 - 2\omega_2\omega_4,$$

$$\begin{aligned} \alpha_{x-\delta_l,y+\delta_l}^{[\mu_1],t-2\delta_t} = & 1 - \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2v^2\omega_3\omega_1 + \frac{1}{4}\omega_2v\omega_1 - \frac{3}{16}\omega_3^2\omega_4u^2 - \frac{1}{4}\omega_2\omega_3\omega_1u + \frac{1}{4}\omega_4c_s^2 - \frac{1}{2}\omega_2\omega_3c_s^2\omega_1 - \frac{1}{8}\omega_2v^2\omega_3\omega_4 - \\ & \frac{1}{8}\omega_2v - \frac{3}{16}\omega_3\omega_4^2u^2 + \frac{1}{8}\omega_2v\omega_4 + \frac{5}{8}\omega_2v^2\omega_3 - \frac{1}{8}\omega_3^2\omega_1u - \frac{3}{8}\omega_2\omega_3\omega_4u^2 + \frac{5}{16}\omega_2\omega_3c_s^2 + \frac{1}{16}\omega_4^2u - \frac{1}{8}v^2\omega_4\omega_1 + \frac{1}{2}v^2\omega_4 + \\ & \frac{1}{2}\omega_3^2c_s^2 - \frac{1}{8}v^2\omega_4^2 + \frac{1}{8}\omega_2\omega_4u^2 - \frac{1}{4}\omega_3 + \frac{1}{8}\omega_4\omega_1 - \frac{1}{8}\omega_2v^2\omega_3^2 - \frac{1}{16}\omega_3\omega_4^2u + \frac{1}{16}\omega_2^2u^2 - \frac{1}{8}\omega_2\omega_3^2u^2 - \frac{1}{8}\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_2\omega_1u + \\ & \frac{19}{16}\omega_3\omega_4c_s^2 - \omega_3u^2 - \frac{1}{16}\omega_3^2\omega_4u + \frac{1}{4}\omega_4\omega_1u - \frac{1}{4}\omega_2\omega_3\omega_1u^2 - \frac{1}{4}\omega_3\omega_4\omega_1u + \frac{5}{8}\omega_2\omega_3u^2 - \frac{1}{2}\omega_2\omega_3\omega_4c_s^2 - \frac{3}{16}\omega_3\omega_4c_s^2 + \\ & \frac{1}{8}\omega_4^2 + \frac{1}{4}\omega_3^2u^2 + \frac{3}{8}\omega_3\omega_1u^2 - \frac{1}{2}\omega_1u - \frac{1}{8}\omega_3\omega_4c_s^2\omega_1 + \frac{1}{8}\omega_3\omega_1 - \frac{3}{16}\omega_3^2\omega_4c_s^2 + \frac{1}{4}v^2\omega_3^2 - \frac{3}{4}\omega_4 + \frac{5}{16}\omega_3\omega_4u - \frac{1}{8}\omega_2v\omega_3^2 - \\ & \frac{1}{2}\omega_1 + \frac{1}{8}\omega_3\omega_4 - \frac{1}{4}\omega_4u^2 + \frac{5}{8}\omega_2v\omega_3 - \frac{1}{8}\omega_2v^2\omega_4 + \frac{1}{16}\omega_3\omega_4u^2 - \frac{1}{4}\omega_2v\omega_3\omega_1 + \frac{1}{8}\omega_2^2\omega_3\omega_4 - \frac{1}{4}\omega_4u - \frac{1}{4}\omega_2\omega_3^2c_s^2 - \\ & v^2\omega_3 + \frac{1}{4}\omega_2\omega_1 - 2\omega_3c_s^2 + \frac{3}{8}v^2\omega_3\omega_1 + \frac{5}{8}\omega_3\omega_1u - \frac{8}{8}\omega_2v\omega_3\omega_4 + \frac{1}{4}\omega_2\omega_4 - \frac{1}{8}\omega_3\omega_4\omega_1u^2 - \frac{1}{16}\omega_4^2c_s^2 + \frac{3}{4}\omega_3c_s^2\omega_1, \end{aligned}$$

$$\alpha_{x-\delta_l,y+\delta_l}^{[\mu_2],t-2\delta_t} = -2 + \omega_2 - \frac{9}{8}\omega_2\omega_3 + \frac{3}{8}\omega_3\omega_4\omega_1 + \frac{3}{8}\omega_2\omega_3\omega_4 + \frac{5}{2}\omega_3 - \frac{3}{8}\omega_4\omega_1 + \frac{1}{4}\omega_3^2\omega_4 + \frac{1}{8}\omega_2\omega_3^2 - \frac{1}{2}\omega_3^2 + \frac{1}{2}\omega_2\omega_3\omega_1 +$$

$$\alpha_{x,y+\delta_l}^{[\mu_1],t-2\delta_t} = \omega_2\omega_1u + \frac{3}{2}\omega_4\omega_1u + \omega_1^2u - \frac{1}{2}\omega_2\omega_1^2u - \frac{1}{2}\omega_2\omega_4\omega_1u - 2\omega_1u - \frac{1}{4}\omega_4\omega_1^2u - \frac{1}{4}\omega_4^2\omega_1u,$$

$$\begin{aligned}
\alpha_{x,y+\delta_1}^{[\mu_2],t-2\delta_t} &= -2 + \omega_2 + \frac{1}{4}\omega_4\omega_1^2 - \frac{7}{4}\omega_4\omega_1 - \frac{1}{4}\omega_4^2 + \frac{3}{2}\omega_4 - \omega_1^2 + \frac{1}{2}\omega_2\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_1^2 + 3\omega_1 + \frac{1}{4}\omega_4^2\omega_1 - \frac{3}{2}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_4, \\
\alpha_{x+\delta_1,y+\delta_1}^{[\mu_1],t-2\delta_t} &= -1 + \frac{1}{2}\omega_2 + \frac{1}{4}\omega_2v^2\omega_3\omega_1 - \frac{1}{4}\omega_2v\omega_1 + \frac{3}{16}\omega_3^2\omega_4u^2 - \frac{1}{4}\omega_2\omega_3\omega_1u - \frac{1}{4}\omega_4c_s^2 + \frac{1}{2}\omega_2\omega_3c_s^2\omega_1 + \frac{1}{8}\omega_2v^2\omega_3\omega_4 + \\
&\quad \frac{1}{2}\omega_2v + \frac{3}{16}\omega_3\omega_4^2u^2 - \frac{1}{8}\omega_2v\omega_4 - \frac{5}{8}\omega_2v^2\omega_3 - \frac{1}{8}\omega_3^2\omega_1u + \frac{3}{8}\omega_2\omega_3\omega_4u^2 - \frac{5}{4}\omega_2\omega_3c_s^2 - \frac{1}{16}\omega_4^2u + \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{2}v^2\omega_4 - \\
&\quad \frac{1}{8}\omega_3^2c_s^2 + \frac{1}{8}v^2\omega_4^2 - \frac{1}{8}\omega_2\omega_4u^2 + \frac{1}{4}\omega_3 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{8}\omega_2v\omega_3^2 + \frac{1}{16}\omega_3\omega_4^2u - \frac{1}{16}\omega_4^2u^2 + \frac{1}{8}\omega_2\omega_3^2u^2 + \frac{1}{8}\omega_4c_s^2\omega_1 + \\
&\quad \frac{1}{4}\omega_2\omega_1u - \frac{19}{16}\omega_3\omega_4c_s^2 + \omega_3u^2 + \frac{1}{16}\omega_3^2\omega_4u + \frac{1}{4}\omega_2\omega_3\omega_1u^2 - \frac{5}{8}\omega_2\omega_3u^2 + \frac{1}{8}\omega_2\omega_3\omega_4c_s^2 + \frac{3}{16}\omega_3\omega_4^2c_s^2 - \frac{1}{8}\omega_4^2 - \\
&\quad \frac{1}{4}\omega_3^2u^2 - \frac{3}{8}\omega_3\omega_1u^2 - \frac{1}{2}\omega_1u + \frac{1}{8}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{8}\omega_3\omega_1 + \frac{3}{16}\omega_3\omega_4c_s^2 - \frac{1}{4}v^2\omega_3^2 + \frac{3}{4}\omega_4 - \frac{5}{16}\omega_3\omega_4u + \frac{1}{8}\omega_2v\omega_3^2 + \\
&\quad \frac{1}{2}\omega_1 - \frac{1}{8}\omega_3\omega_4 + \frac{1}{4}\omega_4u^2 - \frac{5}{8}\omega_2v\omega_3 + \frac{1}{8}\omega_2v^2\omega_4 - \frac{17}{16}\omega_3\omega_4u^2 + \frac{1}{4}\omega_2v\omega_3\omega_1 - \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{4}\omega_4u + \frac{1}{4}\omega_2\omega_3^2c_s^2 + \\
&\quad v^2\omega_3 - \frac{1}{4}\omega_2\omega_1 + 2\omega_3c_s^2 - \frac{3}{8}v^2\omega_3\omega_1 + \frac{5}{8}\omega_3\omega_1u + \frac{1}{8}\omega_2v\omega_3\omega_4 - \frac{1}{4}\omega_2\omega_4 + \frac{1}{8}\omega_3\omega_4\omega_1u^2 + \frac{1}{16}\omega_4^2c_s^2 - \frac{3}{4}\omega_3c_s^2\omega_1, \\
\alpha_{x+\delta_1,y+\delta_1}^{[\mu_2],t-2\delta_t} &= -2 + \omega_2 - \frac{9}{8}\omega_2\omega_3 + \frac{1}{8}\omega_3\omega_4\omega_1 + \frac{3}{8}\omega_2\omega_3\omega_4 + \frac{5}{2}\omega_3 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{8}\omega_3^2\omega_4 + \frac{1}{8}\omega_2\omega_3^2 - \frac{1}{2}\omega_3^2 + \frac{1}{2}\omega_2\omega_3\omega_1 + \\
&\quad \frac{1}{8}\omega_3^2\omega_1 - \frac{1}{8}\omega_4^2 - \frac{9}{8}\omega_3\omega_1 + \omega_4 + \omega_1 - \frac{9}{8}\omega_3\omega_4 + \frac{1}{8}\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_1 - \frac{3}{8}\omega_2\omega_4, \\
\alpha_{x,y-\delta_1}^{[\mu_1],t-3\delta_t} &= \\
&\quad \omega_3\omega_1^2u + \frac{7}{4}\omega_2\omega_3\omega_1u - \frac{1}{2}\omega_3^2\omega_4\omega_1u + \frac{3}{4}\omega_3^2\omega_1u - \frac{1}{2}\omega_3\omega_4^2\omega_1u - \frac{3}{4}\omega_2\omega_3\omega_4\omega_1u - \frac{1}{2}\omega_3\omega_4\omega_1^2u - \frac{3}{2}\omega_2\omega_1u - \frac{11}{4}\omega_4\omega_1u - \\
&\quad \omega_1^2u + \frac{13}{4}\omega_3\omega_4\omega_1u + \frac{1}{2}\omega_2\omega_1^2u + \frac{3}{4}\omega_2\omega_4\omega_1u + 3\omega_1u + \frac{1}{2}\omega_4\omega_1^2u + \frac{1}{2}\omega_4^2\omega_1u - \frac{1}{4}\omega_2\omega_3^2\omega_1u - \frac{15}{4}\omega_3\omega_1u - \frac{1}{2}\omega_2\omega_3\omega_1^2u, \\
\alpha_{x,y-\delta_1}^{[\mu_2],t-3\delta_t} &= 3 - \frac{3}{2}\omega_2 + \frac{7}{4}\omega_2\omega_3 + \frac{1}{2}\omega_2\omega_3\omega_1^2 - \frac{1}{2}\omega_4\omega_1^2 - \frac{15}{4}\omega_3\omega_4\omega_1 - \frac{3}{4}\omega_2\omega_3\omega_4 - \frac{15}{4}\omega_3 + \frac{13}{4}\omega_4\omega_1 - \frac{1}{2}\omega_3^2\omega_4 + \\
&\quad \frac{1}{2}\omega_3\omega_4\omega_1^2 - \frac{1}{4}\omega_2\omega_3^2 + \frac{3}{4}\omega_3^2 - \frac{9}{4}\omega_2\omega_3\omega_1 - \frac{3}{4}\omega_3^2\omega_1 + \frac{1}{4}\omega_2\omega_3^2\omega_1 + \frac{1}{2}\omega_4^2 + \frac{19}{4}\omega_3\omega_1 - \frac{11}{4}\omega_4 + \omega_1^2 - \frac{3}{4}\omega_2\omega_4\omega_1 - \\
&\quad \frac{1}{2}\omega_2\omega_1^2 - 4\omega_1 + \frac{13}{4}\omega_3\omega_4 - \frac{1}{2}\omega_4^2\omega_1 + \frac{3}{4}\omega_2\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4^2 + \frac{1}{2}\omega_3\omega_4^2\omega_1 + 2\omega_2\omega_1 + \frac{1}{2}\omega_3^2\omega_4\omega_1 - \omega_3\omega_1^2 + \frac{3}{4}\omega_2\omega_4\omega_1, \\
\alpha_{x-\delta_1,y}^{[\mu_1],t-3\delta_t} &= -1 - \frac{1}{16}\omega_2\omega_4^2c_s^2 + \omega_2 + \frac{1}{4}\omega_2v^2\omega_3\omega_1 - \frac{1}{4}\omega_2v^2\omega_4 + \frac{7}{16}\omega_3^2\omega_4u^2 - \frac{1}{8}\omega_4\omega_1u^2 + \frac{7}{8}\omega_2\omega_3\omega_1u - \frac{1}{4}\omega_4c_s^2 + \\
&\quad \frac{1}{2}\omega_2\omega_3c_s^2\omega_1 + \frac{1}{4}\omega_2^2\omega_4 - \frac{1}{2}\omega_2\omega_3\omega_4c_s^2 - \frac{3}{8}\omega_2\omega_3\omega_4\omega_1u^2 + \frac{7}{16}\omega_3\omega_4^2u^2 - \frac{5}{4}\omega_2v^2\omega_3 + \frac{1}{4}\omega_3^2\omega_1u + \frac{43}{16}\omega_2\omega_3\omega_4u^2 - \\
&\quad \frac{5}{8}\omega_2\omega_3c_s^2 - \frac{1}{16}\omega_4^2u + \frac{1}{4}v^2\omega_4\omega_1 - v^2\omega_4 - \frac{1}{4}\omega_2\omega_4u - \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{4}\omega_2\omega_3\omega_4 + \frac{1}{4}v^2\omega_4^2 - \frac{3}{8}\omega_2\omega_3\omega_4c_s^2\omega_1 - \omega_2\omega_4u^2 + \\
&\quad \frac{1}{4}\omega_2\omega_3u^2 - \frac{7}{16}\omega_2\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_3 - \frac{3}{8}\omega_2\omega_3\omega_4\omega_1u - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_2v^2\omega_3^2 + \frac{1}{4}\omega_3\omega_4^2u - \frac{3}{16}\omega_4^2u^2 + \frac{5}{16}\omega_2\omega_3\omega_4u - \\
&\quad \frac{7}{16}\omega_2\omega_3\omega_4^2c_s^2 + \frac{1}{4}\omega_2\omega_3^2u^2 + \frac{1}{4}\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_2\omega_3\omega_1 - \frac{3}{2}\omega_2\omega_1u - \frac{35}{16}\omega_3\omega_4c_s^2 + \omega_3u^2 + \frac{1}{16}\omega_3^2\omega_4u - \frac{3}{8}\omega_4\omega_1u + \\
&\quad \frac{1}{4}\omega_2\omega_3\omega_1u^2 + \frac{1}{4}\omega_2\omega_2^2 + \frac{3}{8}\omega_3\omega_4\omega_1u - \frac{5}{4}\omega_2\omega_3u^2 + \frac{43}{16}\omega_2\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_2\omega_4u^2 + \frac{7}{16}\omega_3\omega_4^2c_s^2 - \frac{1}{8}\omega_2\omega_4c_s^2\omega_1 - \\
&\quad \frac{1}{4}\omega_4^2 - \frac{1}{4}\omega_3^2u^2 - \frac{1}{16}\omega_2\omega_3\omega_4u - \frac{1}{4}\omega_3\omega_1u^2 - \frac{1}{2}\omega_2\omega_3\omega_1u + \frac{3}{8}\omega_2\omega_4\omega_1u + \omega_1u + \frac{3}{8}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_3\omega_1 + \\
&\quad \frac{7}{16}\omega_3\omega_4c_s^2 - \frac{1}{4}v^2\omega_3^2 + \frac{1}{2}\omega_2\omega_1u + \frac{5}{4}\omega_4 + \frac{1}{4}\omega_2\omega_4\omega_1 + \frac{3}{16}\omega_2\omega_4u^2 - \frac{1}{2}\omega_2\omega_3\omega_4u^2 - \frac{5}{16}\omega_3\omega_4u - \frac{1}{4}\omega_2v^2\omega_4^2 + \\
&\quad \frac{7}{16}\omega_1 - \frac{1}{4}\omega_3\omega_4 - \frac{1}{16}\omega_2\omega_3\omega_4^2u + \frac{3}{4}\omega_4u^2 + \frac{3}{4}\omega_2v^2\omega_4 - \frac{1}{4}\omega_2\omega_3\omega_1u - \frac{35}{16}\omega_3\omega_4u^2 - \frac{1}{4}\omega_2v^2\omega_4\omega_1 + \frac{1}{4}\omega_4u + \\
&\quad \frac{1}{2}\omega_2\omega_3^2c_s^2 - \frac{7}{16}\omega_2\omega_3\omega_4^2u^2 + v^2\omega_3 - \frac{1}{2}\omega_2\omega_1 + 2\omega_3c_s^2 + \frac{1}{16}\omega_2\omega_4^2u - \frac{1}{4}v^2\omega_3\omega_1 - \frac{7}{16}\omega_2\omega_3\omega_4u^2 + \frac{1}{2}\omega_2\omega_3c_s^2 + \\
&\quad \frac{1}{4}\omega_2\omega_4c_s^2 - \frac{5}{4}\omega_3\omega_1u + \frac{1}{8}\omega_2\omega_4\omega_1u^2 + \frac{1}{4}\omega_2^2v^2\omega_3 - \frac{3}{2}\omega_2\omega_4 - \frac{1}{4}\omega_2\omega_3 + \frac{3}{8}\omega_3\omega_4\omega_1u^2 + \frac{1}{16}\omega_4^2c_s^2 - \frac{1}{2}\omega_3c_s^2\omega_1, \\
\alpha_{x-\delta_1,y}^{[\mu_2],t-3\delta_t} &= 3 - 4\omega_2 + \frac{19}{4}\omega_2\omega_3 - \frac{1}{2}\omega_2\omega_4 - \frac{3}{4}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_1 - \frac{15}{4}\omega_2\omega_3\omega_4 - \frac{15}{4}\omega_3 + \frac{3}{4}\omega_4\omega_1 - \\
&\quad \frac{1}{8}\omega_3^2\omega_4 - \frac{3}{4}\omega_2\omega_3^2 + \frac{3}{4}\omega_3^2 - \frac{9}{4}\omega_2\omega_3\omega_1 - \frac{1}{4}\omega_3^2\omega_1 - \frac{1}{2}\omega_2\omega_4^2 + \frac{1}{2}\omega_2\omega_3\omega_4 + \frac{1}{4}\omega_2\omega_3^2\omega_1 + \frac{1}{2}\omega_4^2 + \frac{7}{4}\omega_3\omega_1 - \frac{11}{4}\omega_4 - \\
&\quad \frac{3}{4}\omega_2\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_3\omega_1 + \frac{1}{2}\omega_2\omega_3\omega_4 - \frac{3}{2}\omega_1 + \frac{13}{4}\omega_3\omega_4 + \frac{3}{4}\omega_2\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4^2 + \omega_2^2 + 2\omega_2\omega_1 + \frac{13}{4}\omega_2\omega_4 - \omega_2^2\omega_3, \\
\alpha_{x,y}^{[\mu_1],t-3\delta_t} &= -\omega_2^2\omega_4\omega_1u - \frac{3}{2}\omega_2\omega_4^2\omega_1u - 4\omega_2\omega_1u - \frac{3}{4}\omega_2\omega_4\omega_1^2u - \frac{7}{2}\omega_4\omega_1u - \omega_1^2u + \omega_2\omega_1^2u + \frac{9}{2}\omega_2\omega_4\omega_1u + 3\omega_1u + \\
&\quad \frac{3}{4}\omega_4\omega_1^2u + \omega_2^2\omega_1u + \frac{3}{4}\omega_2^2\omega_1u, \\
\alpha_{x,y}^{[\mu_2],t-3\delta_t} &= 3 - 4\omega_2 - \omega_2^2\omega_4 - \frac{3}{4}\omega_4\omega_1^2 - \omega_2^2\omega_1 + \frac{3}{4}\omega_2\omega_4^2\omega_1 + \frac{17}{4}\omega_4\omega_1 + \omega_2^2\omega_4\omega_1 - \frac{3}{4}\omega_2\omega_4^2 + \frac{3}{4}\omega_4^2 - \frac{7}{2}\omega_4 + \omega_1^2 - \\
&\quad \frac{21}{4}\omega_2\omega_4\omega_1 - \omega_2\omega_1^2 - 4\omega_1 - \frac{3}{4}\omega_4\omega_1 + \omega_2^2 + \frac{3}{4}\omega_2\omega_4\omega_1^2 + 5\omega_2\omega_1 + \frac{9}{2}\omega_2\omega_4, \\
\alpha_{x+\delta_1,y}^{[\mu_1],t-3\delta_t} &= 1 + \frac{1}{16}\omega_2\omega_4^2c_s^2 - \omega_2 - \frac{1}{4}\omega_2v^2\omega_3\omega_1 + \frac{1}{4}\omega_2^2v^2\omega_4 - \frac{7}{16}\omega_3^2\omega_4u^2 + \frac{1}{8}\omega_4\omega_1u^2 + \frac{7}{4}\omega_2\omega_3\omega_1u + \frac{1}{4}\omega_4c_s^2 - \\
&\quad \frac{1}{2}\omega_2\omega_3c_s^2\omega_1 - \frac{1}{4}\omega_2^2\omega_4 + \frac{1}{2}\omega_2\omega_3\omega_4c_s^2 + \frac{3}{8}\omega_2\omega_3\omega_4\omega_1u^2 - \frac{7}{16}\omega_3\omega_4^2u^2 + \frac{5}{4}\omega_2v^2\omega_3 + \frac{1}{4}\omega_3^2\omega_1u - \frac{43}{16}\omega_2\omega_3\omega_4u^2 + \\
&\quad \frac{5}{8}\omega_2\omega_3c_s^2 + \frac{1}{16}\omega_4^2u - \frac{1}{4}v^2\omega_4\omega_1 + v^2\omega_4 + \frac{1}{4}\omega_2\omega_4u + \frac{1}{2}\omega_3^2c_s^2 - \frac{1}{4}\omega_2\omega_3\omega_4 - \frac{1}{4}\omega_2\omega_4^2 + \frac{3}{8}\omega_2\omega_3\omega_4c_s^2\omega_1 + \omega_2\omega_4u^2 - \\
&\quad \frac{1}{4}\omega_2\omega_3u^2 + \frac{1}{16}\omega_2\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_3 - \frac{1}{8}\omega_2\omega_3\omega_4\omega_1u + \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_2v^2\omega_3^2 - \frac{1}{16}\omega_3\omega_4^2u + \frac{3}{16}\omega_4^2u^2 - \frac{5}{16}\omega_2\omega_3\omega_4u + \\
&\quad \frac{7}{16}\omega_2\omega_3\omega_4^2c_s^2 - \frac{1}{4}\omega_2\omega_3^2u^2 - \frac{1}{8}\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_2\omega_3\omega_1 - \frac{3}{2}\omega_2\omega_1u + \frac{35}{16}\omega_3\omega_4c_s^2 - \omega_3u^2 - \frac{1}{16}\omega_3^2\omega_4u - \frac{1}{8}\omega_4\omega_1u - \\
&\quad \frac{1}{16}\omega_2\omega_3\omega_1u^2 - \frac{1}{4}\omega_2\omega_4^2 + \frac{1}{4}\omega_3\omega_4\omega_1u + \frac{5}{4}\omega_2\omega_3u^2 - \frac{43}{16}\omega_2\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_2\omega_4u^2 - \frac{7}{16}\omega_3\omega_4^2c_s^2 + \frac{1}{8}\omega_2\omega_4c_s^2\omega_1 + \\
&\quad \frac{4}{16}\omega_4^2 + \frac{1}{4}\omega_3^2u^2 + \frac{1}{16}\omega_2\omega_3^2\omega_4u + \frac{1}{4}\omega_3\omega_1u^2 - \frac{1}{2}\omega_2\omega_3\omega_1u + \frac{1}{8}\omega_2\omega_4\omega_1u + \omega_1u - \frac{3}{16}\omega_3\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_3\omega_1 - \\
&\quad \frac{7}{16}\omega_3\omega_4c_s^2 + \frac{1}{4}v^2\omega_3^2 + \frac{1}{2}\omega_2\omega_1u + \frac{5}{2}\omega_2\omega_1u - \frac{5}{4}\omega_4 - \frac{1}{4}\omega_2\omega_4\omega_1 - \frac{3}{16}\omega_2\omega_4u^2 + \frac{1}{2}\omega_2\omega_3\omega_4u^2 + \frac{5}{16}\omega_3\omega_4u + \frac{1}{4}\omega_2v^2\omega_4^2 -
\end{aligned}$$

$$\begin{aligned}
& \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3\omega_4 + \frac{1}{16}\omega_2\omega_3\omega_4^2u - \frac{3}{4}\omega_4u^2 - \frac{5}{4}\omega_2v^2\omega_4 - \frac{1}{4}\omega_2\omega_3^2\omega_1u + \frac{35}{16}\omega_3\omega_4u^2 + \frac{1}{4}\omega_2v^2\omega_4\omega_1 - \frac{1}{4}\omega_4u - \\
& \frac{1}{2}\omega_2\omega_3^2c_s^2 + \frac{7}{16}\omega_2\omega_3\omega_4^2u^2 - v^2\omega_3 + \frac{1}{2}\omega_2\omega_1 - 2\omega_3c_s^2 - \frac{1}{16}\omega_2\omega_4^2u + \frac{1}{4}v^2\omega_3\omega_1 + \frac{7}{16}\omega_2\omega_3^2\omega_4u^2 - \frac{1}{2}\omega_2^2\omega_3c_s^2 - \\
& \frac{1}{4}\omega_2\omega_4c_s^2 - \frac{5}{4}\omega_3\omega_1u - \frac{1}{8}\omega_2\omega_4\omega_1u^2 - \frac{1}{4}\omega_2^2v^2\omega_3 + \frac{3}{2}\omega_2\omega_4 + \frac{1}{4}\omega_2^2\omega_3 - \frac{3}{8}\omega_3\omega_4\omega_1u^2 - \frac{1}{16}\omega_4^2c_s^2 + \frac{1}{2}\omega_3c_s^2\omega_1, \\
\alpha_{x+\delta_l,y}^{[\mu_1],t-3\delta_t} &= 3 - 4\omega_2 + \frac{19}{4}\omega_2\omega_3 - \frac{1}{2}\omega_2^2\omega_4 - \frac{1}{2}\omega_3\omega_4\omega_1 + \frac{3}{8}\omega_2\omega_3\omega_4^2 - \frac{1}{2}\omega_2^2\omega_1 - \frac{25}{8}\omega_2\omega_3\omega_4 - \frac{15}{4}\omega_3 + \frac{1}{2}\omega_4\omega_1 - \\
& \frac{3}{8}\omega_3^2\omega_4 - \frac{3}{4}\omega_2\omega_3^2 + \frac{3}{4}\omega_3^2 - \frac{9}{4}\omega_2\omega_3\omega_1 - \frac{1}{4}\omega_3^2\omega_1 - \frac{3}{8}\omega_2\omega_4^2 + \frac{1}{2}\omega_2^2\omega_3\omega_4 + \frac{1}{4}\omega_2\omega_3^2\omega_1 + \frac{3}{8}\omega_4^2 + \frac{7}{4}\omega_3\omega_1 - \frac{9}{4}\omega_4 - \\
& \frac{1}{2}\omega_2\omega_4\omega_1 + \frac{1}{2}\omega_2^2\omega_3\omega_1 + \frac{3}{8}\omega_2\omega_3^2\omega_4 - \frac{3}{2}\omega_1 + \frac{21}{8}\omega_3\omega_4 + \frac{1}{2}\omega_2\omega_3\omega_4\omega_1 - \frac{3}{8}\omega_3\omega_4^2 + \omega_2^2 + 2\omega_2\omega_1 + \frac{11}{4}\omega_2\omega_4 - \omega_2^2\omega_3, \\
\alpha_{x,y+\delta_l}^{[\mu_1],t-3\delta_t} &= \\
& \omega_3\omega_1^2u + \frac{7}{4}\omega_2\omega_3\omega_1u - \frac{3}{8}\omega_3^2\omega_4\omega_1u + \frac{3}{4}\omega_2^2\omega_1u - \frac{3}{8}\omega_3\omega_4^2\omega_1u - \frac{3}{4}\omega_2\omega_3\omega_4\omega_1u - \frac{1}{4}\omega_3\omega_4\omega_1^2u - \frac{3}{2}\omega_2\omega_1u - \frac{9}{4}\omega_4\omega_1u - \\
& \omega_1^2u + \frac{21}{8}\omega_3\omega_4\omega_1u + \frac{1}{2}\omega_2\omega_1^2u + \frac{3}{4}\omega_2\omega_4\omega_1u + 3\omega_1u + \frac{1}{4}\omega_4\omega_1^2u + \frac{3}{8}\omega_4^2\omega_1u - \frac{1}{4}\omega_2\omega_3^2\omega_1u - \frac{15}{4}\omega_3\omega_1u - \frac{1}{2}\omega_2\omega_3\omega_1^2u, \\
\alpha_{x,y}^{[\mu_2],t-3\delta_t} &= 3 - \frac{3}{2}\omega_2 + \frac{7}{4}\omega_2\omega_3 + \frac{1}{2}\omega_2\omega_3\omega_1^2 - \frac{1}{4}\omega_4\omega_1^2 - \frac{23}{8}\omega_3\omega_4\omega_1 - \frac{3}{4}\omega_2\omega_3\omega_4 - \frac{15}{4}\omega_3 + \frac{5}{2}\omega_4\omega_1 - \frac{3}{8}\omega_3^2\omega_4 + \\
& \frac{1}{4}\omega_3\omega_4\omega_1^2 - \frac{1}{4}\omega_2\omega_3^2 + \frac{3}{4}\omega_3^2 - \frac{9}{4}\omega_2\omega_3\omega_1 - \frac{3}{4}\omega_3^2\omega_1 + \frac{1}{4}\omega_2\omega_3^2\omega_1 + \frac{3}{8}\omega_4^2 + \frac{19}{4}\omega_3\omega_1 - \frac{9}{4}\omega_4 + \omega_1^2 - \frac{3}{4}\omega_2\omega_4\omega_1 - \\
& \frac{1}{2}\omega_2\omega_1^2 - 4\omega_1 + \frac{21}{8}\omega_3\omega_4 - \frac{3}{8}\omega_4^2\omega_1 + \frac{3}{4}\omega_2\omega_3\omega_4\omega_1 - \frac{3}{8}\omega_3\omega_4^2 + \frac{3}{8}\omega_3\omega_4^2\omega_1 + 2\omega_2\omega_1 + \frac{3}{8}\omega_3^2\omega_4\omega_1 - \omega_3\omega_1^2 + \frac{3}{4}\omega_2\omega_4, \\
\alpha_{x,y}^{[\mu_1],t-4\delta_t} &= \\
& -\omega_3\omega_1^2u + \omega_2^2\omega_4\omega_1u - 6\omega_2\omega_3\omega_1u + \frac{7}{8}\omega_3^2\omega_4\omega_1u - \omega_3^2\omega_1u + \frac{7}{8}\omega_3\omega_4^2\omega_1u + \frac{51}{8}\omega_2\omega_3\omega_4\omega_1u + \frac{7}{8}\omega_2\omega_4^2\omega_1u + \frac{3}{4}\omega_3\omega_4\omega_1^2u - \\
& \omega_2^2\omega_3\omega_4\omega_1u + 5\omega_2\omega_1u + \frac{3}{4}\omega_2\omega_4\omega_1^2u + \frac{9}{2}\omega_4\omega_1u + \omega_1^2u - \frac{43}{8}\omega_3\omega_4\omega_1u - \omega_2\omega_1^2u + \omega_2^2\omega_3\omega_1u - \frac{11}{2}\omega_2\omega_4\omega_1u - 4\omega_1u - \\
& \frac{3}{4}\omega_4\omega_1^2u - \frac{7}{8}\omega_2\omega_3\omega_4^2\omega_1u - \omega_2^2\omega_1u - \frac{7}{8}\omega_4^2\omega_1u - \frac{3}{4}\omega_2\omega_3\omega_4\omega_1^2u + \omega_2\omega_3^2\omega_1u - \frac{7}{8}\omega_2\omega_3\omega_4\omega_1u + 5\omega_3\omega_1u + \omega_2\omega_3\omega_1^2u, \\
\alpha_{x,y}^{[\mu_2],t-4\delta_t} &= -4 + 5\omega_2 + \frac{7}{8}\omega_2\omega_3^2\omega_4\omega_1 - 6\omega_2\omega_3 + \omega_2^2\omega_4 - \omega_2\omega_3\omega_1^2 + \frac{3}{4}\omega_4\omega_1^2 + \frac{7}{8}\omega_2\omega_3\omega_4^2\omega_1 + \frac{49}{8}\omega_3\omega_4\omega_1 - \\
& \frac{7}{8}\omega_2\omega_3\omega_4^2 + \omega_2^2\omega_1 + \frac{51}{8}\omega_2\omega_3\omega_4 - \frac{7}{8}\omega_2\omega_4^2\omega_1 + 5\omega_3 - \frac{21}{4}\omega_4\omega_1 + \frac{7}{8}\omega_3\omega_4\omega_1^2 + \omega_2\omega_3\omega_4\omega_1 + \omega_2\omega_3^2 - \\
& \omega_3^2 + 7\omega_2\omega_3\omega_1 - \omega_2^2\omega_4\omega_1 + \omega_3^2\omega_1 + \frac{7}{8}\omega_2\omega_4^2 - \omega_2^2\omega_3\omega_4 - \omega_2\omega_3^2\omega_1 - \frac{7}{8}\omega_4^2 - 6\omega_3\omega_1 + \frac{9}{2}\omega_4 - \omega_1^2 + \frac{25}{4}\omega_2\omega_4\omega_1 - \\
& \omega_2^2\omega_3\omega_1 - \frac{7}{8}\omega_2\omega_3^2\omega_4 + \omega_2\omega_1^2 + 5\omega_1 - \frac{43}{8}\omega_3\omega_4 + \frac{7}{8}\omega_4^2\omega_1 + \frac{3}{4}\omega_2\omega_3\omega_4\omega_1^2 - \frac{57}{8}\omega_2\omega_3\omega_4\omega_1 + \frac{7}{8}\omega_3\omega_4^2 - \frac{7}{8}\omega_3\omega_4^2\omega_1 - \\
& \omega_2^2 - \frac{3}{4}\omega_2\omega_4\omega_1^2 - 6\omega_2\omega_1 - \frac{7}{8}\omega_3^2\omega_4\omega_1 + \omega_3\omega_1^2 - \frac{11}{2}\omega_2\omega_4 + \omega_2^2\omega_3,
\end{aligned}$$

#### 4.4 EFDE for $\mu_3$

$$\mu_{3,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_3],t-\ell\delta_t} \mu_{3,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_1],t} &= 1 - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_2v + \frac{1}{4}v^2\omega_4 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_3u^2 - \frac{1}{4}\omega_4 - \frac{1}{4}\omega_4u^2 + \frac{1}{4}v^2\omega_3 + \frac{1}{2}\omega_3c_s^2. \\
\alpha_{x,y+\delta_l}^{[\mu_1],t} &= -1 + \frac{1}{2}\omega_2 - \frac{1}{4}\omega_4c_s^2 + \frac{1}{2}\omega_2v - \frac{1}{4}v^2\omega_4 + \frac{1}{4}\omega_3 - \frac{1}{4}\omega_3u^2 + \frac{1}{4}\omega_4 + \frac{1}{4}\omega_4u - \frac{1}{4}v^2\omega_3 - \frac{1}{2}\omega_3c_s^2. \\
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{2}\omega_2 - \frac{1}{8}\omega_2\omega_3 + \frac{1}{8}\omega_2v^2\omega_3 + \frac{1}{4}\omega_2\omega_3c_s^2 + \frac{1}{4}v^2\omega_4 - \frac{1}{8}v^2\omega_4^2 + \frac{1}{8}\omega_2\omega_4u^2 + \frac{1}{4}\omega_3 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{8}\omega_4^2u^2 + \\
& \frac{1}{4}\omega_2\omega_1u + \frac{1}{4}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_3u^2 + \frac{1}{4}\omega_4\omega_1u + \frac{1}{8}\omega_2\omega_3u^2 - \frac{1}{8}\omega_4^2 - \frac{1}{2}\omega_1u + \frac{3}{4}\omega_4 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_3\omega_4 - \frac{1}{4}\omega_4u^2 - \\
& \frac{1}{8}\omega_2v^2\omega_4 + \frac{1}{8}\omega_3\omega_4u^2 + \frac{1}{8}v^2\omega_3\omega_4 - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_3c_s^2 - \frac{1}{8}\omega_2\omega_4, \\
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_3],t-\delta_t} &= 1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{4}\omega_2\omega_4, \\
\alpha_{x,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_2v^2\omega_3 - \omega_2\omega_3c_s^2 - \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{4}\omega_3 - \frac{1}{2}\omega_3\omega_4c_s^2 + \omega_3u^2 - \frac{1}{2}\omega_2\omega_3u^2 - \frac{1}{4}\omega_3^2u^2 - \frac{1}{4}v^2\omega_3^2 + \\
& \frac{1}{4}\omega_4 - \frac{1}{4}\omega_3\omega_4u^2 - \frac{1}{4}v^2\omega_3\omega_4 + v^2\omega_3 + 2\omega_3c_s^2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_3],t-\delta_t} &= 1 - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_2\omega_3 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3^2 - \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3\omega_4, \\
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{2}\omega_2 - \frac{1}{8}\omega_2\omega_3 + \frac{1}{8}\omega_2v^2\omega_3 + \frac{1}{4}\omega_2\omega_3c_s^2 + \frac{1}{4}v^2\omega_4 - \frac{1}{8}v^2\omega_4^2 + \frac{1}{8}\omega_2\omega_4u^2 + \frac{1}{4}\omega_3 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{8}\omega_4^2u^2 - \\
&\quad \frac{1}{4}\omega_2\omega_1u + \frac{1}{4}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_3u^2 - \frac{1}{4}\omega_4\omega_1u + \frac{1}{8}\omega_2\omega_3u^2 - \frac{1}{8}\omega_4^2 + \frac{1}{2}\omega_1u + \frac{3}{4}\omega_4 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_3\omega_4 - \frac{1}{4}\omega_4u^2 - \\
&\quad \frac{1}{8}\omega_2v^2\omega_4 + \frac{1}{8}\omega_3\omega_4u^2 + \frac{1}{8}v^2\omega_3\omega_4 - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_3c_s^2 - \frac{1}{8}\omega_2\omega_4, \\
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_3],t-\delta_t} &= 1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{4}\omega_2\omega_4, \\
\alpha_{x-\delta_l,y}^{[\mu_3],t-\delta_t} &= 1 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_1 - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3\omega_4, \\
\alpha_{x,y}^{[\mu_1],t-\delta_t} &= -\frac{1}{4}\omega_4c_s^2 + \omega_2v - \frac{1}{4}\omega_2\omega_4u + \frac{1}{4}\omega_2\omega_4u^2 - \frac{1}{4}\omega_4u^2 - \omega_2^2v + \frac{1}{4}\omega_4u + \frac{1}{4}\omega_2\omega_4c_s^2, \\
\alpha_{x,y}^{[\mu_3],t-\delta_t} &= 2 - 2\omega_2 + \omega_1^2 - 2\omega_1 + \omega_2^2, \\
\alpha_{x+\delta_l,y}^{[\mu_3],t-\delta_t} &= 1 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_1 - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3\omega_4, \\
\alpha_{x-\delta_l,y+\delta_l}^{[\mu_1],t-\delta_t} &= 1 - \frac{1}{2}\omega_2 + \frac{1}{8}\omega_2\omega_3 - \frac{1}{8}\omega_2v^2\omega_3 - \frac{1}{4}\omega_2\omega_3c_s^2 - \frac{1}{4}v^2\omega_4 - \frac{1}{8}v^2\omega_4^2 - \frac{1}{8}\omega_2\omega_4u^2 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_4\omega_1 - \frac{1}{8}\omega_4^2u^2 - \\
&\quad \frac{1}{4}\omega_2\omega_1u - \frac{1}{4}\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_3u^2 - \frac{1}{4}\omega_4\omega_1u - \frac{1}{8}\omega_2\omega_3u^2 + \frac{1}{8}\omega_4^2 + \frac{1}{2}\omega_1u - \frac{3}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{8}\omega_3\omega_4 + \frac{1}{4}\omega_4u^2 + \\
&\quad \frac{1}{8}\omega_2v^2\omega_4 - \frac{1}{8}\omega_3\omega_4u^2 - \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{4}v^2\omega_3 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{2}\omega_3c_s^2 + \frac{1}{8}\omega_2\omega_4, \\
\alpha_{x-\delta_l,y+\delta_l}^{[\mu_3],t-\delta_t} &= 1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{4}\omega_2\omega_4, \\
\alpha_{x,y+\delta_l}^{[\mu_1],t-\delta_t} &= 1 - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_2v^2\omega_3 + \omega_2\omega_3c_s^2 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{4}\omega_3 + \frac{1}{2}\omega_3\omega_4c_s^2 - \omega_3u^2 + \frac{1}{2}\omega_2\omega_3u^2 + \frac{1}{4}\omega_3^2u^2 + \frac{1}{4}v^2\omega_3^2 - \\
&\quad \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3\omega_4u^2 + \frac{1}{4}v^2\omega_3\omega_4 - v^2\omega_3 - 2\omega_3c_s^2, \\
\alpha_{x,y+\delta_l}^{[\mu_3],t-\delta_t} &= 1 - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_2\omega_3 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3^2 - \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3\omega_4, \\
\alpha_{x+\delta_l,y+\delta_l}^{[\mu_1],t-\delta_t} &= 1 - \frac{1}{2}\omega_2 + \frac{1}{8}\omega_2\omega_3 - \frac{1}{8}\omega_2v^2\omega_3 - \frac{1}{4}\omega_2\omega_3c_s^2 - \frac{1}{4}v^2\omega_4 - \frac{1}{8}\omega_2\omega_4u^2 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_2\omega_1u + \frac{1}{4}\omega_3u^2 - \\
&\quad \frac{1}{8}\omega_2\omega_3u^2 - \frac{1}{2}\omega_1u - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4u^2 + \frac{1}{8}\omega_2v^2\omega_4 + \frac{1}{4}v^2\omega_3 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{2}\omega_3c_s^2 + \frac{1}{8}\omega_2\omega_4, \\
\alpha_{x+\delta_l,y+\delta_l}^{[\mu_3],t-\delta_t} &= 1 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{4}\omega_2\omega_4, \\
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-2\delta_t} &= 1 - \frac{1}{2}\omega_2 - \frac{1}{8}v^2\omega_2^2\omega_1 - \frac{1}{4}\omega_2v^2\omega_3\omega_1 + \frac{1}{4}\omega_2v\omega_1 - \frac{1}{8}\omega_4\omega_1u^2 + \frac{1}{4}\omega_2\omega_3\omega_1u - \frac{1}{2}\omega_2\omega_3c_s^2\omega_1 + \frac{1}{8}\omega_2\omega_3 - \\
&\quad \frac{1}{4}\omega_2v^2\omega_3\omega_4 - \frac{1}{2}\omega_2v + \frac{1}{8}\omega_2v\omega_4 + \frac{3}{8}\omega_2v^2\omega_3 + \frac{1}{8}\omega_3\omega_1u + \frac{3}{4}\omega_2\omega_3c_s^2 - \frac{1}{4}v^2\omega_3^2\omega_4 + \frac{1}{8}\omega_4\omega_1 - \frac{1}{4}\omega_3c_s^2\omega_1 - \\
&\quad \frac{1}{4}v^2\omega_4 + \frac{1}{2}\omega_3c_s^2 + \frac{1}{8}v^2\omega_4^2 - \frac{1}{8}\omega_2\omega_4u^2 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_4\omega_1 - \frac{1}{8}\omega_4^2u^2 - \frac{1}{8}\omega_3\omega_1u^2 - \frac{1}{4}\omega_2\omega_1u + \frac{3}{4}\omega_3\omega_4c_s^2 - \omega_3u^2 - \\
&\quad \frac{1}{8}\omega_4\omega_1u - \frac{1}{4}\omega_2\omega_3\omega_1u^2 + \frac{1}{8}\omega_3\omega_4\omega_1u + \frac{3}{4}\omega_2\omega_3u^2 - \frac{1}{4}\omega_2\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_3\omega_4^2c_s^2 + \frac{1}{8}\omega_4^2 + \frac{1}{4}\omega_3u^2 + \frac{5}{8}\omega_3\omega_1u^2 + \\
&\quad \frac{1}{2}\omega_1u - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_3^2\omega_4c_s^2 + \frac{1}{4}v^2\omega_3^2 - \frac{3}{4}\omega_4 - \frac{1}{8}\omega_2v\omega_3^2 - \frac{1}{2}\omega_1 + \frac{1}{8}\omega_3\omega_4 - \frac{1}{4}v^2\omega_3\omega_4^2 + \frac{1}{2}\omega_4u^2 + \\
&\quad \frac{5}{8}\omega_2v\omega_3 + \frac{1}{8}\omega_2v^2\omega_4 + \frac{1}{8}\omega_3\omega_4u^2 - \frac{1}{4}\omega_2v\omega_3\omega_1 + \frac{11}{8}v^2\omega_3\omega_4 - \frac{3}{8}v^2\omega_3\omega_4\omega_1 - v^2\omega_3 + \frac{1}{4}\omega_2\omega_1 - 2\omega_3c_s^2 + \\
&\quad \frac{1}{8}v^2\omega_3\omega_1 - \frac{5}{8}\omega_3\omega_1u - \frac{1}{8}\omega_2v\omega_3\omega_4 + \frac{1}{8}\omega_2\omega_4 - \frac{1}{8}\omega_3\omega_4\omega_1u^2 + \frac{5}{4}\omega_3c_s^2\omega_1, \\
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_3],t-2\delta_t} &= -2 + \omega_2 - \frac{9}{8}\omega_2\omega_3 + \frac{3}{8}\omega_3\omega_4\omega_1 + \frac{3}{8}\omega_2\omega_3\omega_4 + \frac{5}{2}\omega_3 - \frac{3}{2}\omega_4\omega_1 + \frac{1}{4}\omega_3^2\omega_4 + \frac{1}{8}\omega_2\omega_3^2 - \frac{1}{2}\omega_3^2 + \frac{1}{2}\omega_2\omega_3\omega_1 + \\
&\quad \frac{1}{8}\omega_3^2\omega_1 - \frac{1}{4}\omega_4^2 - \frac{9}{8}\omega_3\omega_1 + \frac{3}{2}\omega_4 + \omega_1 - \frac{7}{4}\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_1 - \frac{3}{8}\omega_2\omega_4, \\
\alpha_{x,y-\delta_l}^{[\mu_1],t-2\delta_t} &= 1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_2v^2\omega_3\omega_1 + \omega_2v\omega_1 - \omega_4\omega_1u^2 + \frac{1}{2}\omega_2\omega_3c_s^2\omega_1 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{4}\omega_4\omega_1^2 - \frac{1}{2}\omega_2v - \frac{1}{4}\omega_2v^2\omega_3 - \frac{1}{2}\omega_2\omega_3c_s^2 + \\
&\quad v^2\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4\omega_1 - \frac{3}{4}v^2\omega_4 + \frac{1}{4}v^2\omega_4^2 - \frac{1}{4}\omega_2\omega_4u^2 - \frac{1}{4}\omega_3 + \frac{3}{2}\omega_4\omega_1 - \frac{1}{4}\omega_4^2u^2 - \frac{1}{4}v^2\omega_4\omega_1 - \frac{1}{4}\omega_2\omega_3\omega_1 - \frac{1}{2}\omega_3\omega_4c_s^2 - \\
&\quad \frac{1}{4}\omega_3\omega_1^2 + \frac{1}{4}\omega_3u^2 + \frac{1}{4}\omega_2\omega_3\omega_1u^2 - \frac{1}{2}\omega_2v\omega_1^2 - \frac{1}{4}\omega_2\omega_3u^2 + \frac{1}{4}\omega_4^2 - \frac{1}{2}\omega_3c_s^2\omega_1^2 - \frac{1}{4}v^2\omega_3\omega_1^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 - \frac{5}{4}\omega_4 - \\
&\quad \frac{1}{4}\omega_2\omega_4\omega_1 - \omega_1 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4^2\omega_1 + \frac{3}{4}\omega_4u^2 + \frac{1}{4}\omega_2v^2\omega_4 + \frac{1}{4}\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_4u^2 - \frac{1}{4}\omega_2v^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_4\omega_1 - \\
&\quad \frac{1}{4}v^2\omega_3\omega_4 + \frac{1}{4}v^2\omega_3\omega_4\omega_1 + \frac{1}{4}v^2\omega_3 + \frac{1}{2}\omega_2\omega_1 + \frac{1}{2}\omega_3c_s^2 + \frac{1}{4}\omega_2\omega_4\omega_1u^2 + \frac{1}{4}\omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_1^2 + \frac{1}{4}\omega_2\omega_4 + \frac{1}{4}\omega_3\omega_4\omega_1u^2, \\
\alpha_{x,y-\delta_l}^{[\mu_3],t-2\delta_t} &= -2 + \omega_2 + \frac{1}{2}\omega_4\omega_1^2 - \frac{5}{2}\omega_4\omega_1 - \frac{1}{2}\omega_4^2 + 2\omega_4 - \omega_1^2 + \frac{1}{2}\omega_2\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_1^2 + 3\omega_1 + \frac{1}{2}\omega_4^2\omega_1 - \frac{3}{2}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_4, \\
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-2\delta_t} &= 1 - \frac{1}{2}\omega_2 - \frac{1}{8}v^2\omega_3^2\omega_1 - \frac{1}{4}\omega_2v^2\omega_3\omega_1 + \frac{1}{4}\omega_2v\omega_1 - \frac{1}{8}\omega_4\omega_1u^2 - \frac{1}{4}\omega_2\omega_3\omega_1u - \frac{1}{2}\omega_2\omega_3c_s^2\omega_1 + \frac{1}{8}\omega_2\omega_3 - \\
&\quad \frac{1}{4}\omega_2v^2\omega_3\omega_4 - \frac{1}{2}\omega_2v + \frac{1}{8}\omega_2v\omega_4 + \frac{3}{8}\omega_2v^2\omega_3 - \frac{1}{8}\omega_3\omega_1u + \frac{3}{4}\omega_2\omega_3c_s^2 - \frac{1}{4}v^2\omega_3^2\omega_4 + \frac{1}{8}\omega_4\omega_1 - \frac{1}{4}\omega_3c_s^2\omega_1 -
\end{aligned}$$

$$\begin{aligned} & \frac{1}{2}v^2\omega_4 + \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{8}v^2\omega_4^2 - \frac{1}{8}\omega_2\omega_4u^2 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_4\omega_1 - \frac{1}{8}\omega_4^2u^2 - \frac{1}{8}\omega_3^2\omega_1u^2 + \frac{1}{4}\omega_2\omega_1u + \frac{3}{2}\omega_3\omega_4c_s^2 - \omega_3u^2 + \\ & \frac{1}{8}\omega_4\omega_1u - \frac{1}{4}\omega_2\omega_3\omega_1u^2 - \frac{1}{8}\omega_3\omega_4\omega_1u + \frac{3}{2}\omega_2\omega_3u^2 - \frac{1}{4}\omega_2\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_3\omega_4^2c_s^2 + \frac{1}{8}\omega_4^2 + \frac{1}{4}\omega_3^2u^2 + \frac{5}{8}\omega_3\omega_1u^2 - \\ & \frac{1}{2}\omega_1u - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_3^2\omega_4c_s^2 + \frac{1}{4}v^2\omega_3^2 - \frac{3}{4}\omega_4 - \frac{1}{8}\omega_2v\omega_3^2 - \frac{1}{2}\omega_1 + \frac{1}{8}\omega_3\omega_4 - \frac{1}{4}v^2\omega_3\omega_4^2 + \frac{1}{2}\omega_4u^2 + \\ & \frac{5}{8}\omega_2v\omega_3 + \frac{1}{8}\omega_2v^2\omega_4 + \frac{1}{8}\omega_3\omega_4u^2 - \frac{1}{4}\omega_2v\omega_3\omega_1 + \frac{11}{8}v^2\omega_3\omega_4 - \frac{3}{8}v^2\omega_3\omega_4\omega_1 - v^2\omega_3 + \frac{1}{4}\omega_2\omega_1 - 2\omega_3c_s^2 + \\ & \frac{5}{8}v^2\omega_3\omega_1 + \frac{5}{8}\omega_3\omega_1u - \frac{1}{8}\omega_2v\omega_3\omega_4 + \frac{1}{8}\omega_2\omega_4 - \frac{1}{8}\omega_3\omega_4\omega_1u^2 + \frac{5}{4}\omega_3c_s^2\omega_1, \end{aligned}$$

$$\alpha_{x+\delta_t, y-\delta_t}^{[\mu_3], t-2\delta_t} = -2 + \omega_2 - \frac{9}{8}\omega_2\omega_3 + \frac{3}{8}\omega_3\omega_4\omega_1 + \frac{3}{8}\omega_2\omega_3\omega_4 + \frac{5}{2}\omega_3 - \frac{3}{8}\omega_4\omega_1 + \frac{1}{4}\omega_3^2\omega_4 + \frac{1}{8}\omega_2\omega_3^2 - \frac{1}{2}\omega_3^2 + \frac{1}{2}\omega_2\omega_3\omega_1 + \\ \frac{1}{8}\omega_3^2\omega_1 - \frac{1}{4}\omega_4^2 - \frac{9}{8}\omega_3\omega_1 + \frac{3}{2}\omega_4 + \omega_1 - \frac{7}{4}\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_1 - \frac{3}{8}\omega_2\omega_4,$$

$$\begin{aligned} \alpha_{x-\delta_t, y}^{[\mu_1], t-2\delta_t} = & \frac{1}{8}\omega_4^3u^2 + \frac{1}{8}\omega_2\omega_4^2c_s^2 - \frac{1}{2}\omega_2v\omega_4\omega_1 + \omega_2v\omega_1 - \frac{1}{4}\omega_4\omega_1u^2 + \frac{1}{2}\omega_4c_s^2 - 2\omega_2v + 2\omega_2v\omega_4 + \frac{1}{2}\omega_4^2u + \frac{1}{4}\omega_2\omega_4u - \frac{1}{4}\omega_2\omega_4u^2 - \\ & \frac{1}{2}\omega_2v\omega_4^2 - \frac{1}{2}\omega_4^2u^2 - \frac{1}{4}\omega_4c_s^2\omega_1 - \frac{1}{8}\omega_4^3u + \frac{1}{4}\omega_4\omega_1u + \frac{1}{8}\omega_2\omega_4c_s^2\omega_1 - \frac{1}{8}\omega_2\omega_4\omega_1u + \frac{1}{8}\omega_4^2c_s^2\omega_1 + \frac{1}{8}\omega_4^2\omega_4^2u^2 - \\ & \frac{1}{8}\omega_4^2\omega_1u + \frac{1}{2}\omega_4u^2 - \frac{1}{2}\omega_2v\omega_1 + \omega_2v + \frac{1}{8}\omega_4^2\omega_1u^2 - \frac{1}{2}\omega_4u - \frac{1}{8}\omega_2\omega_4^2u - \frac{1}{4}\omega_2\omega_4c_s^2 + \frac{1}{8}\omega_2\omega_4\omega_1u^2 - \frac{1}{2}\omega_2v\omega_4 - \frac{1}{2}\omega_4^2c_s^2, \end{aligned}$$

$$\alpha_{x-\delta_t, y}^{[\mu_3], t-2\delta_t} = -2 + 3\omega_2 + \frac{1}{2}\omega_2^2\omega_4 + \frac{1}{2}\omega_2^2\omega_1 - \frac{1}{2}\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_4^2 - \frac{1}{2}\omega_4^2 + 2\omega_4 + \frac{1}{2}\omega_2\omega_4\omega_1 + \omega_1 - \omega_2^2 - \frac{3}{2}\omega_2\omega_1 - \frac{5}{2}\omega_2\omega_4,$$

$$\begin{aligned} \alpha_{x, y}^{[\mu_1], t-2\delta_t} = & -\omega_2^2v\omega_3 + \frac{1}{8}\omega_3^2\omega_4u^2 + \frac{1}{2}\omega_4c_s^2 - 2\omega_2v + \frac{1}{8}\omega_3\omega_4^2u^2 + \frac{1}{2}\omega_2v\omega_4 + \frac{1}{4}\omega_2\omega_3\omega_4u^2 + \frac{1}{8}\omega_4^2u + \frac{1}{4}\omega_2\omega_4u - \\ & \frac{1}{4}\omega_2\omega_4u^2 - \frac{1}{8}\omega_3\omega_4^2u - \frac{1}{8}\omega_4^2u^2 - \frac{1}{4}\omega_2\omega_3\omega_4u - \frac{5}{8}\omega_3\omega_4c_s^2 - \frac{1}{8}\omega_3\omega_4u + \frac{1}{4}\omega_2\omega_3\omega_4c_s^2 + \frac{1}{8}\omega_3\omega_4^2c_s^2 + \frac{1}{8}\omega_3\omega_4c_s^2 + \\ & \frac{5}{8}\omega_3\omega_4u - \frac{1}{2}\omega_2v\omega_3^2 + \frac{1}{2}\omega_4u^2 + \frac{5}{2}\omega_2v\omega_3 + \omega_2^2v - \frac{5}{8}\omega_3\omega_4u^2 - \frac{1}{2}\omega_4u - \frac{1}{4}\omega_2\omega_4c_s^2 - \frac{1}{2}\omega_2v\omega_3\omega_4 - \frac{1}{8}\omega_4^2c_s^2, \end{aligned}$$

$$\begin{aligned} \alpha_{x, y}^{[\mu_3], t-2\delta_t} = & -4 + 3\omega_2 - \frac{7}{2}\omega_2\omega_3 + \frac{1}{2}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_3\omega_4 + 5\omega_3 - \frac{1}{2}\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_3^2 - \omega_3^2 + \frac{1}{2}\omega_3\omega_1 - \frac{7}{2}\omega_3\omega_1 + \omega_4 - \\ & \omega_1^2 + 3\omega_1 - \omega_3\omega_4 - \omega_2^2 + \omega_3\omega_1^2 - \frac{1}{2}\omega_2\omega_4 + \omega_2^2\omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_t, y}^{[\mu_1], t-2\delta_t} = & \frac{1}{8}\omega_2\omega_4^2c_s^2 - \frac{1}{4}\omega_2v\omega_4\omega_1 + \omega_2v\omega_1 - \frac{1}{4}\omega_4\omega_1u^2 + \frac{1}{2}\omega_4c_s^2 - \frac{1}{8}\omega_2v^2\omega_3\omega_4 - 2\omega_2v + \frac{1}{8}\omega_3\omega_4^2u^2 + \frac{3}{2}\omega_2v\omega_4 - \\ & \frac{1}{8}\omega_2\omega_3\omega_4u^2 + \frac{1}{2}\omega_4^2u - \frac{1}{8}\omega_3\omega_4\omega_1 + \frac{1}{4}\omega_2\omega_4u + \frac{1}{8}\omega_2\omega_3\omega_4 - \frac{3}{8}v^2\omega_4^2 - \frac{1}{4}\omega_2\omega_4u^2 + \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_2v\omega_4^2 - \frac{1}{8}\omega_4^2u^2 - \\ & \frac{1}{4}\omega_4c_s^2\omega_1 + \frac{1}{8}v^2\omega_4^3 - \frac{1}{4}\omega_3\omega_4c_s^2 - \frac{1}{8}\omega_4^3u - \frac{1}{8}\omega_2\omega_4^2 - \frac{1}{4}\omega_2\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_3\omega_4^2c_s^2 + \frac{1}{8}\omega_2\omega_4c_s^2\omega_1 + \frac{5}{8}\omega_4^2 + \\ & \frac{1}{8}\omega_2\omega_4\omega_1u + \frac{1}{4}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{2}\omega_4 - \frac{1}{8}\omega_4^3 + \frac{1}{8}\omega_4^2c_s^2\omega_1 + \frac{1}{8}\omega_4^3c_s^2 - \frac{1}{8}\omega_4^2\omega_1u + \frac{1}{8}\omega_2v^2\omega_4^2 + \frac{1}{8}\omega_3\omega_4 - \frac{1}{8}\omega_4^2\omega_1 + \\ & \frac{1}{8}v^2\omega_3\omega_4^2 + \frac{1}{2}\omega_4u^2 - \frac{1}{2}\omega_2v\omega_1 + \omega_2^2v - \frac{1}{8}\omega_3\omega_4u^2 - \frac{1}{8}\omega_3\omega_4^2 + \frac{1}{8}v^2\omega_4^2\omega_1 - \frac{1}{8}v^2\omega_3\omega_4 - \frac{1}{2}\omega_4u + \frac{1}{8}v^2\omega_3\omega_4\omega_1 - \\ & \frac{1}{8}\omega_2\omega_4^2u - \frac{1}{4}\omega_2\omega_4c_s^2 + \frac{1}{8}\omega_2\omega_4\omega_1u^2 - \frac{1}{2}\omega_2v\omega_4 + \frac{1}{8}\omega_3\omega_4\omega_1u^2 - \frac{1}{2}\omega_4^2c_s^2, \end{aligned}$$

$$\alpha_{x+\delta_t, y}^{[\mu_3], t-2\delta_t} = -2 + 3\omega_2 + \frac{1}{2}\omega_2^2\omega_4 + \frac{1}{2}\omega_2^2\omega_1 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_2\omega_4^2 - \frac{1}{4}\omega_4^2 + \frac{3}{2}\omega_4 + \frac{1}{4}\omega_2\omega_4\omega_1 + \omega_1 - \omega_2^2 - \frac{3}{2}\omega_2\omega_1 - 2\omega_2\omega_4,$$

$$\begin{aligned} \alpha_{x-\delta_t, y+\delta_t}^{[\mu_1], t-2\delta_t} = & -1 + \frac{1}{2}\omega_2 + \frac{1}{8}v^2\omega_3\omega_1 + \frac{1}{4}\omega_2v^2\omega_3\omega_1 + \frac{1}{4}\omega_2v\omega_1 + \frac{1}{16}\omega_3^2\omega_4u^2 - \frac{1}{4}\omega_2\omega_3\omega_1u + \frac{1}{4}\omega_4c_s^2 + \frac{1}{2}\omega_2\omega_3c_s^2\omega_1 - \\ & \frac{1}{8}\omega_2\omega_3 + \frac{1}{4}\omega_2v^2\omega_3\omega_4 - \frac{1}{2}\omega_2v + \frac{1}{16}\omega_3\omega_4^2u^2 + \frac{1}{8}\omega_2v\omega_4 - \frac{3}{8}\omega_2v^2\omega_3 - \frac{1}{8}\omega_3^2\omega_1u - \frac{3}{8}\omega_2\omega_3c_s^2 + \frac{1}{16}\omega_4^2u + \\ & \frac{1}{4}v^2\omega_3^2\omega_4 - \frac{1}{8}\omega_2^2v\omega_4\omega_1 + \frac{1}{4}\omega_3^2c_s^2\omega_1 + \frac{1}{2}v^2\omega_4 - \frac{1}{2}\omega_3^2c_s^2 - \frac{1}{8}v^2\omega_4^2 + \frac{1}{8}\omega_2\omega_4u^2 + \frac{1}{4}\omega_3 - \frac{1}{4}\omega_4\omega_1 - \frac{1}{16}\omega_3\omega_4^2u + \\ & \frac{1}{4}\omega_4^2u^2 + \frac{1}{8}\omega_3^2\omega_1u^2 - \frac{1}{8}\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_2\omega_1u - \frac{29}{16}\omega_3\omega_4c_s^2 + \omega_3u^2 - \frac{1}{16}\omega_3^2\omega_4u + \frac{1}{4}\omega_4\omega_1u + \frac{1}{4}\omega_2\omega_3\omega_1u^2 - \\ & \frac{1}{4}\omega_3\omega_4\omega_1u - \frac{3}{8}\omega_2\omega_3u^2 + \frac{1}{4}\omega_2\omega_3\omega_4c_s^2 + \frac{5}{16}\omega_3\omega_4^2c_s^2 - \frac{1}{8}\omega_4^2 - \frac{1}{4}\omega_3^2u^2 - \frac{5}{8}\omega_3\omega_1u^2 - \frac{1}{2}\omega_1u + \frac{5}{8}\omega_3\omega_4c_s^2\omega_1 + \\ & \frac{5}{16}\omega_3^2\omega_4c_s^2 - \frac{1}{4}v^2\omega_3^2 + \frac{3}{4}\omega_4 + \frac{5}{16}\omega_3\omega_4u - \frac{1}{8}\omega_2v\omega_3^2 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_3\omega_4 + \frac{1}{4}v^2\omega_3\omega_4^2 - \frac{1}{4}\omega_4u^2 + \frac{5}{8}\omega_2v\omega_3 - \\ & \frac{1}{8}\omega_2v^2\omega_4 - \frac{7}{16}\omega_3\omega_4u^2 - \frac{1}{4}\omega_2v\omega_3\omega_1 - \frac{11}{8}v^2\omega_3\omega_4 - \frac{1}{4}\omega_4u + \frac{3}{8}v^2\omega_3\omega_4\omega_1 + v^2\omega_3 - \frac{1}{4}\omega_2\omega_1 + 2\omega_3c_s^2 - \\ & \frac{5}{8}v^2\omega_3\omega_1 + \frac{5}{8}\omega_3\omega_1u - \frac{1}{8}\omega_2v\omega_3\omega_4 - \frac{1}{8}\omega_2\omega_4 + \frac{1}{4}\omega_3\omega_4\omega_1u^2 - \frac{1}{16}\omega_4^2c_s^2 - \frac{5}{4}\omega_3c_s^2\omega_1, \end{aligned}$$

$$\alpha_{x-\delta_t, y+\delta_t}^{[\mu_3], t-2\delta_t} = -2 + \omega_2 - \frac{9}{8}\omega_2\omega_3 + \frac{3}{8}\omega_3\omega_4\omega_1 + \frac{3}{8}\omega_2\omega_3\omega_4 + \frac{5}{2}\omega_3 - \frac{3}{8}\omega_4\omega_1 + \frac{1}{4}\omega_3^2\omega_4 + \frac{1}{8}\omega_2\omega_3^2 - \frac{1}{2}\omega_3^2 + \frac{1}{2}\omega_2\omega_3\omega_1 + \\ \frac{1}{8}\omega_3^2\omega_1 - \frac{1}{4}\omega_4^2 - \frac{9}{8}\omega_3\omega_1 + \frac{3}{2}\omega_4 + \omega_1 - \frac{7}{4}\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_1 - \frac{3}{8}\omega_2\omega_4,$$

$$\begin{aligned} \alpha_{x, y+\delta_t}^{[\mu_1], t-2\delta_t} = & -1 + \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2v^2\omega_3\omega_1 + \omega_2v\omega_1 + \frac{1}{2}\omega_4\omega_1u^2 + \frac{1}{4}\omega_4c_s^2 - \frac{1}{2}\omega_2\omega_3c_s^2\omega_1 + \frac{1}{4}\omega_4c_s^2\omega_1^2 - \frac{1}{4}\omega_2\omega_3 - \\ & \frac{1}{2}\omega_2v + \frac{1}{4}\omega_2v^2\omega_3 + \frac{1}{2}\omega_2\omega_3c_s^2 - v^2\omega_4\omega_1 + \frac{1}{8}\omega_3\omega_4\omega_1 + \frac{3}{4}v^2\omega_4 - \frac{1}{8}v^2\omega_4^2 + \frac{1}{4}\omega_2\omega_4u^2 + \frac{1}{4}\omega_3 - \frac{3}{4}\omega_4\omega_1 + \\ & \frac{1}{8}\omega_4^2u^2 + \frac{1}{4}v^2\omega_4\omega_1^2 - \frac{1}{2}\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_2\omega_3\omega_1 + \frac{1}{4}\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_3\omega_4^2u^2 - \frac{1}{4}\omega_3u^2 + \frac{1}{4}\omega_4\omega_1u - \frac{1}{4}\omega_2\omega_3\omega_1u^2 - \\ & \frac{1}{2}\omega_2v\omega_1^2 + \frac{1}{4}\omega_2\omega_3u^2 - \frac{1}{8}\omega_4^2 + \frac{1}{2}\omega_3c_s^2\omega_1^2 + \frac{1}{4}v^2\omega_3\omega_1^2 - \frac{1}{4}\omega_3\omega_4c_s^2\omega_1 + \frac{3}{4}\omega_4 + \frac{1}{4}\omega_2\omega_4\omega_1 + \omega_1 - \frac{1}{8}\omega_3\omega_4 + \\ & \frac{1}{8}\omega_4^2\omega_1 - \frac{1}{2}\omega_4u^2 - \frac{1}{4}\omega_2v^2\omega_4 - \frac{1}{8}\omega_4^2\omega_1u^2 + \frac{8}{9}\omega_3\omega_4u^2 + \frac{1}{4}\omega_2v^2\omega_4\omega_1 + \frac{1}{8}v^2\omega_4^2\omega_1 + \frac{1}{8}v^2\omega_3\omega_4 - \frac{1}{4}\omega_4u - \\ & \frac{1}{8}v^2\omega_3\omega_4\omega_1 - \frac{1}{4}v^2\omega_3 - \frac{1}{2}\omega_2\omega_1 - \frac{1}{2}\omega_3c_s^2 - \frac{1}{4}\omega_2\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_1^2 - \frac{1}{4}\omega_2\omega_4 - \frac{1}{8}\omega_3\omega_4\omega_1u^2, \end{aligned}$$

$$\alpha_{x, y+\delta_t}^{[\mu_3], t-2\delta_t} = -2 + \omega_2 + \frac{1}{4}\omega_4\omega_1^2 - \frac{7}{4}\omega_4\omega_1 - \frac{1}{4}\omega_4^2 + \frac{3}{2}\omega_4 - \omega_1^2 + \frac{1}{2}\omega_2\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_1^2 + \frac{1}{4}\omega_4^2\omega_1 - \frac{3}{2}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_4,$$

$$\begin{aligned} \alpha_{x+\delta_i, y+\delta_i}^{[\mu_1, t-2\delta_t]} = & -1 + \frac{1}{2}\omega_2 + \frac{1}{8}v^2\omega_3^2\omega_1 + \frac{1}{4}\omega_2v^2\omega_3\omega_1 + \frac{1}{4}\omega_2v\omega_1 - \frac{1}{16}\omega_3^2\omega_4u^2 + \frac{1}{4}\omega_2\omega_3\omega_1u + \frac{1}{4}\omega_4c_s^2 + \frac{1}{2}\omega_2\omega_3c_s^2\omega_1 - \\ & \frac{1}{8}\omega_2\omega_3 + \frac{1}{4}\omega_2v^2\omega_3\omega_4 - \frac{1}{8}\omega_2v - \frac{1}{16}\omega_3\omega_4^2u^2 + \frac{1}{8}\omega_2v\omega_4 - \frac{3}{8}\omega_2v^2\omega_3 + \frac{1}{8}\omega_3^2\omega_1u - \frac{3}{4}\omega_2\omega_3c_s^2 + \frac{1}{16}\omega_4^2u + \\ & \frac{1}{8}v^2\omega_3^2\omega_4 - \frac{1}{8}v^2\omega_4\omega_1 + \frac{1}{4}\omega_3^2c_s^2\omega_1 + \frac{1}{2}v^2\omega_4 - \frac{1}{2}\omega_3^2c_s^2 - \frac{1}{8}v^2\omega_4^2 + \frac{1}{8}\omega_2\omega_4u^2 + \frac{1}{4}\omega_3 - \frac{1}{16}\omega_3\omega_4^2u + \frac{1}{16}\omega_4^2u^2 + \\ & \frac{1}{8}\omega_3^2\omega_1u^2 - \frac{1}{8}\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_2\omega_1u - \frac{13}{16}\omega_3\omega_4c_s^2 + \omega_3u^2 - \frac{1}{16}\omega_3^2\omega_4u + \frac{1}{4}\omega_2\omega_3\omega_1u^2 - \frac{3}{8}\omega_2\omega_3u^2 + \frac{1}{4}\omega_2\omega_3\omega_4c_s^2 + \\ & \frac{1}{16}\omega_3\omega_4^2c_s^2 - \frac{1}{4}\omega_3^2u^2 - \frac{5}{8}\omega_3\omega_1u^2 + \frac{1}{8}\omega_1u + \frac{1}{8}\omega_3\omega_4c_s^2\omega_1 + \frac{1}{16}\omega_3^2\omega_4c_s^2 - \frac{1}{4}v^2\omega_3^2 + \frac{1}{4}\omega_4 + \frac{5}{16}\omega_3\omega_4u - \\ & \frac{1}{8}\omega_2v\omega_3^2 + \frac{1}{2}\omega_1 + \frac{1}{8}v^2\omega_3\omega_4^2 - \frac{1}{4}\omega_4u^2 + \frac{5}{8}\omega_2v\omega_3 - \frac{1}{8}\omega_2v^2\omega_4 + \frac{1}{16}\omega_3\omega_4u^2 - \frac{1}{4}\omega_2v\omega_3\omega_1 - \frac{7}{8}v^2\omega_3\omega_4 - \frac{1}{4}\omega_4u + \\ & \frac{1}{8}v^2\omega_3\omega_4\omega_1 + v^2\omega_3 - \frac{1}{4}\omega_2\omega_1 + 2\omega_3c_s^2 - \frac{5}{8}v^2\omega_3\omega_1 - \frac{5}{8}\omega_3\omega_1u - \frac{1}{8}\omega_2v\omega_3\omega_4 - \frac{1}{8}\omega_2\omega_4 - \frac{1}{16}\omega_4^2c_s^2 - \frac{5}{4}\omega_3c_s^2\omega_1, \end{aligned}$$

$$\alpha_{x+\delta_1, y+\delta_1}^{[\mu_3], t-2\delta_t} = -2 + \omega_2 - \frac{9}{8}\omega_2\omega_3 + \frac{1}{8}\omega_3\omega_4\omega_1 + \frac{3}{8}\omega_2\omega_3\omega_4 + \frac{5}{2}\omega_3 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{8}\omega_3^2\omega_4 + \frac{1}{8}\omega_2\omega_3^2 - \frac{1}{2}\omega_3^2 + \frac{1}{2}\omega_2\omega_3\omega_1 + \frac{1}{8}\omega_3^2\omega_1 - \frac{1}{8}\omega_4^2 - \frac{9}{8}\omega_3\omega_1 + \omega_4 + \omega_1 - \frac{9}{8}\omega_3\omega_4 + \frac{1}{8}\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_1 - \frac{3}{8}\omega_2\omega_4,$$

$$\begin{aligned} \alpha_{x,y-\delta_1}^{[\mu_1],t-3\delta_t} = & -1 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_2 v^2 \omega_3 \omega_4 \omega_1 + \frac{1}{4}v^2 \omega_3^2 \omega_1 - \frac{1}{2}\omega_3^2 \omega_4 c_s^2 \omega_1 + \frac{1}{4}\omega_2 v \omega_4 \omega_1 + \frac{1}{4}\omega_2 v^2 \omega_3 \omega_1 - \frac{3}{2}\omega_2 v \omega_1 + \\ & \frac{5}{4}\omega_4 \omega_1 u^2 + \frac{1}{2}\omega_2 \omega_3 c_s^2 \omega_1 - \frac{1}{2}\omega_2 \omega_3 - \frac{1}{2}v^2 \omega_3^2 \omega_4 \omega_1 + \frac{1}{4}\omega_4 w_1^2 + \frac{1}{2}\omega_2 v^2 \omega_3 \omega_4 - \frac{1}{4}\omega_2 v \omega_3^2 \omega_1 + \omega_2 v - \frac{1}{4}\omega_2 v \omega_4 - \\ & \frac{1}{2}\omega_2 v^2 \omega_3 - \frac{1}{2}\omega_2 \omega_3 c_s^2 + \frac{1}{2}v^2 \omega_3^2 \omega_4 - \frac{5}{4}v^2 \omega_4 \omega_1 + \frac{1}{4}\omega_3 \omega_4 \omega_1 + \frac{1}{2}\omega_3^2 c_s^2 \omega_1 + v^2 \omega_4 - \frac{1}{2}v^2 \omega_3 \omega_4^2 \omega_1 - \frac{1}{2}\omega_3^2 c_s^2 - \\ & \frac{1}{4}v^2 \omega_4^2 - \frac{1}{2}\omega_2 \omega_3 \omega_4 c_s^2 \omega_1 + \frac{1}{4}\omega_2 \omega_4 u^2 - \frac{1}{2}\omega_3 \omega_4^2 c_s^2 \omega_1 + \frac{1}{4}\omega_3 - \frac{3}{2}\omega_4 \omega_1 + \frac{1}{4}\omega_4^2 u^2 + \frac{1}{4}\omega_3^2 \omega_1 u^2 + \frac{1}{4}v^2 \omega_4 \omega_1^2 + \\ & \frac{1}{4}\omega_2 \omega_3 \omega_1 - \frac{5}{2}\omega_3 \omega_4 c_s^2 + \frac{1}{4}\omega_3 \omega_1^2 u^2 + \omega_3 u^2 + \frac{1}{4}\omega_2 \omega_3 \omega_1 u^{\frac{3}{2}} + \frac{1}{2}\omega_2 v \omega_1^2 - \frac{1}{4}\omega_2 \omega_3 u^2 + \frac{1}{2}\omega_2 \omega_3 \omega_4 c_s^2 + \frac{1}{2}\omega_3 \omega_4^2 c_s^2 - \\ & \frac{1}{4}\omega_4^2 + \frac{1}{2}\omega_3 c_s^2 \omega_1^2 + \frac{1}{4}v^2 \omega_4 \omega_1^2 - \frac{1}{4}\omega_3^2 u^2 - \frac{5}{4}\omega_3 \omega_1 u^2 - \frac{1}{4}\omega_2 v \omega_3 \omega_4 \omega_1 + 3\omega_3 \omega_4 c_s^2 \omega_1 + \frac{1}{2}\omega_3^2 \omega_4 c_s^2 - \frac{1}{4}v^2 \omega_3^2 + \\ & \frac{5}{4}\omega_4 - \frac{1}{2}v^2 \omega_3 \omega_4 \omega_1^2 + \frac{1}{4}\omega_2 \omega_4 \omega_1 + \frac{1}{4}\omega_2 v \omega_3^2 + \omega_1 - \frac{1}{4}\omega_3 \omega_4 - \frac{1}{2}\omega_2 v \omega_3 \omega_1^2 + \frac{1}{4}\omega_4^2 \omega_1 + \frac{1}{2}v^2 \omega_3 \omega_4^2 - \omega_4 u^2 - \frac{5}{4}\omega_2 v \omega_3 - \\ & \frac{1}{4}\omega_2 v^2 \omega_4 - \frac{1}{4}\omega_2^2 \omega_1 u^2 + \frac{7}{4}\omega_2 v \omega_3 \omega_1 + \frac{1}{4}\omega_2 v^2 \omega_4 \omega_1 + \frac{1}{4}v^2 \omega_4^2 \omega_1 - \frac{5}{2}v^2 \omega_3 \omega_4 + 3v^2 \omega_3 \omega_4 \omega_1 + v^2 \omega_3 - \frac{1}{2}\omega_2 \omega_1 + \\ & 2\omega_3 c_s^2 - \frac{5}{4}v^2 \omega_3 \omega_1 - \frac{1}{4}\omega_2 \omega_4 \omega_1 u^2 - \frac{1}{4}\omega_4 \omega_1^2 u^2 - \frac{1}{4}\omega_3 \omega_1^2 + \frac{1}{4}\omega_2 v \omega_3 \omega_4 - \frac{1}{2}\omega_3 \omega_4 c_s^2 \omega_1^2 - \frac{1}{4}\omega_2 \omega_4 - \frac{5}{2}\omega_3 c_s^2 \omega_1, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y-\delta_1}^{[\mu_3],t-3\delta_t} = & 3 - \frac{3}{2}\omega_2 + \frac{7}{4}\omega_2\omega_3 + \frac{1}{2}\omega_2\omega_3\omega_1^2 - \frac{1}{2}\omega_4\omega_1^2 - \frac{15}{4}\omega_3\omega_4\omega_1 - \frac{3}{4}\omega_2\omega_3\omega_4 - \frac{15}{4}\omega_3 + \frac{13}{4}\omega_4\omega_1 - \frac{1}{2}\omega_3^2\omega_4 + \\ & \frac{1}{2}\omega_3\omega_4\omega_1^2 - \frac{1}{4}\omega_2\omega_3^2 + \frac{3}{4}\omega_3^2 - \frac{9}{4}\omega_2\omega_3\omega_1 - \frac{3}{4}\omega_3^2\omega_1 + \frac{1}{4}\omega_2\omega_3^2\omega_1 + \frac{1}{2}\omega_4^2 + \frac{19}{4}\omega_3\omega_1 - \frac{11}{4}\omega_4 + \omega_1^2 - \frac{3}{4}\omega_2\omega_4\omega_1 - \\ & \frac{1}{2}\omega_2\omega_1^2 - 4\omega_1 + \frac{13}{4}\omega_3\omega_4 - \frac{1}{2}\omega_4^2\omega_1 + \frac{3}{4}\omega_2\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4^2 + \frac{1}{2}\omega_3\omega_4^2\omega_1 + 2\omega_2\omega_1 + \frac{1}{2}\omega_3^2\omega_4\omega_1 - \omega_3\omega_1^2 + \frac{3}{4}\omega_2\omega_4, \end{aligned}$$

$$\alpha_{x-\delta_1,y}^{[\mu_1,t-\delta_t]} = -\frac{1}{8}\omega_4^3 u^2 - \frac{1}{8}\omega_2\omega_4^2 c_s^2 + \frac{1}{16}\omega_3^2\omega_4 c_s^2 w_1 + \frac{3}{4}\omega_2 v\omega_4 w_1 - \frac{1}{2}\omega_2 v\omega_3^2 w_4 - \frac{3}{2}\omega_2 v w_1 + \omega_2^2 v\omega_3 - \frac{1}{8}\omega_3 w_3^3 u - \frac{3}{16}\omega_3^2\omega_4 u^2 + \frac{3}{8}\omega_4 w_1 u^2 - \frac{3}{4}\omega_4 c_s^2 - \frac{1}{16}\omega_3^2\omega_4 w_1 u + \frac{1}{8}\omega_2 w_3\omega_4 w_1 u^2 - \frac{1}{4}\omega_2 v\omega_3^2 w_1 + 3\omega_2 v - \frac{13}{16}\omega_3 w_4^2 u^2 - \frac{11}{4}\omega_2 v w_4 - \frac{1}{4}\omega_2 w_3\omega_4 u^2 - \frac{11}{16}\omega_4^2 u - \frac{1}{4}\omega_2 w_4 u + \frac{3}{16}\omega_3 w_4^2 w_1 u^2 + \frac{1}{8}\omega_3^2\omega_4^2 c_s^2 + \frac{1}{8}\omega_2 w_3\omega_4 c_s^2 w_1 + \frac{1}{4}\omega_2 w_4 u^2 - \frac{3}{16}\omega_3 w_4^2 w_1 u + \frac{3}{16}\omega_3 w_4^2 c_s^2 w_1 - \frac{1}{8}\omega_2 w_3\omega_4 w_1 u + \frac{1}{2}\omega_2 v\omega_4^2 u + \frac{13}{16}\omega_3 w_4^2 u + \frac{11}{16}\omega_4^2 u^2 + \frac{1}{4}\omega_2 w_3\omega_4 u - \frac{1}{2}\omega_2^2 v\omega_3 w_1 + \frac{1}{8}\omega_2 w_3\omega_4^2 c_s^2 + \frac{3}{8}\omega_4 c_s^2 w_1 + \frac{1}{16}\omega_3^2\omega_4 w_1 u^2 + \frac{15}{16}\omega_3 w_4 c_s^2 + \frac{1}{8}\omega_3^4 u - \frac{1}{2}\omega_2^2 v\omega_3 w_4 + \frac{3}{16}\omega_3^2\omega_4 u - \frac{3}{8}\omega_4 w_1 u + \frac{1}{8}\omega_3 w_4^3 u^2 + \frac{7}{16}\omega_3 w_4 w_1 u - \frac{1}{4}\omega_2 w_3\omega_4 c_s^2 - \frac{13}{16}\omega_3 w_4^2 c_s^2 - \frac{1}{8}\omega_2 w_4 c_s^2 w_1 + \frac{1}{8}\omega_2 w_4 w_1 u - \frac{1}{8}\omega_3^2 w_4^2 u - \frac{3}{4}\omega_2 v\omega_3 w_4 w_1 - \frac{7}{16}\omega_3 w_4 c_s^2 w_1 - \frac{1}{4}\omega_2 v\omega_3 w_4^2 u - \frac{3}{16}\omega_3^2\omega_4 c_s^2 - \frac{3}{16}\omega_4^2 c_s^2 w_1 - \frac{1}{8}\omega_3^4 c_s^2 - \frac{1}{8}\omega_2 w_4^2 u^2 + \frac{3}{16}\omega_4^2 w_1 u - \frac{15}{16}\omega_3 w_4 u + \frac{3}{4}\omega_2 v\omega_3^2 u - \frac{1}{8}\omega_2 w_3\omega_4^2 u - \frac{3}{2}\omega_4 u^2 + \frac{1}{2}\omega_2^2 v w_1 - \frac{15}{4}\omega_2 w v w_3 - \omega_2^2 v - \frac{3}{16}\omega_4^2 w_1 u^2 + \frac{15}{16}\omega_3 w_4 u^2 + \frac{7}{4}\omega_2 v\omega_3 w_1 + \frac{3}{4}\omega_4 u + \frac{1}{8}\omega_2 w_3\omega_4^2 u^2 + \frac{1}{8}\omega_3 w_4^3 c_s^2 + \frac{1}{8}\omega_2 w_4^2 u + \frac{1}{4}\omega_2 w_4 c_s^2 - \frac{1}{8}\omega_2 w_4 w_1 u^2 + \frac{1}{8}\omega_3^2 w_4^2 u^2 + \frac{1}{2}\omega_2^2 v w_4 + \frac{13}{4}\omega_2 v\omega_3 w_4 - \frac{7}{16}\omega_3 w_4 w_1 u^2 + \frac{11}{16}\omega_4^2 c_s^2,$$

$$\alpha_{x-\delta_1,y}^{[\mu_3],t-3\delta_t} = 3 - 4w_2 + \frac{19}{4}w_2w_3 - \frac{1}{2}w_2^2w_4 - \frac{3}{4}\omega_3w_4w_1 + \frac{1}{2}\omega_2w_3w_4^2 - \frac{1}{2}w_2^2w_1 - \frac{15}{4}\omega_2w_3w_4 - \frac{15}{4}\omega_3 + \frac{3}{4}w_4w_1 - \frac{1}{2}w_3^2w_4 - \frac{3}{4}\omega_2w_3^2 + \frac{3}{4}\omega_3^2 - \frac{9}{4}\omega_2w_3w_1 - \frac{1}{4}\omega_3^2w_1 - \frac{1}{2}\omega_2w_4^2 + \frac{1}{2}\omega_2^2w_3w_4 + \frac{1}{4}\omega_2w_3^2w_1 + \frac{1}{2}w_4^2 + \frac{7}{4}\omega_3w_1 - \frac{11}{4}\omega_4 - \frac{3}{4}\omega_2w_4w_1 + \frac{1}{2}\omega_2^2w_3w_1 + \frac{1}{2}\omega_2w_3^2w_4 - \frac{3}{2}w_1 + \frac{13}{4}\omega_3w_4 + \frac{3}{4}\omega_2w_3w_4w_1 - \frac{1}{2}\omega_3w_4^2 + w_2^2 + 2\omega_2w_1 + \frac{13}{4}\omega_2w_4 - \omega_2^2w_3,$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_1,t-\delta_t]} = & -\tfrac{1}{8}\omega_4^3 u^2 - \tfrac{1}{4}\omega_2\omega_4^2 c_s^2 - \tfrac{1}{8}\omega_2 v^2 w_3 w_4 \omega_1 + \tfrac{17}{4}\omega_2 v w_4 \omega_1 - 4\omega_2 v \omega_1 + \omega_4 \omega_1 u^2 - \tfrac{3}{4}\omega_4 c_s^2 + \tfrac{1}{8}\omega_3 w_4 \omega_1^2 u^2 - \\ & \tfrac{1}{4}\omega_4 c_s^2 \omega_1^2 + \tfrac{1}{4}\omega_4^3 c_s^2 \omega_1 + \tfrac{1}{4}\omega_4 \omega_1^2 + \tfrac{1}{8}\omega_2 v^2 w_3 w_4 - \tfrac{1}{8}\omega_2 w_3 w_4 \omega_1 u^2 + \tfrac{1}{8}\omega_2 v^2 \omega_4^2 \omega_1 + 3\omega_2 v + \tfrac{1}{8}\omega_4^2 \omega_1^2 u^2 - \\ & \tfrac{1}{8}\omega_3 w_4^2 u^2 - \tfrac{7}{2}\omega_2 v w_4 + \tfrac{1}{8}\omega_2 w_4^2 \omega_1 u^2 + \tfrac{1}{8}\omega_2 w_3 w_4 u^2 - \omega_4^2 u + \tfrac{1}{4}\omega_3 w_4 \omega_1 + \tfrac{1}{8}v^2 w_3 w_4^2 \omega_1 - \tfrac{1}{4}\omega_2 w_4 u + \\ & \tfrac{1}{8}\omega_3 w_4^2 \omega_1 u^2 - \tfrac{1}{8}\omega_2 w_3 w_4 - \tfrac{1}{8}\omega_2 w_4^2 \omega_1 + \tfrac{1}{4}\omega_2 w_4^2 c_s^2 \omega_1 + \tfrac{3}{8}v^2 \omega_4^2 - \tfrac{1}{4}\omega_2 w_3 w_4 c_s^2 \omega_1 + \tfrac{1}{4}\omega_2 w_4 u^2 + \tfrac{1}{4}\omega_3 w_4 c_s^2 \omega_1 - \\ & \tfrac{3}{4}\omega_4 \omega_1 + \tfrac{3}{4}\omega_2 v w_4^2 + \tfrac{5}{8}\omega_4^2 u^2 - \tfrac{1}{8}\omega_3 w_4 \omega_1^2 + \omega_4 c_s^2 \omega_1 - \tfrac{1}{8}v^2 \omega_4^3 + \tfrac{1}{4}\omega_3 w_4 c_s^2 + \tfrac{1}{4}\omega_4^3 u + \tfrac{1}{8}\omega_3^2 \omega_1 u^2 - \tfrac{3}{4}\omega_2 v w_4 \omega_1^2 - \\ & \tfrac{1}{4}\omega_4 \omega_1 u + \omega_2 v w_1^2 + \tfrac{1}{8}\omega_2 w_4^2 + \tfrac{1}{4}\omega_2 w_3 w_4 c_s^2 - \tfrac{1}{4}\omega_3 w_4^2 c_s^2 - \tfrac{1}{4}\omega_2 v c_s^2 \omega_1 - \tfrac{5}{8}\omega_4^2 + \tfrac{1}{8}v^2 \omega_4^3 \omega_1 - \omega_2^2 v w_4 \omega_1 - \\ & \tfrac{1}{8}\omega_3 w_4 c_s^2 \omega_1 + \tfrac{1}{2}\omega_4 + \tfrac{1}{8}\omega_4^3 + \tfrac{1}{8}v^2 w_3 w_4 \omega_1^2 - \tfrac{5}{4}\omega_4^2 c_s^2 \omega_1 - \tfrac{1}{4}\omega_4^3 c_s^2 - \tfrac{1}{8}\omega_2 w_4^2 u^2 + \tfrac{1}{4}\omega_4^2 \omega_1 u - \tfrac{1}{8}\omega_2 v^2 w_4^2 - \\ & \tfrac{1}{8}\omega_3 w_4 + \tfrac{3}{4}\omega_4^2 \omega_1 + \tfrac{1}{8}v^2 \omega_4^2 \omega_1^2 - \tfrac{1}{8}v^2 w_3 w_4^2 - \tfrac{3}{4}\omega_4 u^2 + \omega_2 v \omega_1 - \omega_2^2 v - \tfrac{3}{4}\omega_4 \omega_1 u^2 + \tfrac{1}{8}\omega_3 w_4 u^2 + \tfrac{1}{8}\omega_2 w_3 w_4 \omega_1 + \\ & \tfrac{1}{8}\omega_3 w_4^2 - \tfrac{1}{8}\omega_4^2 \omega_1^2 - \tfrac{1}{8}\omega_3 w_4^2 \omega_1 - \tfrac{1}{2}v^2 \omega_4^2 \omega_1 + \tfrac{1}{8}v^2 w_3 w_4 + \tfrac{3}{4}\omega_4 u - \tfrac{1}{4}v^2 w_3 w_4 \omega_1 + \tfrac{1}{4}\omega_4 c_s^2 \omega_1^2 + \tfrac{1}{4}\omega_2 w_4^2 u + \\ & \tfrac{1}{4}\omega_2 w_4 c_s^2 - \tfrac{1}{4}\omega_2 w_4 \omega_1 u^2 - \tfrac{1}{4}\omega_4 \omega_1^2 u^2 + \omega_2^2 v w_4 - \tfrac{3}{4}\omega_2 v w_4^2 \omega_1 + \tfrac{1}{4}\omega_3 w_4 c_s^2 \omega_1^2 - \tfrac{1}{8}\omega_4^2 \omega_1 - \tfrac{1}{4}\omega_3 w_4 \omega_1 u^2 + \omega_4^2 c_s^2, \end{aligned}$$

$$\alpha_{x,y}^{[\mu_3],t-3\delta_t} = 3 - 4\omega_2 - \omega_2^2\omega_4 - \frac{3}{4}\omega_4\omega_1^2 - \omega_2^2\omega_1 + \frac{3}{4}\omega_2\omega_4^2\omega_1 + \frac{17}{4}\omega_4\omega_1 + \omega_2^2\omega_4\omega_1 - \frac{3}{4}\omega_2\omega_4^2 + \frac{3}{4}\omega_4^2 - \frac{7}{2}\omega_4 + \omega_1^2 - \frac{21}{4}\omega_2\omega_4\omega_1 - \omega_2\omega_1^2 - 4\omega_1 - \frac{3}{4}\omega_4^2\omega_1 + \omega_2^2 + \frac{3}{4}\omega_2\omega_4\omega_1^2 + 5\omega_2\omega_1 + \frac{9}{2}\omega_2\omega_4,$$

$$\begin{aligned} \alpha_{x+\delta_t,y}^{[\mu_1],t-3\delta_t} = & -\frac{1}{8}\omega_2\omega_4^2c_s^2 + \frac{1}{16}\omega_3^2\omega_4c_s^2\omega_1 + \frac{1}{2}\omega_2v\omega_4\omega_1 - \frac{3}{8}\omega_2v\omega_3^2\omega_4 - \frac{3}{2}\omega_2v\omega_1 + \omega_2^2v\omega_3 - \frac{1}{8}\omega_3\omega_4^3u - \frac{1}{16}\omega_3^2\omega_4u^2 + \frac{3}{8}\omega_4\omega_1u^2 - \\ & \frac{3}{4}\omega_4c_s^2 + \frac{1}{16}\omega_3^2\omega_4\omega_1u + \frac{1}{8}\omega_2v^2\omega_3\omega_4 + \frac{1}{8}\omega_2\omega_3\omega_4\omega_1u^2 - \frac{1}{4}\omega_2v\omega_3^2\omega_1 + 3\omega_2v + \frac{7}{16}\omega_3\omega_4^2u^2 - \frac{9}{16}\omega_2v\omega_4 - \frac{1}{8}\omega_2\omega_3\omega_4u^2 - \\ & \frac{11}{16}\omega_4^2u + \frac{1}{8}v^2\omega_3^2\omega_4 + \frac{1}{8}\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_2\omega_4u - \frac{1}{16}\omega_3\omega_4^2\omega_1u^2 - \frac{1}{8}\omega_2\omega_3\omega_4 - \frac{1}{8}\omega_3\omega_4^2c_s^2 + \frac{1}{2}v^2\omega_4^2 + \frac{1}{8}\omega_2\omega_3\omega_4c_s^2\omega_1 + \\ & \frac{1}{4}\omega_2\omega_4u^2 - \frac{1}{16}\omega_3\omega_4^2\omega_1u - \frac{1}{16}\omega_3\omega_4^2c_s^2\omega_1 + \frac{1}{8}\omega_2\omega_3\omega_4\omega_1u - \frac{1}{4}\omega_4\omega_1 + \frac{3}{8}v^2\omega_4^2 + \frac{13}{16}\omega_3\omega_4^2u + \frac{3}{16}\omega_4^2u^2 + \frac{1}{4}\omega_2\omega_3\omega_4u - \\ & \frac{1}{8}\omega_2v\omega_3\omega_1 - \frac{1}{8}\omega_2\omega_3\omega_4^2c_s^2 + \frac{3}{8}\omega_4c_s^2\omega_1 - \frac{1}{8}v^2\omega_4^3 + \frac{1}{16}\omega_3^2\omega_4\omega_1u^2 - \frac{1}{16}\omega_3\omega_4c_s^2 + \frac{1}{8}\omega_3^3u - \frac{1}{2}\omega_2v\omega_3\omega_4 + \frac{3}{16}\omega_3^2\omega_4u + \\ & \frac{1}{8}\omega_4\omega_1u - \frac{1}{8}\omega_3\omega_4^3u^2 + \frac{1}{8}\omega_2\omega_4^2 - \frac{3}{16}\omega_3\omega_4\omega_1u + \frac{1}{16}\omega_3\omega_4^2c_s^2 - \frac{1}{8}\omega_2\omega_4c_s^2\omega_1 - \frac{5}{8}\omega_4^2 - \frac{1}{8}\omega_2\omega_4\omega_1u - \frac{1}{8}\omega_3^2\omega_4u^2 - \\ & \frac{1}{2}\omega_2v\omega_3\omega_4\omega_1 - \frac{3}{16}\omega_3\omega_4c_s^2\omega_1 - \frac{3}{8}\omega_2v\omega_3\omega_4^2 + \frac{1}{16}\omega_3^2\omega_4c_s^2 + \frac{1}{2}\omega_4 + \frac{1}{8}\omega_4^3 - \frac{3}{16}\omega_2c_s^2\omega_1 - \frac{1}{8}\omega_3^3c_s^2 + \frac{1}{16}\omega_4^2\omega_1u - \\ & \frac{15}{16}\omega_3\omega_4u + \frac{3}{8}v^2\omega_3^2 - \frac{1}{8}\omega_2v^2\omega_4^2 - \frac{1}{8}\omega_3\omega_4 + \frac{1}{8}\omega_4^2\omega_1 - \frac{1}{8}\omega_2\omega_3\omega_4^2u - \frac{3}{4}\omega_4u^2 + \frac{1}{2}\omega_2v\omega_1 - \frac{15}{16}\omega_2v\omega_3 - \omega_2^2v - \\ & \frac{1}{16}\omega_4^2\omega_1u^2 + \frac{7}{16}\omega_3\omega_4u^2 + \frac{7}{4}\omega_2v\omega_3\omega_1 + \frac{1}{8}\omega_3\omega_4^3 - \frac{1}{8}v^2\omega_4^2\omega_1 - \frac{1}{2}\omega_4\omega_1 - \frac{1}{8}\omega_2\omega_3\omega_4^2u^2 + \frac{1}{8}v^2\omega_3\omega_4\omega_1 - \\ & \frac{8}{3}\omega_3\omega_4^3c_s^2 + \frac{1}{8}\omega_2\omega_4^2u + \frac{1}{4}\omega_2\omega_4c_s^2 - \frac{1}{8}\omega_2\omega_4\omega_1u^2 - \frac{1}{8}\omega_3^2\omega_4^2u^2 + \frac{1}{2}\omega_2v\omega_3\omega_4 + \frac{21}{16}\omega_3\omega_4\omega_1u^2 + \frac{11}{16}\omega_4^2c_s^2, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_t,y}^{[\mu_3],t-3\delta_t} = & 3 - 4\omega_2 + \frac{19}{4}\omega_2\omega_3 - \frac{1}{2}\omega_2^2\omega_4 - \frac{1}{2}\omega_3\omega_4\omega_1 + \frac{3}{8}\omega_2\omega_3\omega_4^2 - \frac{1}{2}\omega_2^2\omega_1 - \frac{25}{8}\omega_2\omega_3\omega_4 - \frac{15}{4}\omega_3 + \frac{1}{2}\omega_4\omega_1 - \\ & \frac{3}{8}\omega_3^2\omega_4 - \frac{3}{4}\omega_2\omega_3^2 + \frac{3}{4}\omega_3^2 - \frac{9}{4}\omega_2\omega_3\omega_1 - \frac{1}{4}\omega_3^2\omega_1 - \frac{3}{8}\omega_2\omega_4^2 + \frac{1}{2}\omega_2\omega_3\omega_4 + \frac{1}{4}\omega_2\omega_3^2\omega_1 + \frac{3}{8}\omega_4^2 + \frac{7}{4}\omega_3\omega_1 - \frac{9}{4}\omega_4 - \\ & \frac{1}{2}\omega_2\omega_4\omega_1 + \frac{1}{2}\omega_2^2\omega_3\omega_1 + \frac{3}{8}\omega_2\omega_3^2\omega_4 - \frac{3}{2}\omega_1 + \frac{21}{8}\omega_3\omega_4 + \frac{1}{2}\omega_2\omega_3\omega_4\omega_1 - \frac{3}{8}\omega_3\omega_4^2 + \omega_2^2 + 2\omega_2\omega_1 + \frac{11}{4}\omega_2\omega_4 - \omega_2^2\omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y+\delta_t}^{[\mu_1],t-3\delta_t} = & 1 - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_2v^2\omega_3\omega_4\omega_1 - \frac{1}{4}v^2\omega_3^2\omega_1 + \frac{3}{8}\omega_3^2\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_2v\omega_4\omega_1 - \frac{1}{4}\omega_2v^2\omega_3\omega_1 - \frac{3}{2}\omega_2v\omega_1 - \frac{1}{2}\omega_4\omega_1u^2 - \\ & \frac{1}{2}\omega_4c_s^2 - \frac{1}{2}\omega_2\omega_3c_s^2\omega_1 - \frac{1}{4}\omega_4c_s^2\omega_1^2 + \frac{1}{4}\omega_2\omega_3 + \frac{3}{8}v^2\omega_3^2\omega_4\omega_1 - \frac{1}{2}\omega_2v^2\omega_3\omega_4 - \frac{1}{4}\omega_2v\omega_3^2\omega_1 + \omega_2v - \frac{1}{4}\omega_2v\omega_4 + \\ & \frac{1}{4}\omega_2v^2\omega_3 + \frac{1}{2}\omega_2\omega_3c_s^2 - \frac{1}{8}\omega_4^2u - \frac{3}{8}v^2\omega_3^2\omega_4 + \frac{5}{4}v^2\omega_4\omega_1 - \frac{1}{8}\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_3^2c_s^2\omega_1 - v^2\omega_4 + \frac{3}{8}v^2\omega_3\omega_4^2\omega_1 + \\ & \frac{1}{5}\omega_3^2c_s^2 + \frac{1}{4}v^2\omega_4^2 + \frac{1}{2}\omega_2\omega_3\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_2\omega_4u^2 + \frac{3}{8}\omega_3\omega_4^2c_s^2\omega_1 - \frac{1}{4}\omega_3 + \frac{3}{4}\omega_4\omega_1 + \frac{1}{8}\omega_3\omega_4^2u - \frac{1}{8}\omega_4^2u^2 - \frac{1}{4}\omega_3\omega_1u^2 - \\ & \frac{1}{4}v^2\omega_4\omega_1^2 + \frac{3}{4}\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_2\omega_3\omega_1 - \frac{1}{4}\omega_2\omega_3\omega_1u^2 - \frac{1}{4}\omega_3\omega_1u^2 + \frac{1}{8}\omega_3\omega_4u - \frac{1}{4}\omega_4\omega_1u - \frac{1}{4}\omega_2\omega_3\omega_1u^2 + \\ & \frac{1}{2}\omega_2v\omega_1^2 + \frac{1}{4}\omega_3\omega_4\omega_1u + \frac{1}{4}\omega_2\omega_3u^2 - \frac{1}{2}\omega_2\omega_3\omega_4c_s^2 - \frac{3}{8}\omega_3\omega_4^2c_s^2 + \frac{1}{8}\omega_4^2 - \frac{1}{2}\omega_3c_s^2\omega_1^2 - \frac{1}{4}v^2\omega_3\omega_1^2 + \frac{1}{4}\omega_3^2u^2 + \\ & \frac{5}{4}\omega_3\omega_1u^2 - \frac{1}{4}\omega_2v\omega_3\omega_4\omega_1 - \frac{19}{8}\omega_3\omega_4c_s^2\omega_1 - \frac{3}{8}\omega_3\omega_4c_s^2 + \frac{1}{4}v^2\omega_3^2 - \frac{3}{4}\omega_4 + \frac{1}{4}v^2\omega_3\omega_4\omega_1^2 - \frac{1}{4}\omega_2\omega_4\omega_1 - \frac{1}{8}\omega_4^2c_s^2\omega_1 - \\ & \frac{5}{8}\omega_3\omega_4u + \frac{1}{4}\omega_2v\omega_3^2 - \omega_1 + \frac{1}{8}\omega_3\omega_4 - \frac{1}{2}\omega_2v\omega_3\omega_1^2 - \frac{1}{8}\omega_4^2\omega_1 - \frac{3}{8}v^2\omega_3\omega_4^2 + \frac{1}{2}\omega_4u^2 - \frac{5}{4}\omega_2v\omega_3 + \frac{1}{4}\omega_2v^2\omega_4 + \frac{1}{8}\omega_4^2\omega_1u^2 + \\ & \frac{8}{3}\omega_3\omega_4u^2 + \frac{7}{4}\omega_2v\omega_3\omega_1 - \frac{1}{4}\omega_2v^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_4^2\omega_1 + 2v^2\omega_3\omega_4 + \frac{1}{2}\omega_4u - \frac{9}{4}v^2\omega_3\omega_4\omega_1 - v^2\omega_3 + \frac{1}{2}\omega_2\omega_1 - 2\omega_3c_s^2 + \\ & \frac{5}{4}v^2\omega_3\omega_1 + \frac{1}{4}\omega_2\omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_1^2 + \frac{1}{4}\omega_2v\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_4c_s^2\omega_1^2 + \frac{1}{4}\omega_2\omega_4 - \frac{1}{8}\omega_3\omega_4\omega_1u^2 + \frac{1}{8}\omega_4^2c_s^2 + \frac{5}{2}\omega_3c_s^2\omega_1, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y+\delta_t}^{[\mu_3],t-3\delta_t} = & 3 - \frac{3}{2}\omega_2 + \frac{7}{4}\omega_2\omega_3 + \frac{1}{2}\omega_2\omega_3\omega_1^2 - \frac{1}{4}\omega_4\omega_1^2 - \frac{23}{8}\omega_3\omega_4\omega_1 - \frac{3}{4}\omega_2\omega_3\omega_4 - \frac{15}{4}\omega_3 + \frac{5}{2}\omega_4\omega_1 - \frac{3}{8}\omega_3^2\omega_4 + \\ & \frac{1}{4}\omega_3\omega_4\omega_1^2 - \frac{1}{4}\omega_2\omega_3^2 + \frac{3}{4}\omega_3^2 - \frac{9}{4}\omega_2\omega_3\omega_1 - \frac{3}{4}\omega_3^2\omega_1 + \frac{1}{2}\omega_2\omega_3^2\omega_1 + \frac{3}{8}\omega_4^2 + \frac{19}{4}\omega_3\omega_1 - \frac{9}{4}\omega_4 + \omega_1^2 - \frac{3}{4}\omega_2\omega_4\omega_1 - \\ & \frac{1}{2}\omega_2\omega_1^2 - 4\omega_1 + \frac{21}{8}\omega_3\omega_4 - \frac{3}{8}\omega_4^2\omega_1 + \frac{3}{4}\omega_2\omega_3\omega_4\omega_1 - \frac{3}{8}\omega_3\omega_4^2 + \frac{3}{8}\omega_3\omega_4^2\omega_1 + 2\omega_2\omega_1 + \frac{3}{8}\omega_3^2\omega_4\omega_1 - \omega_3\omega_1^2 + \frac{3}{4}\omega_2\omega_4, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_1],t-4\delta_t} = & \frac{1}{8}\omega_4^3u^2 + \frac{1}{4}\omega_2\omega_4^2c_s^2 + \frac{1}{8}\omega_2v^2\omega_3\omega_4\omega_1 - \frac{21}{16}\omega_2v\omega_4\omega_1 + \frac{7}{8}\omega_2v\omega_3^2\omega_4 + 5\omega_2v\omega_1 - \omega_2^2v\omega_3 + \frac{1}{4}\omega_3\omega_4^3u + \frac{1}{8}\omega_3^2\omega_4u^2 - \\ & \frac{5}{4}\omega_4\omega_1u^2 + \omega_4c_s^2 - \frac{1}{8}\omega_3\omega_4\omega_1^2u^2 + \frac{1}{4}\omega_4c_s^2\omega_1^2 + \frac{1}{8}v^2\omega_3^2\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4^2\omega_1^2 - \frac{1}{4}\omega_4\omega_1^2 - \frac{1}{8}\omega_2v\omega_3\omega_4\omega_1u^2 + \\ & \omega_2v\omega_3^2\omega_1 - \frac{1}{8}\omega_2v^2\omega_4^2\omega_1 - 4\omega_2v - \frac{1}{8}\omega_4^2\omega_1^2u^2 + \frac{1}{4}\omega_3\omega_4^2u^2 + \frac{1}{2}\omega_2v\omega_4 - \frac{1}{8}\omega_2\omega_3\omega_4\omega_1^2u^2 + \frac{5}{4}\omega_4^2u - \\ & \frac{1}{8}v^2\omega_3^2\omega_4 - \frac{1}{4}\omega_3\omega_4\omega_1 + \frac{1}{4}\omega_2\omega_4u - \frac{1}{4}\omega_3\omega_4^2\omega_1u^2 + \frac{1}{8}\omega_2\omega_3\omega_4 + \frac{1}{8}\omega_2\omega_4\omega_1^2 - \frac{1}{4}\omega_2\omega_4c_s^2\omega_1 - \frac{1}{2}v^2\omega_4^2 - \frac{1}{4}\omega_2\omega_4u^2 + \\ & \frac{1}{4}\omega_3\omega_4^2\omega_1u - \frac{7}{8}\omega_2v\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4^2c_s^2\omega_1 + \frac{3}{4}\omega_4\omega_1 - \frac{7}{8}\omega_2v\omega_4^2 - \frac{3}{8}\omega_3\omega_4^2u - \frac{3}{4}\omega_4^2u^2 - \frac{1}{4}\omega_2\omega_3\omega_4u + \frac{1}{8}\omega_3\omega_4\omega_1^2 + \\ & \omega_2^2v\omega_3\omega_1 - \frac{5}{4}\omega_4c_s^2\omega_1 + \frac{1}{8}v^2\omega_4^3 - \frac{1}{8}\omega_3\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_4^3u + \omega_2^2v\omega_3\omega_4 - \frac{1}{8}\omega_4^3\omega_1u^2 + \frac{3}{4}\omega_2v\omega_4\omega_1^2 - \\ & \frac{7}{8}\omega_2v\omega_3\omega_4^2\omega_1 - \frac{1}{4}\omega_3\omega_4u + \frac{1}{4}\omega_4\omega_1u - \omega_2v\omega_1^2 - \frac{1}{8}\omega_2\omega_4^2 - \frac{1}{4}\omega_3\omega_4\omega_1u + \frac{1}{4}\omega_3\omega_4^2c_s^2\omega_1 + \frac{5}{8}\omega_4^2 - \frac{1}{8}v^2\omega_3^2\omega_1 + \\ & \omega_2^2v\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4^2u + \frac{49}{8}\omega_2v\omega_3\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4c_s^2\omega_1 + \frac{7}{8}\omega_2v\omega_3\omega_4^2 - \frac{1}{2}\omega_4 - \frac{1}{8}\omega_4^3 + \frac{1}{8}v^2\omega_3\omega_4\omega_1^2 + \frac{3}{2}\omega_4^2c_s^2\omega_1 + \\ & \frac{1}{4}\omega_4^3c_s^2 + \frac{1}{8}\omega_2\omega_4^2u^2 - \omega_2^2v\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_4^2\omega_1u + \frac{5}{4}\omega_3\omega_4u - \omega_2v\omega_3^2 + \frac{1}{8}\omega_2v\omega_4^2\omega_1^2 + \frac{1}{8}\omega_3\omega_4 + \\ & \frac{1}{8}v^2\omega_4^2\omega_1^2 + \frac{1}{4}\omega_2\omega_3\omega_4^2u + \omega_4u^2 - \omega_2^2v\omega_1 + 5\omega_2v\omega_3 + \omega_2^2v + \frac{7}{8}\omega_4^2\omega_1u^2 - \frac{3}{4}\omega_3\omega_4u^2 - \frac{1}{8}\omega_2\omega_3\omega_4\omega_1 - 6\omega_2v\omega_3\omega_1 - \\ & \frac{1}{8}\omega_3\omega_4^2 + \frac{1}{8}\omega_4^2\omega_1^2 + \frac{1}{8}\omega_3\omega_4^2\omega_1 + \frac{5}{8}v^2\omega_4^2\omega_1 + \frac{1}{2}v^2\omega_3\omega_4 - \omega_4u - \frac{5}{8}v^2\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_4^2c_s^2\omega_1 - \frac{1}{4}\omega_2\omega_4^2u - \frac{1}{4}\omega_2\omega_4c_s^2 + \\ & \frac{1}{4}\omega_2\omega_4\omega_1^2u^2 + \frac{1}{4}\omega_4\omega_1^2u^2 - \omega_2^2v\omega_4 - \frac{43}{8}\omega_2v\omega_3\omega_4 + \frac{7}{8}\omega_2v\omega_4\omega_1^2 - \frac{3}{4}\omega_2v\omega_3\omega_4\omega_1^2 + \frac{1}{8}\omega_4^2\omega_1 + \frac{7}{8}\omega_3\omega_4\omega_1u^2 - \frac{5}{4}\omega_4^2c_s^2, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_3],t-4\delta_t} = & -4 + 5\omega_2 + \frac{7}{8}\omega_2\omega_3^2\omega_4\omega_1 - 6\omega_2\omega_3 + \omega_2^2\omega_4 - \omega_2\omega_3\omega_1^2 + \frac{3}{4}\omega_4\omega_1^2 + \frac{7}{8}\omega_2\omega_3\omega_4\omega_1^2 + \frac{49}{8}\omega_3\omega_4\omega_1 - \\ & \frac{7}{8}\omega_2\omega_3\omega_4^2 + \omega_2^2\omega_1 + \frac{51}{8}\omega_2\omega_3\omega_4 - \frac{7}{8}\omega_2\omega_4^2\omega_1 + 5\omega_3 - \frac{21}{4}\omega_4\omega_1 + \frac{7}{8}\omega_3\omega_4 - \frac{3}{4}\omega_3\omega_4\omega_1^2 + \omega_2\omega_3\omega_4\omega_1 + \omega_2\omega_3^2 - \\ & \omega_3^2 + 7\omega_2\omega_3\omega_1 - \omega_2^2\omega_4\omega_1 + \omega_3^2\omega_1 + \frac{7}{8}\omega_2\omega_4^2 - \omega_2^2\omega_3\omega_4 - \omega_2\omega_3^2\omega_1 - \frac{7}{8}\omega_4^2 - 6\omega_3\omega_1 + \frac{9}{4}\omega_4 - \omega_1^2 + \frac{25}{4}\omega_2\omega_4\omega_1 - \end{aligned}$$

$$\omega_2^2\omega_3\omega_1 - \frac{7}{8}\omega_2\omega_3^2\omega_4 + \omega_2\omega_1^2 + 5\omega_1 - \frac{43}{8}\omega_3\omega_4 + \frac{7}{8}\omega_4^2\omega_1 + \frac{3}{4}\omega_2\omega_3\omega_4\omega_1^2 - \frac{57}{8}\omega_2\omega_3\omega_4\omega_1 + \frac{7}{8}\omega_3\omega_4^2 - \frac{7}{8}\omega_3\omega_4^2\omega_1 - \omega_2^2 - \frac{3}{4}\omega_2\omega_4\omega_1^2 - 6\omega_2\omega_1 - \frac{7}{8}\omega_3^2\omega_4\omega_1 + \omega_3\omega_1^2 - \frac{11}{2}\omega_2\omega_4 + \omega_2^2\omega_3,$$

#### 4.5 EFDE for $\mu_4$

$$\mu_{4,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_t, y+j\delta_t}^{[\mu_1], t-\ell\delta_t} \mu_{x+i\delta_t, y+j\delta_t}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_t, y+j\delta_t}^{[\mu_4], t-\ell\delta_t} \mu_{4,x+i\delta_t, y+j\delta_t}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x-\delta_t, y}^{[\mu_1], t} = 1 - \frac{1}{4}v^2\omega_4 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_3u^2 + \frac{1}{2}\omega_1u - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4u^2 + \frac{1}{4}v^2\omega_3 + \frac{1}{2}\omega_3c_s^2.$$

$$\alpha_{x+\delta_t, y}^{[\mu_1], t} = 1 - \frac{1}{4}v^2\omega_4 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_3u^2 - \frac{1}{2}\omega_1u - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4u^2 + \frac{1}{4}v^2\omega_3 + \frac{1}{2}\omega_3c_s^2.$$

$$\begin{aligned} \alpha_{x-\delta_t, y-\delta_t}^{[\mu_1], t-\delta_t} &= -1 + \frac{1}{2}\omega_2 + \frac{1}{4}\omega_2v\omega_1 - \frac{1}{8}\omega_4\omega_1u^2 - \frac{1}{2}\omega_2v + \frac{1}{4}\omega_2v\omega_4 + \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_4 + \frac{1}{8}v^2\omega_4^2 + \frac{1}{4}\omega_3 - \frac{1}{8}\omega_4\omega_1 - \\ &\quad \frac{1}{8}\omega_4^2u^2 + \frac{1}{4}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_3u^2 - \frac{1}{8}\omega_4^2 + \frac{1}{8}\omega_3\omega_1u^2 - \frac{1}{8}\omega_3\omega_1 + \frac{3}{4}\omega_4 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_3\omega_4 + \frac{1}{4}\omega_4u^2 + \frac{1}{8}\omega_3\omega_4u^2 + \\ &\quad \frac{1}{8}v^2\omega_3\omega_4 - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_3c_s^2 + \frac{1}{8}v^2\omega_3\omega_1 - \frac{1}{4}\omega_2\omega_4 + \frac{1}{4}\omega_3c_s^2\omega_1, \end{aligned}$$

$$\alpha_{x-\delta_t, y-\delta_t}^{[\mu_4], t-\delta_t} = 1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{4}\omega_2\omega_4,$$

$$\alpha_{x, y-\delta_t}^{[\mu_4], t-\delta_t} = 1 - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_2\omega_3 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3^2 - \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3\omega_4,$$

$$\begin{aligned} \alpha_{x+\delta_t, y-\delta_t}^{[\mu_1], t-\delta_t} &= -1 + \frac{1}{2}\omega_2 + \frac{1}{4}\omega_2v\omega_1 - \frac{1}{8}\omega_4\omega_1u^2 - \frac{1}{2}\omega_2v + \frac{1}{4}\omega_2v\omega_4 + \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_4 + \frac{1}{8}v^2\omega_4^2 + \frac{1}{4}\omega_3 - \frac{1}{8}\omega_4\omega_1 - \\ &\quad \frac{1}{8}\omega_4^2u^2 + \frac{1}{4}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_3u^2 - \frac{1}{8}\omega_4^2 + \frac{1}{8}\omega_3\omega_1u^2 - \frac{1}{8}\omega_3\omega_1 + \frac{3}{4}\omega_4 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_3\omega_4 + \frac{1}{4}\omega_4u^2 + \frac{1}{8}\omega_3\omega_4u^2 + \\ &\quad \frac{1}{8}v^2\omega_3\omega_4 - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_3c_s^2 + \frac{1}{8}v^2\omega_3\omega_1 - \frac{1}{4}\omega_2\omega_4 + \frac{1}{4}\omega_3c_s^2\omega_1, \end{aligned}$$

$$\alpha_{x+\delta_t, y-\delta_t}^{[\mu_4], t-\delta_t} = 1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{4}\omega_2\omega_4,$$

$$\begin{aligned} \alpha_{x-\delta_t, y}^{[\mu_1], t-\delta_t} &= -1 - \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{4}\omega_3 - \frac{1}{2}\omega_3\omega_4c_s^2 + \omega_3u^2 - \frac{1}{4}\omega_3^2u^2 - \frac{1}{2}\omega_3\omega_1u^2 - \frac{1}{4}v^2\omega_3^2 + \frac{1}{4}\omega_4 + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_3\omega_4u^2 - \\ &\quad \frac{1}{4}v^2\omega_3\omega_4 + v^2\omega_3 + 2\omega_3c_s^2 - \frac{1}{2}v^2\omega_3\omega_1 - \omega_3c_s^2\omega_1, \end{aligned}$$

$$\alpha_{x-\delta_t, y}^{[\mu_4], t-\delta_t} = 1 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_1 - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3\omega_4,$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_1], t-\delta_t} &= -2 + \frac{1}{2}\omega_4\omega_1u^2 - \frac{1}{2}v^2\omega_4\omega_1 + \frac{1}{2}v^2\omega_4 + \frac{1}{2}\omega_3 - \frac{1}{2}\omega_4\omega_1 - \frac{1}{2}\omega_3u^2 + \frac{1}{2}\omega_3\omega_1u^2 - \frac{1}{2}\omega_3\omega_1 + \frac{1}{2}\omega_4 - \omega_1^2 + \\ &\quad 3\omega_1 - \frac{1}{2}\omega_4u^2 - \frac{1}{2}v^2\omega_3 - \omega_3c_s^2 + \frac{1}{2}v^2\omega_3\omega_1 + \omega_3c_s^2\omega_1, \end{aligned}$$

$$\alpha_{x,y}^{[\mu_4], t-\delta_t} = 2 - 2\omega_2 + \omega_1^2 - 2\omega_1 + \omega_2^2,$$

$$\begin{aligned} \alpha_{x+\delta_t, y}^{[\mu_1], t-\delta_t} &= -1 - \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{4}\omega_3 - \frac{1}{2}\omega_3\omega_4c_s^2 + \omega_3u^2 - \frac{1}{4}\omega_3^2u^2 - \frac{1}{2}\omega_3\omega_1u^2 - \frac{1}{4}v^2\omega_3^2 + \frac{1}{4}\omega_4 + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_3\omega_4u^2 - \\ &\quad \frac{1}{4}v^2\omega_3\omega_4 + v^2\omega_3 + 2\omega_3c_s^2 - \frac{1}{2}v^2\omega_3\omega_1 - \omega_3c_s^2\omega_1, \end{aligned}$$

$$\alpha_{x+\delta_t, y}^{[\mu_4], t-\delta_t} = 1 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_1 - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3\omega_4,$$

$$\begin{aligned} \alpha_{x-\delta_t, y+\delta_t}^{[\mu_1], t-\delta_t} &= -1 + \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2v\omega_1 - \frac{1}{4}\omega_4c_s^2 + \frac{1}{2}\omega_2v - \frac{1}{4}\omega_2v\omega_4 - \frac{1}{8}\omega_4^2u + \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_4 + \frac{1}{8}v^2\omega_4^2 + \frac{1}{4}\omega_3 - \\ &\quad \frac{1}{8}\omega_4\omega_1 + \frac{1}{8}\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_3u^2 - \frac{1}{8}\omega_4\omega_1u - \frac{1}{8}\omega_4^2 + \frac{1}{8}\omega_3\omega_1u^2 - \frac{1}{8}\omega_3\omega_1 + \frac{3}{4}\omega_4 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_3\omega_4 + \\ &\quad \frac{1}{8}\omega_3\omega_4u^2 + \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{4}\omega_4u - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_3c_s^2 + \frac{1}{8}v^2\omega_3\omega_1 - \frac{1}{4}\omega_2\omega_4 + \frac{1}{8}\omega_4^2c_s^2 + \frac{1}{4}\omega_3c_s^2\omega_1, \end{aligned}$$

$$\alpha_{x-\delta_t, y+\delta_t}^{[\mu_4], t-\delta_t} = 1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{4}\omega_2\omega_4,$$

$$\alpha_{x,y+\delta_l}^{[\mu_4], t-\delta_t} = 1 - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_2\omega_3 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3^2 - \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3\omega_4,$$

$$\alpha_{x+\delta_1, y+\delta_1}^{[\mu_1], t-\delta_t} = -1 + \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2 v\omega_1 - \frac{1}{4}\omega_4 c s^2 + \frac{1}{2}\omega_2 v - \frac{1}{4}\omega_2 v\omega_4 - \frac{1}{8}\omega_4^2 u + \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_4 + \frac{1}{8}v^2\omega_4^2 + \frac{1}{4}\omega_3 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{8}\omega_4 c s^2\omega_1 + \frac{1}{4}\omega_3\omega_4 c s^2 - \frac{1}{4}\omega_3 u^2 - \frac{1}{8}\omega_4\omega_1 u - \frac{1}{8}\omega_4^2 + \frac{1}{8}\omega_3\omega_1 u^2 - \frac{1}{8}\omega_3\omega_1 + \frac{3}{4}\omega_4 + \frac{1}{2}\omega_4 + \frac{1}{8}\omega_3\omega_4 + \frac{1}{8}\omega_3\omega_4 u^2 + \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{4}\omega_4 u - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_3 c s^2 + \frac{1}{8}v^2\omega_3\omega_1 - \frac{1}{4}\omega_2\omega_4 + \frac{1}{8}\omega_4^2 c s^2 + \frac{1}{4}\omega_3 c s^2\omega_1,$$

$$\alpha_{x+\delta_l, y+\delta_l}^{[\mu_4], t-\delta_t} = 1 - \tfrac{1}{2}\omega_2 - \tfrac{1}{2}\omega_4 - \tfrac{1}{2}\omega_1 + \tfrac{1}{4}\omega_2\omega_1 + \tfrac{1}{4}\omega_2\omega_4,$$

$$\begin{aligned} \alpha_{x-\delta_i, y-\delta_i}^{[\mu_1], t-2\delta_t} = & 1 - \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2 v^2 \omega_3 \omega_1 - \frac{1}{4}\omega_2 v \omega_1 - \frac{1}{4}\omega_2^2 \omega_4 u^2 + \frac{1}{8}\omega_4 \omega_1 u^2 - \frac{1}{4}\omega_2 \omega_3 \omega_1 u - \frac{1}{2}\omega_2 \omega_3 c_s^2 \omega_1 - \frac{1}{8}\omega_2 v^2 \omega_3 \omega_4 + \\ & \frac{1}{2}\omega_2 v - \frac{1}{4}\omega_3 \omega_4^2 u^2 - \frac{1}{8}\omega_2 v \omega_4 + \frac{5}{8}\omega_2 v^2 \omega_3 - \frac{1}{8}\omega_3^2 \omega_1 u - \frac{3}{8}\omega_2 \omega_3 \omega_4 u^2 + \frac{5}{4}\omega_2 \omega_3 c_s^2 - \frac{1}{8}v^2 \omega_4 \omega_1 + \frac{1}{2}v^2 \omega_4 + \\ & \frac{1}{2}\omega_3^2 c_s^2 - \frac{1}{8}v^2 \omega_4^2 + \frac{1}{8}\omega_2 \omega_4 u^2 - \frac{1}{4}\omega_3 + \frac{1}{8}\omega_4 \omega_1 - \frac{1}{8}\omega_2 v^2 \omega_3 + \frac{1}{8}\omega_4^2 u^2 - \frac{1}{8}\omega_2 \omega_3^2 u^2 + \frac{1}{4}\omega_2 \omega_1 u + \frac{3}{2}\omega_3 \omega_4 c_s^2 - \\ & \omega_3 u^2 + \frac{1}{8}\omega_4 \omega_1 u - \frac{1}{4}\omega_2 \omega_3 \omega_1 u^2 - \frac{1}{8}\omega_3 \omega_4 \omega_1 u + \frac{5}{8}\omega_2 \omega_3 u^2 - \frac{1}{2}\omega_2 \omega_3 \omega_4 c_s^2 - \frac{1}{4}\omega_3 \omega_4^2 c_s^2 + \frac{1}{8}\omega_4^2 + \frac{1}{4}\omega_3^2 u^2 + \\ & \frac{3}{8}\omega_3 \omega_1 u^2 - \frac{1}{2}\omega_1 u - \frac{1}{4}\omega_3 \omega_4 c_s^2 \omega_1 + \frac{1}{8}\omega_3 \omega_1 - \frac{1}{4}\omega_2^2 \omega_4 c_s^2 + \frac{1}{4}v^2 \omega_3^2 - \frac{3}{4}\omega_4 + \frac{1}{8}\omega_2 v \omega_3^2 - \frac{1}{2}\omega_1 + \frac{1}{8}\omega_3 \omega_4 - \\ & \frac{1}{2}\omega_4 u^2 - \frac{5}{8}\omega_2 v \omega_3 - \frac{1}{8}\omega_2 v^2 \omega_4 + \frac{11}{8}\omega_3 \omega_4 u^2 + \frac{1}{4}\omega_2 v \omega_3 \omega_1 + \frac{1}{8}v^2 \omega_3 \omega_4 - \frac{1}{4}\omega_2 \omega_3^2 c_s^2 - v^2 \omega_3 + \frac{1}{4}\omega_2 \omega_1 - 2\omega_3 c_s^2 + \\ & \frac{3}{8}v^2 \omega_3 \omega_1 + \frac{5}{8}\omega_3 \omega_1 u + \frac{1}{8}\omega_2 v \omega_3 \omega_4 + \frac{1}{4}\omega_2 \omega_4 - \frac{1}{4}\omega_3 \omega_4 \omega_1 u^2 + \frac{3}{4}\omega_3 c_s^2 \omega_1, \end{aligned}$$

$$\alpha_{x-\delta_i, y-\delta_i}^{[\mu_4], t-2\delta_t} = -2 + \omega_2 - \frac{9}{8}\omega_2\omega_3 + \frac{3}{8}\omega_3\omega_4\omega_1 + \frac{3}{8}\omega_2\omega_3\omega_4 + \frac{5}{2}\omega_3 - \frac{3}{8}\omega_4\omega_1 + \frac{1}{4}\omega_3^2\omega_4 + \frac{1}{8}\omega_2\omega_3^2 - \frac{1}{2}\omega_3^2 + \frac{1}{2}\omega_2\omega_3\omega_1 + \frac{1}{8}\omega_3^2\omega_1 - \frac{1}{4}\omega_4^2 - \frac{9}{8}\omega_3\omega_1 + \frac{3}{2}\omega_4 + \omega_1 - \frac{7}{4}\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_1 - \frac{3}{8}\omega_2\omega_4,$$

$$\begin{aligned} \alpha_{x,y-\delta_1}^{[\mu_1],t-2\delta_t} = & 2 - \omega_2 + \frac{1}{2}\omega_2vw_4\omega_1 - \frac{3}{2}\omega_2vw_1 + \frac{3}{4}\omega_4\omega_1u^2 - \frac{1}{4}\omega_4\omega_1^2 + \omega_2v - \frac{1}{2}\omega_2vw_4 - \frac{3}{4}v^2\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4\omega_1 + \\ & \frac{1}{2}v^2\omega_4 - \frac{1}{4}v^2\omega_4^2 - \frac{1}{2}\omega_3 + \frac{7}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2u^2 + \frac{1}{2}v^2\omega_4\omega_1^2 - \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_3\omega_1^2u^2 + \frac{1}{2}\omega_3u^2 + \frac{1}{2}\omega_2vw_1^2 + \frac{1}{4}\omega_4^2 + \\ & \frac{1}{2}\omega_3c_s^2\omega_1^2 + \frac{1}{4}v^2\omega_3\omega_1^2 - \frac{3}{4}\omega_3\omega_1u^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 + \frac{3}{4}\omega_3\omega_1 - \frac{3}{2}\omega_4 + \omega_1 - \frac{1}{2}\omega_2w_4\omega_1 - \frac{1}{2}\omega_2\omega_1^2 - 3\omega_1 + \\ & \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4\omega_1 - \frac{1}{2}\omega_4u^2 - \frac{1}{4}\omega_4^2\omega_1u^2 - \frac{1}{4}\omega_3\omega_4u^2 + \frac{1}{4}v^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_3\omega_4 + \frac{1}{4}v^2\omega_3\omega_4\omega_1 + \frac{1}{2}v^2\omega_3 + \frac{3}{2}\omega_2\omega_1 + \\ & \omega_3c_s^2 - \frac{3}{4}v^2\omega_3\omega_1 - \frac{1}{4}\omega_4\omega_1^2u^2 - \frac{1}{4}\omega_3\omega_1^2 + \frac{1}{2}\omega_2w_4 + \frac{1}{4}\omega_3\omega_4\omega_1u^2 - \frac{3}{2}\omega_3c_s^2\omega_1, \end{aligned}$$

$$\alpha_{x,y-\delta_l}^{[\mu_4],t-2\delta_t} = -2 + \omega_2 + \frac{1}{2}\omega_4\omega_1^2 - \frac{5}{2}\omega_4\omega_1 - \frac{1}{2}\omega_4^2 + 2\omega_4 - \omega_1^2 + \frac{1}{2}\omega_2\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_1^2 + 3\omega_1 + \frac{1}{2}\omega_4^2\omega_1 - \frac{3}{2}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_4,$$

$$\begin{aligned} \alpha_{x+\delta_t, y-\delta_t}^{[\mu_1], t-2\delta_t} = & 1 - \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2 v^2 \omega_3 \omega_1 - \frac{1}{4}\omega_2 v \omega_1 - \frac{1}{4}\omega_3^2 \omega_4 u^2 + \frac{1}{8}\omega_4 \omega_1 u^2 + \frac{1}{4}\omega_2 \omega_3 \omega_1 u - \frac{1}{2}\omega_2 \omega_3 c_s^2 \omega_1 - \frac{1}{8}\omega_2 v^2 \omega_3 \omega_4 + \\ & \frac{1}{2}\omega_2 v - \frac{1}{4}\omega_3 \omega_4^2 u^2 - \frac{1}{8}\omega_2 v \omega_4 + \frac{5}{8}\omega_2 v^2 \omega_3 + \frac{1}{8}\omega_3^2 \omega_1 u - \frac{3}{8}\omega_2 \omega_3 \omega_4 u^2 + \frac{5}{4}\omega_2 \omega_3 c_s^2 - \frac{1}{8}v^2 \omega_4 \omega_1 + \frac{1}{2}v^2 \omega_4 + \\ & \frac{1}{2}\omega_3^2 c_s^2 - \frac{1}{8}v^2 \omega_4^2 + \frac{1}{8}\omega_2 \omega_4 u^2 - \frac{1}{4}\omega_3 + \frac{1}{8}\omega_4 \omega_1 - \frac{1}{8}\omega_2 v^2 \omega_3^2 + \frac{1}{8}\omega_4^2 u^2 - \frac{1}{8}\omega_2 \omega_3^2 u^2 - \frac{1}{4}\omega_2 \omega_1 u + \frac{3}{2}\omega_3 \omega_4 c_s^2 - \\ & \omega_3 u^2 - \frac{1}{8}\omega_4 \omega_1 u - \frac{1}{4}\omega_2 \omega_3 \omega_1 u^2 + \frac{1}{8}\omega_3 \omega_4 \omega_1 u + \frac{5}{8}\omega_2 \omega_3 u^2 - \frac{1}{2}\omega_2 \omega_3 \omega_4 c_s^2 - \frac{1}{4}\omega_3 \omega_4^2 c_s^2 + \frac{1}{8}\omega_4^2 + \frac{1}{4}\omega_3^2 u^2 + \\ & \frac{3}{8}\omega_3 \omega_1 u^2 + \frac{1}{2}\omega_1 u - \frac{1}{4}\omega_3 \omega_4 c_s^2 \omega_1 + \frac{1}{8}\omega_3 \omega_1 - \frac{1}{4}\omega_3^2 \omega_4 c_s^2 + \frac{1}{4}v^2 \omega_3^2 - \frac{3}{4}\omega_4 + \frac{1}{8}\omega_2 v \omega_3^2 - \frac{1}{2}\omega_1 + \frac{1}{8}\omega_3 \omega_4 - \\ & \frac{1}{2}\omega_4 u^2 - \frac{5}{8}\omega_2 v \omega_3 - \frac{1}{8}\omega_2 v^2 \omega_4 + \frac{11}{8}\omega_3 \omega_4 u^2 + \frac{1}{4}\omega_2 v \omega_3 \omega_1 + \frac{1}{8}v^2 \omega_3 \omega_4 - \frac{1}{4}\omega_2 \omega_3^2 c_s^2 - v^2 \omega_3 + \frac{1}{4}\omega_2 \omega_1 - 2\omega_3 c_s^2 + \\ & \frac{3}{8}v^2 \omega_3 \omega_1 - \frac{5}{8}\omega_3 \omega_1 u + \frac{1}{8}\omega_2 v \omega_3 \omega_4 + \frac{1}{4}\omega_2 \omega_4 - \frac{1}{4}\omega_3 \omega_4 \omega_1 u^2 + \frac{3}{4}\omega_3 c_s^2 \omega_1, \end{aligned}$$

$$\alpha_{x+\delta_1, y-\delta_1}^{[\mu_4], t-2\delta_t} = -2 + \omega_2 - \frac{9}{8}\omega_2\omega_3 + \frac{3}{8}\omega_3\omega_4\omega_1 + \frac{3}{8}\omega_2\omega_3\omega_4 + \frac{5}{2}\omega_3 - \frac{3}{8}\omega_4\omega_1 + \frac{1}{4}\omega_3^2\omega_4 + \frac{1}{8}\omega_2\omega_3^2 - \frac{1}{2}\omega_3^2 + \frac{1}{2}\omega_2\omega_3\omega_1 + \frac{1}{8}\omega_3^2\omega_1 - \frac{1}{4}\omega_4^2 - \frac{9}{8}\omega_3\omega_1 + \frac{3}{2}\omega_4 + \omega_1 - \frac{7}{4}\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_1 - \frac{3}{8}\omega_2\omega_4,$$

$$\alpha_{x-\delta t,y}^{[\mu],t-2\delta t} = 1 + \frac{1}{8}\omega_2\omega_4^2c_s^2 - \omega_2 + \frac{1}{4}\omega_2v^2\omega_3\omega_1 + \frac{1}{4}\omega_2^2v^2\omega_4 + \frac{1}{8}\omega_4\omega_1u^2 + \frac{1}{4}\omega_4c_s^2 + \frac{1}{2}\omega_2\omega_3c_s^2\omega_1 - \frac{1}{4}\omega_2^2\omega_4 + \frac{1}{4}\omega_2v^2\omega_3\omega_4 + \frac{1}{4}\omega_2\omega_3\omega_4u^2 + \frac{1}{8}\omega_4^2u - \frac{1}{4}v^2\omega_4\omega_1 + \frac{3}{4}v^2\omega_4 + \frac{1}{4}\omega_2\omega_4u - \frac{1}{4}\omega_2\omega_3\omega_4 - \frac{1}{4}v^2\omega_4^2 + \frac{3}{4}\omega_2\omega_4u^2 - \frac{1}{4}\omega_2^2\omega_3u^2 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{8}\omega_4^2u^2 - \frac{1}{8}\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_2\omega_3\omega_1 + \omega_2\omega_1u - \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_3u^2 + \frac{1}{8}\omega_4\omega_1u + \frac{1}{4}\omega_2\omega_3\omega_1u^2 - \frac{1}{4}\omega_2\omega_4^2 + \frac{1}{2}\omega_2\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_2^2\omega_4u^2 + \frac{1}{8}\omega_2\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{4}\omega_3\omega_1u^2 - \frac{1}{8}\omega_2\omega_4\omega_1u - \frac{1}{2}\omega_1u + \frac{1}{4}\omega_3\omega_1 - \frac{1}{2}\omega_2^2\omega_1u - \frac{5}{4}\omega_4 - \frac{1}{4}\omega_2\omega_4\omega_1 - \frac{1}{8}\omega_2\omega_4^2u^2 + \frac{1}{4}\omega_2v^2\omega_4^2 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{2}\omega_4u^2 - \omega_2v^2\omega_4 - \frac{1}{4}\omega_3\omega_4u^2 + \frac{1}{4}\omega_2v^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_3\omega_4 - \frac{1}{4}\omega_4u + \frac{1}{4}v^2\omega_3^2 + \frac{1}{2}\omega_2\omega_1 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{8}\omega_2\omega_4^2u - \frac{1}{4}v^2\omega_3\omega_1 - \frac{1}{2}\omega_2^2\omega_3c_s^2 - \frac{1}{4}\omega_2\omega_4c_s^2 - \frac{1}{8}\omega_2\omega_4\omega_1u^2 - \frac{1}{4}\omega_2^2v^2\omega_3 + \frac{3}{2}\omega_2\omega_4 + \frac{1}{4}\omega_2^2\omega_3 - \frac{1}{8}\omega_4^2c_s^2 - \frac{1}{2}\omega_3c_s^2\omega_1,$$

$$a_{x-\delta_l,y}^{[\mu_4],t-2\delta_t} = -2 + 3\omega_2 + \frac{1}{2}\omega_2^2\omega_4 + \frac{1}{2}\omega_2^2\omega_1 - \frac{1}{2}\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_4^2 - \frac{1}{2}\omega_4^2 + 2\omega_4 + \frac{1}{2}\omega_2\omega_4\omega_1 + \omega_1 - \omega_2^2 - \frac{3}{2}\omega_2\omega_1 - \frac{5}{2}\omega_2\omega_4,$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_1],t-2\delta_t} = & 2 - \frac{1}{2}v^2w_3^2\omega_1 - \omega_3^2c_s^2\omega_1 + \omega_3^2c_s^2 - \frac{1}{2}\omega_3 + \frac{1}{2}\omega_4\omega_1 - \frac{1}{2}\omega_3^2\omega_1u^2 + w_3\omega_4c_s^2 - \omega_3\omega_1^2u^2 - 2\omega_3u^2 - \\ & 2\omega_3c_s^2\omega_1^2 - v^2w_3\omega_1^2 + \frac{1}{2}\omega_3^2u^2 + 3\omega_3\omega_1u^2 - \omega_3\omega_4c_s^2\omega_1 + \frac{1}{2}\omega_3\omega_1 + \frac{1}{2}v^2\omega_3^2 - \frac{1}{2}\omega_4 + \omega_1^2 - 3\omega_1 + \frac{1}{2}\omega_3\omega_4u^2 + \\ & \frac{1}{2}v^2\omega_3\omega_4 - \frac{1}{2}v^2w_3\omega_4\omega_1 - 2v^2\omega_3 - 4\omega_3c_s^2 + 3v^2w_3\omega_1 - \frac{1}{2}\omega_3\omega_4\omega_1u^2 + 6\omega_3c_s^2\omega_1, \end{aligned}$$



$$\begin{aligned}
& \frac{1}{4}w_3w_4 + \frac{1}{2}w_2vw_3w_1^2 + \frac{1}{4}w_4^2w_1 + w_4u^2 + \frac{5}{4}w_2v_3w_3 + \frac{1}{4}w_2v^2w_4 + \frac{1}{4}w_4^2w_1u^2 - \frac{11}{4}w_3w_4u^2 - \frac{7}{4}w_2v_3w_3w_1 - \frac{1}{4}w_2v^2w_4w_1 - \\
& \frac{1}{4}v^2w_4^2w_1 - \frac{1}{4}v^2w_3w_4 + \frac{1}{2}w_2w_3^2c_s^2 + \frac{1}{4}v^2w_3w_4w_1 + 2v^2w_3 - \frac{1}{2}w_2w_3^2c_s^2w_1 - \frac{3}{2}w_2w_1 + 4w_3c_s^2 - \frac{11}{4}v^2w_3w_1 + \\
& \frac{1}{4}w_2w_4w_1u^2 + \frac{1}{4}w_4w_1^2u^2 + \frac{1}{4}w_3w_1^2 - \frac{1}{4}w_2v_3w_3w_4 - \frac{1}{4}w_2v^2w_3^2w_1 - \frac{1}{2}w_3w_4c_s^2w_1^2 - \frac{11}{4}w_3w_4w_1u^2 - \frac{11}{2}w_3c_s^2w_1, \\
\alpha_{x-\delta,y}^{[4],t-3\delta_t} &= 3 - \frac{3}{2}w_2 + \frac{7}{4}w_2w_3 + \frac{1}{2}w_2w_3w_1^2 - \frac{1}{2}w_4w_1^2 - \frac{15}{4}w_3w_4w_1 - \frac{3}{4}w_2w_3w_4 - \frac{15}{4}w_3 + \frac{13}{4}w_4w_1 - \frac{1}{2}w_3^2w_4 + \\
& \frac{1}{2}w_3w_4w_1^2 - \frac{1}{4}w_2w_3^2 + \frac{3}{4}w_3^2 - \frac{9}{4}w_2w_3w_1 - \frac{3}{4}w_3^2w_1 + \frac{1}{4}w_2w_3^2w_1 + \frac{1}{2}w_4^2 + \frac{19}{4}w_3w_1 - \frac{11}{4}w_4 + w_1^2 - \frac{3}{4}w_2w_4w_1 - \\
& \frac{1}{2}w_2w_1^2 - 4w_1 + \frac{13}{4}w_3w_4 - \frac{1}{2}w_4^2w_1 + \frac{3}{4}w_2w_3w_4w_1 - \frac{1}{2}w_3w_4^2 + \frac{1}{2}w_3w_4^2w_1 + 2w_2w_1 + \frac{1}{2}w_3^2w_4w_1 - w_3w_1^2 + \frac{3}{4}w_2w_4, \\
\alpha_{x-\delta,y}^{[\mu_1],t-3\delta_t} &= -1 - \frac{1}{16}w_2w_4^2c_s^2 + w_2 + \frac{1}{4}w_2v^2w_3w_1 - \frac{1}{4}w_2^2w_4u^2 + \frac{7}{16}w_3^2w_4u^2 - \frac{1}{8}w_4w_1u^2 + \frac{7}{4}w_2w_3w_1u - \frac{1}{4}w_4c_s^2 + \\
& \frac{1}{2}w_2w_3c_s^2w_1 + \frac{1}{4}w_2^2w_4 - \frac{1}{2}w_2^2w_3w_4c_s^2 - \frac{3}{8}w_2w_3w_4w_1u^2 + \frac{7}{16}w_3w_4^2u^2 - \frac{5}{4}w_2v^2w_3 + \frac{1}{4}w_3^2w_1u + \frac{43}{16}w_2w_3w_4u^2 - \\
& \frac{5}{2}w_2w_3c_s^2 - \frac{1}{2}w_2^2u + \frac{1}{4}v^2w_4w_1 - v^2w_4 - \frac{1}{4}w_2w_4u - \frac{1}{2}w_3c_s^2 + \frac{1}{2}w_2w_3w_4 + \frac{1}{4}v^2w_4^2 - \frac{3}{8}w_2w_3w_4c_s^2w_1 - w_2w_4u^2 + \\
& \frac{1}{4}w_2w_3u^2 - \frac{16}{16}w_2w_3^2w_4c_s^2 + \frac{1}{4}w_3 - \frac{3}{8}w_2w_3w_4w_1u - \frac{1}{4}w_4w_1 + \frac{1}{4}w_2v^2w_3^2 + \frac{1}{16}w_3w_4^2u - \frac{3}{16}w_4^2u^2 + \frac{5}{16}w_2w_3w_4u - \\
& \frac{7}{16}w_2w_3w_4^2c_s^2 + \frac{1}{4}w_2w_3^2u^2 + \frac{1}{8}w_4c_s^2w_1 + \frac{1}{4}w_2w_3w_1 - \frac{3}{2}w_2w_1u - \frac{35}{16}w_3w_4c_s^2 + w_3u^2 + \frac{1}{16}w_3^2w_4u - \frac{3}{8}w_4w_1u + \\
& \frac{1}{2}w_2w_3w_4c_s^2 + \frac{1}{4}w_2w_4^2 + \frac{3}{8}w_3w_4w_1u - \frac{5}{4}w_2w_3u^2 + \frac{43}{16}w_2w_3w_4c_s^2 + \frac{1}{4}w_2w_4u^2 + \frac{7}{16}w_3w_4^2c_s^2 - \frac{1}{8}w_2w_4c_s^2w_1 - \\
& \frac{1}{4}w_4^2 - \frac{1}{4}w_3^2u^2 - \frac{1}{16}w_2w_3^2w_4u - \frac{1}{4}w_3w_1u^2 - \frac{1}{2}w_2w_3w_1u + \frac{3}{8}w_2w_4w_1u + w_1u + \frac{3}{8}w_3w_4c_s^2w_1 - \frac{1}{4}w_3w_1 + \\
& \frac{7}{16}w_3w_4c_s^2 - \frac{1}{4}v^2w_3^2 + \frac{1}{2}w_2^2w_1u + \frac{5}{4}w_4 + \frac{1}{4}w_2w_4w_1 + \frac{3}{16}w_2w_4^2u^2 - \frac{1}{2}w_2w_3w_4u^2 - \frac{5}{16}w_3w_4u - \frac{1}{4}w_2v^2w_4^2 + \\
& \frac{1}{2}w_1 - \frac{1}{4}w_3w_4 - \frac{1}{16}w_2w_3w_4^2u + \frac{3}{4}w_4u^2 + \frac{5}{4}w_2v^2w_4 - \frac{1}{4}w_2w_3^2w_1u - \frac{35}{16}w_3w_4u^2 - \frac{1}{4}w_2v^2w_4w_1 + \frac{1}{4}w_4u + \\
& \frac{1}{2}w_2w_3^2c_s^2 - \frac{7}{16}w_2w_3w_4^2u^2 + v^2w_3 - \frac{1}{2}w_2w_1 + 2w_3c_s^2 + \frac{1}{16}w_2w_4^2u - \frac{1}{4}v^2w_3w_1 - \frac{7}{16}w_2w_3^2w_4u^2 + \frac{1}{2}w_2w_3c_s^2 + \\
& \frac{1}{4}w_2w_4c_s^2 - \frac{5}{4}w_3w_1u + \frac{1}{8}w_2w_4w_1u^2 + \frac{1}{4}w_2^2v^2w_3 - \frac{3}{2}w_2w_4 - \frac{1}{4}w_2^2w_3 + \frac{3}{8}w_3w_4w_1u^2 + \frac{1}{16}w_4^2c_s^2 - \frac{1}{2}w_3c_s^2w_1, \\
\alpha_{x-\delta,y}^{[\mu_4],t-3\delta_t} &= 3 - 4w_2 + \frac{19}{4}w_2w_3 - \frac{1}{2}w_2^2w_4 - \frac{3}{4}w_3w_4w_1 + \frac{1}{2}w_2w_3w_4^2 - \frac{1}{2}w_2^2w_1 - \frac{15}{4}w_2w_3w_4 - \frac{15}{4}w_3 + \frac{3}{4}w_4w_1 - \\
& \frac{1}{3}w_3^2w_4 - \frac{3}{4}w_2w_3^2 + \frac{3}{4}w_3^2 - \frac{9}{4}w_2w_3w_1 - \frac{1}{4}w_3w_1 - \frac{1}{2}w_2w_4^2 + \frac{1}{2}w_2w_3w_4 + \frac{1}{4}w_2w_3^2w_1 + \frac{1}{2}w_4^2 + \frac{7}{4}w_3w_1 - \frac{11}{4}w_4 - \\
& \frac{3}{4}w_2w_4w_1 + \frac{1}{2}w_2w_3w_1 + \frac{1}{2}w_2w_3^2w_4 - \frac{3}{2}w_1 + \frac{13}{4}w_3w_4 + \frac{3}{4}w_2w_3w_4w_1 - \frac{1}{2}w_3w_4^2 + w_2^2 + 2w_2w_1 + \frac{13}{4}w_2w_4 - w_2^2w_3, \\
\alpha_{x,y}^{[\mu_1],t-3\delta_t} &= -2 - \frac{1}{4}w_2w_4^2c_s^2 - \frac{1}{4}w_2w_4w_1^2u^2 + 2w_2 + \frac{1}{2}w_2v^2w_3w_4w_1 - \frac{1}{2}w_2v^2w_3w_1 - \frac{1}{2}w_2^2v^2w_4 - \frac{5}{4}w_4w_1u^2 - \frac{1}{2}w_4c_s^2 - \\
& w_2w_3c_s^2w_1 - \frac{1}{4}w_4c_s^2w_1^2 + \frac{1}{2}w_2^2w_4 - \frac{1}{2}w_2w_3w_1^2 + \frac{1}{2}w_4w_1^2 - \frac{1}{2}w_2v^2w_3w_4 + \frac{1}{2}w_2w_3w_4w_1u^2 + \frac{1}{2}w_2v^2w_4^2w_1 - \\
& \frac{1}{4}w_2w_4^2w_1u^2 - \frac{1}{2}w_2w_3w_4u^2 - \frac{1}{4}w_2^2u + 2v^2w_4w_1 + \frac{1}{2}w_3w_4w_1 - \frac{3}{2}v^2w_4 - \frac{1}{2}w_2w_4u + \frac{1}{2}w_2w_3w_4 - \frac{1}{2}w_2w_4^2w_1 + \\
& \frac{1}{4}w_2w_4^2c_s^2w_1 + \frac{1}{2}v^2w_4^2 + w_2w_3w_4c_s^2w_1 - \frac{3}{2}w_2w_4u^2 + \frac{1}{2}w_2w_3w_4u^2 + \frac{1}{2}w_3 - 3w_4w_1 - \frac{1}{4}w_2^2u^2 + \frac{1}{2}w_2^2v^2w_4w_1 - \\
& \frac{1}{2}v^2w_4w_1^2 + w_2w_3c_s^2w_1^2 + \frac{3}{4}w_4c_s^2w_1 + \frac{1}{2}w_2w_3w_1 - \frac{1}{2}w_2^2w_4w_1 + w_3w_4c_s^2 - \frac{1}{2}w_3w_4w_1^2 - \frac{1}{2}w_3w_1^2 + \frac{1}{2}w_2v^2w_3w_1^2 - \\
& \frac{1}{4}w_4w_1u - \frac{1}{2}w_2w_4w_1u^2 - \frac{1}{2}w_2w_3w_1u^2 + \frac{1}{2}w_2w_4^2 - w_2w_3w_4c_s^2 + \frac{1}{2}w_2w_4u^2 - \frac{3}{4}w_2w_4c_s^2w_1 - \frac{1}{2}w_4^2 - w_3c_s^2w_1^2 - \\
& w_2w_3c_s^2w_1 - \frac{1}{2}w_2^2v^2w_3w_1 - \frac{1}{2}v^2w_3w_1^2 + w_3w_1u^2 + \frac{1}{4}w_2w_4w_1u + \frac{1}{2}w_2w_3w_1u^2 - w_3w_4c_s^2w_1 - w_3w_1 + \frac{5}{2}w_4 - w_1^2 + \\
& \frac{7}{2}w_2w_4w_1 + \frac{1}{2}w_2w_3w_1 + w_2w_1^2 - \frac{1}{4}w_2^2c_s^2w_1 + \frac{1}{4}w_2w_4^2u^2 - \frac{1}{2}w_2v^2w_4^2 + 3w_1 - \frac{1}{2}w_3w_4 + \frac{1}{2}w_2v^2w_4w_1^2 + \frac{1}{2}w_4^2w_1 + w_4u^2 + \\
& 2w_2v^2w_4 + \frac{1}{4}w_2^2w_1u^2 + \frac{1}{2}w_3w_4u^2 - \frac{1}{2}w_2w_3w_4w_1 - \frac{5}{2}w_2v^2w_4w_1 - \frac{1}{2}v^2w_4w_1^2 + \frac{1}{2}v^2w_3w_4 + \frac{1}{2}w_4u - \frac{1}{2}v^2w_3w_4w_1 - \\
& \frac{1}{2}v^2w_3 - \frac{1}{2}w_2w_4w_1^2 - 3w_2w_1 - w_3c_s^2 + \frac{1}{4}w_2w_4^2u + v^2w_3w_1 + w_2^2w_3c_s^2 + \frac{1}{2}w_2w_4c_s^2 - \frac{1}{2}w_2w_3w_1u^2 + \frac{4}{4}w_2w_4w_1u^2 + \\
& \frac{1}{4}w_4w_1^2u^2 + \frac{1}{2}w_2^2v^2w_3 + \frac{1}{2}w_3w_1^2 - 3w_2w_4 - \frac{1}{2}w_2^2w_3 - \frac{1}{2}w_3w_4w_1u^2 + \frac{1}{4}w_4^2c_s^2 + \frac{1}{4}w_2w_4c_s^2w_1^2 + 2w_3c_s^2w_1, \\
\alpha_{x,y}^{[\mu_4],t-3\delta_t} &= 3 - 4w_2 - w_2^2w_4 - \frac{3}{4}w_4w_1^2 - w_2^2w_1 + \frac{3}{4}w_2w_4^2w_1 + \frac{17}{4}w_4w_1 + w_2^2w_4w_1 - \frac{3}{4}w_2w_4^2 + \frac{3}{4}w_4^2 - \frac{7}{2}w_4 + w_1^2 - \\
& \frac{21}{4}w_2w_4w_1 - w_2w_1^2 - 4w_1 - \frac{3}{4}w_4w_1^2 + w_2^2 + \frac{3}{4}w_2w_4w_1^2 + 5w_2w_1 + \frac{9}{2}w_2w_4, \\
\alpha_{x+\delta,y}^{[\mu_1],t-3\delta_t} &= -1 - \frac{1}{16}w_2w_4^2c_s^2 + w_2 + \frac{1}{4}w_2v^2w_3w_1 - \frac{1}{4}w_2^2w_4w_1u^2 + \frac{7}{16}w_3^2w_4u^2 - \frac{1}{8}w_4w_1u^2 - \frac{7}{4}w_2w_3w_1u - \frac{1}{4}w_4c_s^2 + \\
& \frac{1}{2}w_2w_3c_s^2w_1 + \frac{1}{4}w_2^2w_4 - \frac{1}{2}w_2w_3w_4c_s^2 - \frac{3}{8}w_2w_3w_4w_1u^2 + \frac{7}{16}w_3w_4^2u^2 - \frac{5}{4}w_2v^2w_3 - \frac{1}{4}w_3^2w_1u + \frac{43}{16}w_2w_3w_4u^2 - \\
& \frac{5}{2}w_2w_3c_s^2 - \frac{1}{2}w_2^2u + \frac{1}{4}v^2w_4w_1 - v^2w_4 - \frac{1}{4}w_2w_4u - \frac{1}{2}w_3c_s^2 + \frac{1}{4}w_2w_3w_4 + \frac{1}{4}v^2w_4^2 - \frac{3}{8}w_2w_3w_4c_s^2w_1 - w_2w_4u^2 + \\
& \frac{1}{4}w_2w_3u^2 - \frac{1}{6}w_2w_3^2w_4c_s^2 + \frac{1}{4}w_3 + \frac{1}{8}w_2w_3w_4w_1u - \frac{1}{4}w_4w_1 + \frac{1}{4}w_2v^2w_3^2 + \frac{1}{16}w_3w_4^2u - \frac{3}{16}w_4^2u^2 + \frac{5}{16}w_2w_3w_4u - \\
& \frac{7}{16}w_2w_3w_4^2c_s^2 + \frac{1}{4}w_2w_3^2u^2 + \frac{1}{8}w_4c_s^2w_1 + \frac{1}{4}w_2w_3w_1 + \frac{3}{2}w_2w_1u - \frac{35}{16}w_3w_4c_s^2 + w_3u^2 + \frac{1}{16}w_3^2w_4u + \frac{1}{8}w_4w_1u + \\
& \frac{1}{2}w_2w_3w_1u^2 + \frac{1}{4}w_2w_4^2 - \frac{1}{8}w_3w_4w_1u - \frac{5}{2}w_2w_3u^2 + \frac{43}{16}w_2w_3w_4c_s^2 + \frac{1}{4}w_2w_4u^2 + \frac{7}{16}w_3w_4^2c_s^2 + \frac{1}{2}w_2w_4w_1u^2 - \frac{1}{2}v^2w_3w_4w_1 - \\
& \frac{1}{2}v^2w_3 - \frac{1}{2}w_2w_4w_1^2 - 3w_2w_1 - w_3c_s^2 + \frac{1}{4}w_2w_4^2u + v^2w_3w_1 + w_2^2w_3c_s^2 + \frac{1}{2}w_2w_4c_s^2 - \frac{1}{2}w_2w_3w_1u^2 + \frac{4}{4}w_2w_4w_1u^2 + \\
& \frac{1}{4}w_4w_1^2u^2 + \frac{1}{2}w_2^2v^2w_3 + \frac{1}{2}w_3w_1^2 - 3w_2w_4 - \frac{1}{2}w_2^2w_3 - \frac{1}{2}w_3w_4w_1u^2 + \frac{1}{4}w_4^2c_s^2 + \frac{1}{4}w_2w_4c_s^2w_1^2 + 2w_3c_s^2w_1, \\
\alpha_{x,y}^{[\mu_4],t-3\delta_t} &= 3 - 4w_2 - w_2^2w_4 - \frac{3}{4}w_4w_1^2 - w_2^2w_1 + \frac{3}{4}w_2w_4^2w_1 + \frac{17}{4}w_4w_1 + w_2^2w_4w_1 - \frac{3}{4}w_2w_4^2 + \frac{3}{4}w_4^2 - \frac{7}{2}w_4 + w_1^2 - \\
& \frac{21}{4}w_2w_4w_1 - w_2w_1^2 - 4w_1 - \frac{3}{4}w_4w_1^2 + w_2^2 + \frac{3}{4}w_2w_4w_1^2 + 5w_2w_1 + \frac{9}{2}w_2w_4,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_t, y}^{[\mu_4], t-3\delta_t} &= 3 - 4\omega_2 + \frac{19}{4}\omega_2\omega_3 - \frac{1}{2}\omega_2^2\omega_4 - \frac{1}{2}\omega_3\omega_4\omega_1 + \frac{3}{8}\omega_2\omega_3\omega_4^2 - \frac{1}{2}\omega_2^2\omega_1 - \frac{25}{8}\omega_2\omega_3\omega_4 - \frac{15}{4}\omega_3 + \frac{1}{2}\omega_4\omega_1 - \\
&\quad \frac{3}{4}\omega_3^2\omega_4 - \frac{3}{4}\omega_2\omega_3^2 + \frac{3}{4}\omega_3^2 - \frac{9}{4}\omega_2\omega_3\omega_1 - \frac{1}{4}\omega_3^2\omega_1 - \frac{3}{8}\omega_2\omega_4^2 + \frac{1}{2}\omega_2^2\omega_3\omega_4 + \frac{1}{4}\omega_2\omega_3^2\omega_1 + \frac{3}{8}\omega_4^2 + \frac{7}{4}\omega_3\omega_1 - \frac{9}{4}\omega_4 - \\
&\quad \frac{9}{2}\omega_2\omega_4\omega_1 + \frac{1}{2}\omega_2^2\omega_3\omega_1 + \frac{3}{8}\omega_2\omega_3^2\omega_4 - \frac{3}{2}\omega_1 + \frac{21}{8}\omega_3\omega_4 + \frac{1}{2}\omega_2\omega_3\omega_4\omega_1 - \frac{3}{8}\omega_3\omega_4^2 + \omega_2^2 + 2\omega_2\omega_1 + \frac{11}{4}\omega_2\omega_4 - \omega_2^2\omega_3, \\
\alpha_{x,y+\delta_t}^{[\mu_1], t-3\delta_t} &= -2 + \omega_2 - \frac{1}{4}\omega_2v^2\omega_3\omega_4\omega_1 + \frac{1}{2}v^2\omega_3^2\omega_1 - \frac{3}{8}\omega_2^2\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_2v\omega_4\omega_1 + \frac{7}{4}\omega_2v^2\omega_3\omega_1 - \frac{3}{2}\omega_2v\omega_1 + \frac{3}{8}\omega_3^2\omega_4u^2 - \\
&\quad \frac{1}{2}\omega_4\omega_1u^2 - \frac{1}{2}\omega_4c_s^2 - \frac{1}{4}\omega_3\omega_4\omega_1^2u^2 + \frac{7}{2}\omega_2\omega_3c_s^2\omega_1 - \frac{1}{4}\omega_4c_s^2\omega_1^2 + \frac{1}{4}\omega_4\omega_1^2 + \frac{1}{4}\omega_2v^2\omega_3\omega_4 - \frac{3}{4}\omega_2\omega_3\omega_4\omega_1u^2 - \\
&\quad \frac{1}{4}\omega_2v\omega_3^2\omega_1 + \omega_2v + \frac{3}{8}\omega_3\omega_4^2u^2 - \frac{1}{4}\omega_2v\omega_4 - \frac{5}{4}\omega_2v^2\omega_3 + \frac{3}{4}\omega_2\omega_3\omega_4u^2 - \frac{5}{2}\omega_2\omega_3c_s^2 - \frac{1}{8}\omega_4^2u + \frac{5}{4}v^2\omega_4\omega_1 + \\
&\quad \frac{1}{4}\omega_3\omega_4\omega_1 + \omega_2^2c_s^2\omega_1 - v^2\omega_4 - \frac{3}{8}\omega_3\omega_4^2\omega_1u^2 - \omega_2^2c_s^2 + \frac{1}{4}v^2\omega_4^2 - \omega_2\omega_3\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_2\omega_4u^2 - \frac{3}{8}\omega_3\omega_4^2c_s^2\omega_1 + \\
&\quad \frac{1}{2}\omega_3 - \frac{7}{4}\omega_4\omega_1 + \frac{1}{4}\omega_2v^2\omega_3^2 + \frac{1}{8}\omega_3\omega_4^2u - \frac{1}{8}\omega_4^2u^2 + \frac{1}{2}\omega_3^2\omega_1u^2 - \frac{1}{4}v^2\omega_4\omega_1^2 + \frac{1}{4}\omega_2\omega_3^2u^2 - \omega_2\omega_3c_s^2\omega_1^2 + \frac{3}{4}\omega_4c_s^2\omega_1 - \\
&\quad \frac{3}{8}\omega_3^2\omega_4\omega_1u^2 - \frac{19}{8}\omega_3\omega_4c_s^2 + \frac{3}{4}\omega_3\omega_1^2u^2 + 2\omega_3u^2 - \frac{1}{2}\omega_2v^2\omega_3\omega_1^2 + \frac{1}{8}\omega_3^2\omega_4u - \frac{1}{4}\omega_4\omega_1u + \frac{7}{4}\omega_2\omega_3\omega_1u^2 + \\
&\quad \frac{1}{5}\omega_2v\omega_1^2 + \frac{1}{4}\omega_3\omega_4\omega_1u - \frac{5}{4}\omega_2\omega_3u^2 + \omega_2\omega_3\omega_4c_s^2 + \frac{3}{8}\omega_3\omega_4^2c_s^2 - \frac{1}{4}\omega_4^2 + \frac{3}{2}\omega_3c_s^2\omega_1^2 + \frac{3}{4}v^2\omega_3\omega_1^2 - \frac{1}{2}\omega_3^2u^2 - \\
&\quad \frac{11}{4}\omega_3\omega_1u^2 - \frac{1}{2}\omega_2\omega_3\omega_1^2u^2 - \frac{1}{4}\omega_2v\omega_3\omega_4\omega_1 + \frac{21}{8}\omega_3\omega_4c_s^2\omega_1 - \frac{3}{8}\omega_3\omega_1 + \frac{3}{8}\omega_3^2\omega_4c_s^2 - \frac{1}{2}v^2\omega_3^2 + \frac{3}{2}\omega_4 - \omega_1^2 + \\
&\quad \frac{1}{4}\omega_2\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_1^2 - \frac{1}{8}\omega_4^2c_s^2\omega_1 - \frac{1}{4}\omega_2\omega_3^2\omega_1u^2 - \frac{5}{8}\omega_3\omega_4u + \frac{1}{4}\omega_2v\omega_3^2 + 3\omega_1 - \frac{1}{4}\omega_3\omega_4 - \frac{1}{2}\omega_2v\omega_3\omega_1^2 + \frac{1}{4}\omega_4\omega_1 + \\
&\quad \frac{1}{5}\omega_4u^2 - \frac{5}{4}\omega_2v\omega_3 + \frac{1}{4}\omega_2v^2\omega_4 + \frac{1}{8}\omega_4^2\omega_1u^2 - \frac{17}{8}\omega_3\omega_4u^2 + \frac{7}{4}\omega_2v\omega_3\omega_1 - \frac{1}{4}\omega_2v^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_4^2\omega_1 - \frac{1}{4}v^2\omega_3\omega_4 + \\
&\quad \frac{1}{5}\omega_4u + \frac{1}{2}\omega_2\omega_3^2c_s^2 + \frac{1}{4}v^2\omega_3\omega_4\omega_1 + 2v^2\omega_3 - \frac{1}{2}\omega_2\omega_3^2c_s^2\omega_1 - \frac{3}{2}\omega_2\omega_1 + 4\omega_3c_s^2 - \frac{11}{4}v^2\omega_3\omega_1 + \frac{1}{4}\omega_2\omega_4\omega_1u^2 + \\
&\quad \frac{1}{4}\omega_3\omega_1^2 + \frac{1}{4}\omega_2v\omega_3\omega_4 - \frac{1}{4}\omega_2v^2\omega_3^2\omega_1 - \frac{1}{4}\omega_3\omega_4c_s^2\omega_1^2 - \frac{1}{2}\omega_2\omega_4 + \frac{19}{8}\omega_3\omega_4\omega_1u^2 + \frac{1}{8}\omega_4^2c_s^2 - \frac{11}{2}\omega_3c_s^2\omega_1, \\
\alpha_{x,y+\delta_t}^{[\mu_4], t-3\delta_t} &= 3 - \frac{3}{2}\omega_2 + \frac{7}{4}\omega_2\omega_3 + \frac{1}{2}\omega_2\omega_3\omega_1^2 - \frac{1}{4}\omega_4\omega_1^2 - \frac{23}{8}\omega_3\omega_4\omega_1 - \frac{3}{4}\omega_2\omega_3\omega_4 - \frac{15}{4}\omega_3 + \frac{5}{2}\omega_4\omega_1 - \frac{3}{8}\omega_3^2\omega_4 + \\
&\quad \frac{1}{4}\omega_3\omega_4\omega_1^2 - \frac{1}{4}\omega_2\omega_3^2 + \frac{3}{4}\omega_3^2 - \frac{9}{4}\omega_2\omega_3\omega_1 - \frac{3}{4}\omega_3^2\omega_1 + \frac{1}{4}\omega_2\omega_3^2\omega_1 + \frac{3}{8}\omega_4^2 + \frac{19}{4}\omega_3\omega_1 - \frac{9}{4}\omega_4 + \omega_1^2 - \frac{3}{4}\omega_2\omega_4\omega_1 - \\
&\quad \frac{1}{2}\omega_2\omega_1^2 - 4\omega_1 + \frac{21}{8}\omega_3\omega_4 - \frac{3}{8}\omega_4^2\omega_1 + \frac{3}{4}\omega_2\omega_3\omega_4\omega_1 - \frac{3}{8}\omega_3\omega_4^2 + \frac{3}{8}\omega_3\omega_4^2\omega_1 + 2\omega_2\omega_1 + \frac{3}{8}\omega_3^2\omega_4\omega_1 - \omega_3\omega_1^2 + \frac{3}{4}\omega_2\omega_4, \\
\alpha_{x,y}^{[\mu_1], t-4\delta_t} &= 2 + \frac{1}{8}\omega_2\omega_4^2c_s^2 + \frac{1}{4}\omega_2\omega_4\omega_1^2u^2 - 2\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1 + \frac{7}{8}\omega_3^2\omega_4c_s^2\omega_1 - 3\omega_2v^2\omega_3\omega_1 + \frac{1}{2}\omega_2^2v^2\omega_4 - \frac{7}{8}\omega_3^2\omega_4u^2 + \\
&\quad \frac{7}{4}\omega_4\omega_1u^2 + \frac{1}{2}\omega_4c_s^2 + \frac{3}{4}\omega_3\omega_4\omega_1^2u^2 - \omega_2^2\omega_3\omega_4\omega_1u^2 - 6\omega_2\omega_3c_s^2\omega_1 + \frac{1}{4}\omega_4c_s^2\omega_1^2 - \frac{1}{2}\omega_2^2\omega_4 + \frac{1}{2}\omega_2\omega_3\omega_1^2 + \omega_2^2\omega_3\omega_4c_s^2 - \\
&\quad \frac{3}{4}\omega_4\omega_1^2 + \frac{49}{8}\omega_2\omega_3\omega_4\omega_1u^2 - \frac{1}{2}\omega_2v^2\omega_4^2\omega_1 - \frac{7}{8}\omega_3\omega_4^2u^2 + \frac{5}{2}\omega_2v^2\omega_3 + \frac{3}{8}\omega_2\omega_4^2\omega_1u^2 - \frac{43}{8}\omega_2\omega_3\omega_4u^2 + 5\omega_2\omega_3c_s^2 + \\
&\quad \frac{1}{8}\omega_4^2u - \frac{5}{2}v^2\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_3c_s^2\omega_1 + 2v^2\omega_4 + \frac{1}{2}\omega_2\omega_4u + \frac{7}{8}\omega_3\omega_4^2\omega_1u^2 - \frac{3}{4}\omega_2\omega_3\omega_4c_s^2\omega_1 + \omega_3c_s^2 - \frac{1}{2}\omega_2\omega_3\omega_4 + \\
&\quad \frac{1}{5}\omega_2\omega_4^2\omega_1 - \frac{1}{8}\omega_2\omega_4^2c_s^2\omega_1 - \frac{1}{2}v^2\omega_4^2 + \frac{49}{8}\omega_2\omega_3\omega_4c_s^2\omega_1 + 2\omega_2\omega_4u^2 - \frac{1}{2}\omega_2^2\omega_3u^2 + \frac{7}{8}\omega_2\omega_3^2\omega_4c_s^2\omega_1 - \frac{1}{8}\omega_3\omega_4^2\omega_1u^2 - \\
&\quad \frac{1}{2}\omega_3 + \frac{1}{4}\omega_2\omega_3\omega_4\omega_1u + 3\omega_4\omega_1 - \frac{1}{2}\omega_2v^2\omega_3^2 - \frac{1}{8}\omega_3\omega_4^2u + \frac{3}{8}\omega_4^2u^2 - \frac{1}{2}\omega_3^2\omega_1u^2 - \frac{5}{8}\omega_2\omega_3\omega_4u - \frac{1}{2}\omega_2^2v^2\omega_4\omega_1 + \frac{1}{2}v^2\omega_4\omega_1^2 + \\
&\quad \frac{7}{8}\omega_2\omega_3\omega_4^2c_s^2 - \frac{1}{2}\omega_2\omega_3^2u^2 + \omega_2\omega_3c_s^2\omega_1^2 - \frac{3}{4}\omega_4c_s^2\omega_1 - \frac{1}{2}\omega_2\omega_3\omega_1 + \frac{1}{2}\omega_2^2\omega_4\omega_1 + \frac{7}{8}\omega_3\omega_4\omega_1u^2 + \frac{35}{8}\omega_3\omega_4c_s^2 - \\
&\quad \frac{1}{2}\omega_3\omega_1^2u^2 - 2\omega_3u^2 - \omega_2^2\omega_3\omega_4c_s^2\omega_1 + \frac{1}{2}\omega_2v^2\omega_3\omega_1^2 - \frac{1}{8}\omega_3\omega_4u + \frac{1}{4}\omega_4\omega_1u + \frac{1}{2}\omega_2^2\omega_4\omega_1u^2 - 3\omega_2\omega_3\omega_1u^2 - \frac{1}{2}\omega_2\omega_4^2 - \\
&\quad \frac{7}{8}\omega_2\omega_3\omega_4^2c_s^2\omega_1 - \frac{1}{4}\omega_3\omega_4\omega_1u + \frac{5}{2}\omega_2\omega_3u^2 - \frac{43}{8}\omega_2\omega_3\omega_4c_s^2 - \frac{1}{2}\omega_2^2\omega_4u^2 - \frac{7}{8}\omega_3\omega_4^2c_s^2 + \frac{3}{4}\omega_2\omega_4c_s^2\omega_1 + \frac{1}{2}\omega_4^2 - \\
&\quad \omega_3c_s^2\omega_1^2 + \omega_2^2\omega_3c_s^2\omega_1 + \frac{1}{2}\omega_2^2v^2\omega_3\omega_1 - \frac{1}{2}\omega_2^2\omega_3\omega_1^2 + \frac{1}{2}\omega_2^2u^2 + \frac{1}{8}\omega_2\omega_3^2\omega_4u + \frac{5}{2}\omega_3\omega_1u^2 - \frac{1}{2}\omega_2\omega_4\omega_1u + \frac{1}{2}\omega_2\omega_3\omega_1^2u^2 - \\
&\quad \frac{41}{8}\omega_3\omega_4c_s^2\omega_1 + \omega_3\omega_1 - \frac{7}{8}\omega_3\omega_4c_s^2 + \frac{1}{2}v^2\omega_3^2 - \frac{5}{2}\omega_4 + \omega_1^2 - \frac{7}{2}\omega_2\omega_4\omega_1 - \frac{1}{2}\omega_2^2\omega_3\omega_1 - \omega_2\omega_1^2 + \frac{1}{8}\omega_4c_s^2\omega_1 - \frac{3}{8}\omega_2\omega_4^2u^2 + \\
&\quad \frac{1}{2}\omega_2\omega_3^2\omega_1u^2 + \omega_2^2\omega_3\omega_4u^2 + \frac{5}{8}\omega_3\omega_4u + \frac{1}{2}\omega_2v^2\omega_4^2 - 3\omega_1 + \frac{1}{2}\omega_3\omega_4 - \frac{1}{2}\omega_2v^2\omega_4\omega_1^2 - \frac{1}{2}\omega_4\omega_1u^2 - \frac{7}{8}\omega_2\omega_3^2\omega_4\omega_1u^2 + \\
&\quad \frac{1}{5}\omega_2\omega_3\omega_4^2u - \frac{3}{2}\omega_4u^2 - \frac{5}{2}\omega_2v^2\omega_4 - \frac{3}{8}\omega_4^2\omega_1u^2 + \frac{35}{8}\omega_3\omega_4u^2 + \frac{1}{2}\omega_2\omega_3\omega_4\omega_1 + 3\omega_2v^2\omega_4\omega_1 - \frac{3}{4}\omega_2\omega_3\omega_4\omega_1u^2 + \frac{1}{2}v^2\omega_4\omega_1^2 - \\
&\quad \frac{1}{2}\omega_4u - \omega_2\omega_3^2c_s^2 + \frac{7}{8}\omega_2\omega_3\omega_4u^2 - 2v^2\omega_3 - \frac{7}{8}\omega_2\omega_3^2\omega_4c_s^2\omega_1 + \frac{1}{2}\omega_2\omega_4\omega_1^2 + \omega_2\omega_3^2c_s^2\omega_1 + 3\omega_2\omega_1 - 4\omega_3c_s^2 - \frac{1}{8}\omega_2\omega_4^2u + \\
&\quad \frac{5}{2}v^2\omega_3\omega_1 + \frac{7}{8}\omega_2\omega_3^2\omega_4u^2 - \omega_2\omega_3c_s^2 - \frac{1}{2}\omega_2\omega_4c_s^2 + \frac{1}{2}\omega_2^2\omega_3\omega_1u^2 - \frac{9}{4}\omega_2\omega_4\omega_1u^2 - \frac{1}{4}\omega_4\omega_1u^2 - \frac{1}{2}\omega_2^2v^2\omega_3 - \frac{1}{2}\omega_3\omega_1^2 - \\
&\quad \frac{7}{8}\omega_2\omega_3\omega_4^2\omega_1u^2 + \frac{1}{2}\omega_2v^2\omega_3^2\omega_1 + \frac{3}{4}\omega_3\omega_4c_s^2\omega_1^2 + 3\omega_2\omega_4 + \frac{1}{2}\omega_2^2\omega_3 - \frac{41}{8}\omega_3\omega_4\omega_1u^2 - \frac{1}{8}\omega_4^2c_s^2 - \frac{1}{4}\omega_2\omega_4c_s^2\omega_1^2 + 5\omega_3c_s^2\omega_1, \\
\alpha_{x,y}^{[\mu_4], t-4\delta_t} &= -4 + 5\omega_2 + \frac{7}{8}\omega_2\omega_3^2\omega_4\omega_1 - 6\omega_2\omega_3 + \omega_2^2\omega_4 - \omega_2\omega_3\omega_1^2 + \frac{3}{4}\omega_4\omega_1^2 + \frac{49}{8}\omega_3\omega_4\omega_1 - \\
&\quad \frac{7}{8}\omega_2\omega_3\omega_4^2 + \omega_2^2\omega_1 + \frac{51}{8}\omega_2\omega_3\omega_4 - \frac{7}{8}\omega_2\omega_4^2\omega_1 + 5\omega_3 - \frac{21}{4}\omega_4\omega_1 + \frac{7}{8}\omega_3\omega_4 - \frac{3}{4}\omega_3\omega_4\omega_1^2 + \omega_2\omega_3\omega_4\omega_1 + \omega_2\omega_3^2 - \\
&\quad \omega_3^2 + 7\omega_2\omega_3\omega_1 - \omega_2^2\omega_4\omega_1 + \omega_3^2\omega_1 + \frac{7}{8}\omega_2\omega_4^2 - \omega_2^2\omega_3\omega_4 - \omega_2\omega_3^2\omega_1 - \frac{7}{8}\omega_4^2 - 6\omega_3\omega_1 + \frac{9}{2}\omega_4 - \omega_1^2 + \frac{25}{4}\omega_2\omega_4\omega_1 - \\
&\quad \omega_2^2\omega_3\omega_1 - \frac{7}{8}\omega_2\omega_3^2\omega_4 + \omega_2\omega_1^2 + 5\omega_1 - \frac{43}{8}\omega_3\omega_4 + \frac{7}{8}\omega_4^2\omega_1 + \frac{3}{4}\omega_2\omega_3\omega_4\omega_1^2 - \frac{57}{8}\omega_2\omega_3\omega_4\omega_1 + \frac{7}{8}\omega_3\omega_4^2 - \frac{7}{8}\omega_3\omega_4^2\omega_1 - \\
&\quad \omega_2^2 - \frac{3}{4}\omega_2\omega_4\omega_1^2 - 6\omega_2\omega_1 - \frac{7}{8}\omega_3\omega_4\omega_1 + \omega_3\omega_1^2 - \frac{11}{2}\omega_2\omega_4 + \omega_2^2\omega_3 + \frac{41}{8}\omega_3\omega_4\omega_1u^2 - \frac{1}{8}\omega_4^2c_s^2 - \frac{1}{4}\omega_2\omega_4c_s^2\omega_1^2 + 5\omega_3c_s^2\omega_1,
\end{aligned}$$

#### 4.6 EFDE for $\mu_5$

$$\mu_{5,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_5],t-\ell\delta_t} \mu_{5,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x,y-\delta_l}^{[\mu_1],t} = 1 - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_2v + \frac{1}{4}v^2\omega_4 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_3u^2 - \frac{1}{4}\omega_4 - \frac{1}{4}\omega_4u^2 + \frac{1}{4}v^2\omega_3 + \frac{1}{2}\omega_3c_s^2.$$

$$\alpha_{x,y+\delta_l}^{[\mu_1],t} = 1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_4c_s^2 - \frac{1}{2}\omega_2v + \frac{1}{4}v^2\omega_4 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_3u^2 - \frac{1}{4}\omega_4 - \frac{1}{4}\omega_4u + \frac{1}{4}v^2\omega_3 + \frac{1}{2}\omega_3c_s^2.$$

$$\begin{aligned} \alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} = & -1 + \frac{1}{2}\omega_2 - \frac{1}{8}\omega_2\omega_3 + \frac{1}{8}\omega_2v^2\omega_3 + \frac{1}{4}\omega_2\omega_3c_s^2 + \frac{1}{4}v^2\omega_4 - \frac{1}{8}v^2\omega_4^2 + \frac{1}{8}\omega_2\omega_4u^2 + \frac{1}{4}\omega_3 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{8}\omega_4u^2 + \\ & \frac{1}{4}\omega_2\omega_1u + \frac{1}{4}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_3u^2 + \frac{1}{4}\omega_4\omega_1u + \frac{1}{8}\omega_2\omega_3u^2 - \frac{1}{8}\omega_4^2 - \frac{1}{2}\omega_1u + \frac{3}{4}\omega_4 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_3\omega_4 - \frac{1}{4}\omega_4u^2 - \\ & \frac{1}{8}\omega_2v^2\omega_4 + \frac{1}{8}\omega_3\omega_4u^2 + \frac{1}{8}v^2\omega_3\omega_4 - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_3c_s^2 - \frac{1}{8}\omega_2\omega_4, \end{aligned}$$

$$\alpha_{x-\delta_l,y-\delta_l}^{[\mu_5],t-\delta_t} = 1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{4}\omega_2\omega_4,$$

$$\begin{aligned} \alpha_{x,y-\delta_l}^{[\mu_1],t-\delta_t} = & -1 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_2v^2\omega_3 - \omega_2\omega_3c_s^2 - \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{4}\omega_3 - \frac{1}{2}\omega_3\omega_4c_s^2 + \omega_3u^2 - \frac{1}{2}\omega_2\omega_3u^2 - \frac{1}{4}\omega_3u^2 - \frac{1}{4}v^2\omega_3c_s^2, \end{aligned}$$

$$\alpha_{x,y-\delta_l}^{[\mu_5],t-\delta_t} = 1 - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_2\omega_3 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3^2 - \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3\omega_4,$$

$$\begin{aligned} \alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} = & -1 + \frac{1}{2}\omega_2 - \frac{1}{8}\omega_2\omega_3 + \frac{1}{8}\omega_2v^2\omega_3 + \frac{1}{4}\omega_2\omega_3c_s^2 + \frac{1}{4}v^2\omega_4 - \frac{1}{8}v^2\omega_4^2 + \frac{1}{8}\omega_2\omega_4u^2 + \frac{1}{4}\omega_3 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{8}\omega_4u^2 - \\ & \frac{1}{4}\omega_2\omega_1u + \frac{1}{4}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_3u^2 - \frac{1}{4}\omega_4\omega_1u + \frac{1}{8}\omega_2\omega_3u^2 - \frac{1}{8}\omega_4^2 + \frac{1}{2}\omega_1u + \frac{3}{4}\omega_4 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_3\omega_4 - \frac{1}{4}\omega_4u^2 - \\ & \frac{1}{8}\omega_2v^2\omega_4 + \frac{1}{8}\omega_3\omega_4u^2 + \frac{1}{8}v^2\omega_3\omega_4 - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_3c_s^2 - \frac{1}{8}\omega_2\omega_4, \end{aligned}$$

$$\alpha_{x+\delta_l,y-\delta_l}^{[\mu_5],t-\delta_t} = 1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{4}\omega_2\omega_4,$$

$$\alpha_{x-\delta_l,y}^{[\mu_5],t-\delta_t} = 1 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_1 - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3\omega_4,$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_1],t-\delta_t} = & -2 + 3\omega_2 - \frac{1}{4}\omega_4c_s^2 - \frac{1}{2}\omega_2\omega_3 + \frac{1}{2}\omega_2v^2\omega_3 + \omega_2\omega_3c_s^2 - \frac{1}{2}v^2\omega_4 - \frac{1}{4}\omega_2\omega_4u - \frac{1}{4}\omega_2\omega_4u^2 + \frac{1}{2}\omega_3 - \frac{1}{2}\omega_3\omega_4u^2 + \\ & \frac{1}{2}\omega_4 + \frac{1}{4}\omega_4u^2 + \frac{1}{2}\omega_2v^2\omega_4 - \omega_2^2 + \frac{1}{4}\omega_4u - \frac{1}{2}v^2\omega_3 - \omega_3c_s^2 + \frac{1}{4}\omega_2\omega_4c_s^2 - \frac{1}{2}\omega_2\omega_4, \end{aligned}$$

$$\alpha_{x,y}^{[\mu_5],t-\delta_t} = 2 - 2\omega_2 + \omega_1^2 - 2\omega_1 + \omega_2^2,$$

$$\alpha_{x+\delta_l,y}^{[\mu_5],t-\delta_t} = 1 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_1 - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3\omega_4,$$

$$\begin{aligned} \alpha_{x-\delta_l,y+\delta_l}^{[\mu_1],t-\delta_t} = & -1 + \frac{1}{2}\omega_2 - \frac{1}{8}\omega_2\omega_3 + \frac{1}{8}\omega_2v^2\omega_3 + \frac{1}{4}\omega_2\omega_3c_s^2 + \frac{1}{4}v^2\omega_4 - \frac{1}{8}v^2\omega_4^2 + \frac{1}{8}\omega_2\omega_4u^2 + \frac{1}{4}\omega_3 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{8}\omega_4u^2 + \\ & \frac{1}{4}\omega_2\omega_1u + \frac{1}{4}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_3u^2 + \frac{1}{4}\omega_4\omega_1u + \frac{1}{8}\omega_2\omega_3u^2 - \frac{1}{8}\omega_4^2 - \frac{1}{2}\omega_1u + \frac{3}{4}\omega_4 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_3\omega_4 - \frac{1}{4}\omega_4u^2 - \\ & \frac{1}{8}\omega_2v^2\omega_4 + \frac{1}{8}\omega_3\omega_4u^2 + \frac{1}{8}v^2\omega_3\omega_4 - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_3c_s^2 - \frac{1}{8}\omega_2\omega_4, \end{aligned}$$

$$\alpha_{x-\delta_l,y+\delta_l}^{[\mu_5],t-\delta_t} = 1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{4}\omega_2\omega_4,$$

$$\begin{aligned} \alpha_{x,y+\delta_l}^{[\mu_1],t-\delta_t} = & -1 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_2v^2\omega_3 - \omega_2\omega_3c_s^2 - \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{4}\omega_3 - \frac{1}{2}\omega_3\omega_4c_s^2 + \omega_3u^2 - \frac{1}{2}\omega_2\omega_3u^2 - \frac{1}{4}\omega_3u^2 - \frac{1}{4}v^2\omega_3c_s^2 + \\ & \frac{1}{4}\omega_4 - \frac{1}{4}\omega_3\omega_4u^2 - \frac{1}{4}v^2\omega_3\omega_4 + v^2\omega_3 + 2\omega_3c_s^2, \end{aligned}$$

$$\alpha_{x,y+\delta_l}^{[\mu_5],t-\delta_t} = 1 - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_2\omega_3 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3^2 - \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3\omega_4,$$

$$\begin{aligned} \alpha_{x+\delta_l,y+\delta_l}^{[\mu_1],t-\delta_t} = & -1 + \frac{1}{2}\omega_2 - \frac{1}{8}\omega_2\omega_3 + \frac{1}{8}\omega_2v^2\omega_3 + \frac{1}{4}\omega_2\omega_3c_s^2 + \frac{1}{4}v^2\omega_4 + \frac{1}{8}v^2\omega_4u^2 + \frac{1}{4}\omega_3 - \frac{1}{4}\omega_2\omega_1u - \frac{1}{4}\omega_3u^2 + \\ & \frac{1}{8}\omega_2\omega_3u^2 + \frac{1}{2}\omega_1u + \frac{1}{4}\omega_4 + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_4u^2 - \frac{1}{8}\omega_2v^2\omega_4 - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_3c_s^2 - \frac{1}{8}\omega_2\omega_4, \end{aligned}$$

$$\alpha_{x+\delta_l,y+\delta_l}^{[\mu_5],t-\delta_t} = 1 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{4}\omega_2\omega_4,$$





$$\begin{aligned}
& v^2 w_4 + \frac{1}{4} \omega_2 w_4 u - \omega_3^2 c_s^2 + \frac{1}{2} \omega_2^2 \omega_1 + \frac{1}{4} \omega_2 w_3 \omega_4 - \frac{1}{4} v^2 \omega_4^2 - \frac{9}{8} \omega_2 w_3 \omega_4 c_s^2 \omega_1 + \omega_2 w_4 u^2 + \frac{3}{4} \omega_2^2 \omega_3 u^2 - \frac{9}{16} \omega_2 \omega_3^2 \omega_4 c_s^2 + \\
& \frac{1}{2} \omega_3 + \frac{3}{8} \omega_2 \omega_3 \omega_4 \omega_1 u - \frac{1}{2} \omega_2 v^2 \omega_3 \omega_4^2 - \frac{1}{2} \omega_4 \omega_1 + \frac{1}{2} \omega_2 v^2 \omega_3^2 - \frac{1}{16} \omega_3 \omega_4^2 u + \frac{3}{16} \omega_4^2 u^2 + \frac{1}{4} \omega_3^2 \omega_1 u^2 - \frac{5}{16} \omega_2 \omega_3 \omega_4 c_s^2 + \\
& \frac{9}{16} \omega_2 \omega_3 \omega_4^2 c_s^2 + \frac{1}{2} \omega_2 \omega_3^2 u^2 - \frac{1}{8} \omega_4 c_s^2 \omega_1 + \frac{3}{2} \omega_2 \omega_1 u - \frac{53}{16} \omega_3 \omega_4 c_s^2 + 2 \omega_3 u^2 - \frac{1}{16} \omega_3^2 \omega_4 u + \frac{3}{8} \omega_4 \omega_1 u + \frac{4}{4} \omega_2 \omega_3 \omega_1 u^2 + \\
& \frac{1}{4} \omega_2 \omega_4^2 - \frac{3}{8} \omega_3 \omega_4 \omega_1 u - \frac{11}{4} \omega_2 \omega_3 u^2 + \frac{61}{16} \omega_2 \omega_3 \omega_4 c_s^2 - \frac{1}{4} \omega_2^2 \omega_4 u^2 + \frac{9}{16} \omega_3 \omega_4 c_s^2 + \frac{1}{8} \omega_2 \omega_4 c_s^2 \omega_1 - \frac{1}{4} \omega_4^2 - \\
& \omega_2^2 \omega_3 c_s^2 \omega_1 - \frac{1}{2} \omega_2^2 v^2 \omega_3 \omega_1 - \frac{1}{2} \omega_3^2 u^2 + \frac{1}{16} \omega_2 \omega_3^2 \omega_4 u - \frac{5}{4} \omega_3 \omega_1 u^2 + \frac{1}{2} \omega_2^2 \omega_3 \omega_1 u - \frac{3}{8} \omega_2 \omega_4 \omega_1 u - \omega_1 u + \frac{9}{8} \omega_3 \omega_4 c_s^2 \omega_1 + \\
& \frac{9}{16} \omega_3^2 \omega_4 c_s^2 - \frac{1}{2} v^2 \omega_3^2 - \frac{1}{2} \omega_2^2 \omega_1 u + \frac{3}{2} \omega_4 + \frac{1}{2} \omega_2 \omega_4 \omega_1 - \frac{3}{16} \omega_2 \omega_4^2 u^2 - \frac{1}{4} \omega_2 \omega_3^2 \omega_1 u^2 + \frac{5}{16} \omega_3 \omega_4 u + \frac{1}{4} \omega_2 v^2 \omega_4^2 + \omega_1 - \\
& \frac{1}{4} \omega_3 \omega_4 + \frac{1}{2} v^2 \omega_3 \omega_4^2 - \frac{1}{2} \omega_2^2 v^2 \omega_3 \omega_4 + \frac{1}{16} \omega_2 \omega_3 \omega_4 u - \frac{3}{4} \omega_4 u^2 - \frac{5}{4} \omega_2 v^2 \omega_4 + \frac{1}{4} \omega_2 \omega_3^2 \omega_1 u - \frac{1}{16} \omega_3 \omega_4 u^2 + \frac{1}{4} \omega_2 v^2 \omega_4 \omega_1 - \\
& \frac{3}{8} \omega_2 v^2 \omega_3^2 \omega_4 - \frac{11}{4} v^2 \omega_3 \omega_4 - \omega_2^2 - \frac{1}{4} \omega_4 u + \omega_2 \omega_3^2 c_s^2 - \frac{1}{16} \omega_2 \omega_3 \omega_4^2 u^2 + \frac{3}{4} v^2 \omega_3 \omega_4 \omega_1 + 2 v^2 \omega_3 - \frac{1}{2} \omega_2 \omega_3^2 c_s^2 \omega_1 - \\
& \frac{3}{2} \omega_2 \omega_1 + 4 \omega_3 c_s^2 - \frac{1}{16} \omega_2 \omega_4^2 u - \frac{5}{4} v^2 \omega_3 \omega_1 - \frac{1}{16} \omega_2 \omega_3^2 \omega_4 u^2 + \frac{3}{2} \omega_2^2 \omega_3 \omega_4 c_s^2 - \frac{1}{4} \omega_2 \omega_4 c_s^2 - \frac{1}{2} \omega_2^2 \omega_3 \omega_1 u^2 + \frac{5}{4} \omega_3 \omega_1 u - \\
& \frac{1}{8} \omega_2 \omega_4 \omega_1 u^2 + \frac{3}{4} \omega_2^2 v^2 \omega_3 \omega_1 - \frac{1}{4} \omega_2 v^2 \omega_3^2 \omega_1 - \frac{7}{4} \omega_2 \omega_4 + \frac{1}{4} \omega_2^2 \omega_3 + \frac{3}{8} \omega_3 \omega_4 \omega_1 u^2 - \frac{1}{16} \omega_4^2 c_s^2 - \frac{5}{2} \omega_3 c_s^2 \omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l, y}^{[\mu_5], t-3\delta_t} = & 3 - 4 \omega_2 + \frac{19}{4} \omega_2 \omega_3 - \frac{1}{2} \omega_2^2 \omega_4 - \frac{3}{4} \omega_3 \omega_4 \omega_1 + \frac{1}{2} \omega_2 \omega_3 \omega_4^2 - \frac{1}{2} \omega_2^2 \omega_1 - \frac{15}{4} \omega_3 + \frac{3}{4} \omega_4 \omega_1 - \\
& \frac{1}{8} \omega_2^2 \omega_4 - \frac{3}{4} \omega_2 \omega_3^2 + \frac{3}{4} \omega_3^2 - \frac{9}{4} \omega_2 \omega_3 \omega_1 - \frac{1}{4} \omega_3^2 \omega_1 - \frac{1}{2} \omega_2 \omega_4^2 + \frac{1}{2} \omega_2 \omega_3 \omega_4 + \frac{1}{4} \omega_2 \omega_3^2 \omega_1 + \frac{1}{2} \omega_4^2 + \frac{7}{4} \omega_3 \omega_1 - \frac{11}{4} \omega_4 - \\
& \frac{3}{4} \omega_2 \omega_4 \omega_1 + \frac{1}{2} \omega_2^2 \omega_3 \omega_1 + \frac{1}{2} \omega_2 \omega_3^2 \omega_4 - \frac{3}{2} \omega_1 + \frac{13}{4} \omega_3 \omega_4 + \frac{3}{4} \omega_2 \omega_3 \omega_4 \omega_1 - \frac{1}{2} \omega_3 \omega_4^2 + \omega_2^2 + 2 \omega_2 \omega_1 + \frac{13}{4} \omega_2 \omega_4 - \omega_2^2 \omega_3,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_1], t-3\delta_t} = & -2 + \frac{1}{4} \omega_2 \omega_4 \omega_1^2 u^2 + 3 \omega_2 + \frac{3}{8} \omega_2 v^2 \omega_3 \omega_4 \omega_1 - \frac{1}{2} \omega_2 v^2 \omega_3 \omega_1 + \frac{1}{2} \omega_2^2 v^2 \omega_4 + \frac{3}{2} \omega_4 \omega_1 u^2 + \frac{1}{4} \omega_4 c_s^2 - \\
& \omega_2 \omega_3 c_s^2 \omega_1 + \frac{1}{4} \omega_4 c_s^2 \omega_1^2 - \omega_2 \omega_3 + \frac{1}{2} \omega_2^2 \omega_4 + \frac{1}{2} \omega_2 \omega_3 \omega_1^2 + \frac{1}{4} \omega_4 \omega_1^2 - \frac{3}{8} \omega_2 v^2 \omega_3 \omega_4 + \frac{3}{8} \omega_2 \omega_3 \omega_4 \omega_1 u^2 - \\
& \frac{3}{8} \omega_2 v^2 \omega_4 \omega_1 + \omega_2 v^2 \omega_3 + \frac{3}{8} \omega_2 \omega_4^2 \omega_1 u^2 - \frac{3}{8} \omega_2 \omega_3 \omega_4 u^2 + 2 \omega_2 \omega_3 c_s^2 - \frac{2}{2} v^2 \omega_4 \omega_1 + \frac{3}{8} \omega_3 \omega_4 \omega_1 + \frac{3}{2} v^2 \omega_4 + \frac{1}{4} \omega_2 \omega_4 u + \\
& \omega_2 \omega_1 + \frac{3}{8} \omega_2 \omega_3 \omega_4 - \frac{3}{8} \omega_2 \omega_4^2 \omega_1 - \frac{3}{8} v^2 \omega_4^2 + \frac{3}{4} \omega_2 \omega_3 \omega_4 c_s^2 \omega_1 + \frac{7}{4} \omega_2 \omega_4 u^2 - \frac{1}{2} \omega_2^2 \omega_3 u^2 + \frac{1}{2} \omega_3 - \frac{9}{4} \omega_4 \omega_1 + \frac{3}{8} \omega_4^2 u^2 - \\
& \frac{1}{8} \omega_2 v^2 \omega_4 \omega_1 + \frac{1}{2} v^2 \omega_4 \omega_1^2 - \omega_2 \omega_3 c_s^2 \omega_1^2 - \frac{1}{2} \omega_4 c_s^2 \omega_1 + \frac{1}{2} \omega_2 \omega_3 \omega_1 - \frac{1}{2} \omega_2^2 \omega_4 \omega_1 + \frac{3}{4} \omega_3 \omega_4 c_s^2 + \frac{1}{2} \omega_3 \omega_4^2 u^2 - \\
& \frac{1}{2} \omega_3 u^2 - \frac{1}{2} \omega_2 v^2 \omega_3 \omega_1^2 + \frac{1}{4} \omega_4 \omega_1 u + \frac{1}{2} \omega_2^2 \omega_4 \omega_1 u^2 - \frac{1}{2} \omega_2 \omega_3 \omega_1 u^2 + \frac{3}{8} \omega_2 \omega_4^2 + \omega_2 \omega_3 u^2 - \frac{3}{2} \omega_2 \omega_3 \omega_4 c_s^2 - \\
& \frac{1}{2} \omega_2^2 \omega_4 u^2 + \frac{1}{2} \omega_2 \omega_4 c_s^2 \omega_1 - \frac{3}{8} \omega_2^2 + \omega_3 c_s^2 \omega_1^2 + \frac{1}{2} \omega_2^2 v^2 \omega_3 \omega_1 + \frac{1}{2} v^2 \omega_3 \omega_1^2 - \frac{1}{4} \omega_2 \omega_4 \omega_1 u - \\
& \frac{1}{2} \omega_2 \omega_3 \omega_1^2 u^2 - \frac{3}{4} \omega_3 \omega_4 c_s^2 \omega_1 + 2 \omega_4 + \frac{11}{4} \omega_2 \omega_4 \omega_1 - \frac{1}{2} \omega_2^2 \omega_3 \omega_1 - \frac{3}{8} \omega_2 \omega_4^2 u^2 + \frac{3}{8} \omega_2 v^2 \omega_4^2 + 2 \omega_1 - \frac{3}{8} \omega_3 \omega_4 - \\
& \frac{1}{8} \omega_2 v^2 \omega_4 \omega_1^2 + \frac{8}{8} \omega_2^2 \omega_1 - \frac{5}{4} \omega_4 u^2 - 2 \omega_2 v^2 \omega_4 - \frac{3}{8} \omega_2 \omega_4^2 \omega_1 u^2 + \frac{3}{8} \omega_3 \omega_4 u^2 - \frac{3}{8} \omega_2 \omega_3 \omega_4 \omega_1 + \frac{5}{2} \omega_2 v^2 \omega_4 \omega_1 + \frac{3}{8} v^2 \omega_4^2 \omega_1 + \\
& \frac{3}{8} v^2 \omega_3 \omega_4 - \omega_2^2 - \frac{1}{4} \omega_4 u - \frac{8}{8} v^2 \omega_3 \omega_4 \omega_1 - \frac{1}{2} v^2 \omega_3 - \frac{1}{4} \omega_2 \omega_4 \omega_1^2 - 3 \omega_2 \omega_1 - \omega_3 c_s^2 - \omega_2^2 \omega_3 c_s^2 - \frac{1}{4} \omega_2 \omega_4 c_s^2 + \\
& \frac{1}{2} \omega_2^2 \omega_3 \omega_1 u^2 - 2 \omega_2 \omega_4 \omega_1 u^2 - \frac{1}{4} \omega_4 \omega_1^2 u^2 - \frac{1}{2} \omega_2^2 v^2 \omega_3 - \frac{1}{2} \omega_3 \omega_1^2 - \frac{5}{2} \omega_2 \omega_4 + \frac{1}{2} \omega_2^2 \omega_3 - \frac{3}{8} \omega_3 \omega_4 \omega_1 u^2 - \frac{1}{4} \omega_2 \omega_4 c_s^2 \omega_1^2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_5], t-3\delta_t} = & 3 - 4 \omega_2 - \omega_2^2 \omega_4 - \frac{3}{4} \omega_4 \omega_1^2 - \omega_2^2 \omega_1 + \frac{3}{4} \omega_2 \omega_4^2 \omega_1 + \frac{17}{4} \omega_4 \omega_1 + \omega_2^2 \omega_4 \omega_1 - \frac{3}{4} \omega_2 \omega_4^2 + \frac{3}{4} \omega_4^2 - \frac{7}{2} \omega_4 + \omega_1^2 - \\
& \frac{21}{4} \omega_2 \omega_4 \omega_1 - \omega_2 \omega_1^2 - 4 \omega_1 - \frac{3}{4} \omega_4^2 \omega_1 + \omega_2^2 + \frac{3}{4} \omega_2 \omega_4 \omega_1^2 + 5 \omega_2 \omega_1 + \frac{9}{2} \omega_2 \omega_4,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l, y}^{[\mu_1], t-3\delta_t} = & -2 + \frac{1}{16} \omega_2 \omega_4^2 c_s^2 + 3 \omega_2 - \frac{1}{2} \omega_2 v^2 \omega_3 \omega_4 \omega_1 + \frac{1}{4} v^2 \omega_2^2 \omega_1 + \frac{7}{4} \omega_2 v^2 \omega_3 \omega_1 + \frac{1}{4} \omega_2^2 v^2 \omega_4 - \frac{1}{16} \omega_3 \omega_4 u^2 + \frac{1}{8} \omega_4 \omega_1 u^2 + \\
& \frac{7}{4} \omega_2 \omega_3 \omega_1 u + \frac{1}{4} \omega_4 c_s^2 + \frac{7}{2} \omega_2 \omega_3 c_s^2 \omega_1 - \frac{3}{4} \omega_2 \omega_3 + \frac{1}{4} \omega_2^2 \omega_4 - \frac{1}{2} \omega_2^2 \omega_3 \omega_4 c_s^2 + \frac{11}{4} \omega_2 v^2 \omega_3 \omega_4 - \frac{1}{8} \omega_2 \omega_3 \omega_4 \omega_1 u^2 - \\
& \frac{1}{16} \omega_3 \omega_4^2 u^2 - \frac{11}{4} \omega_2 v^2 \omega_3 + \frac{1}{4} \omega_3^2 \omega_1 u + \frac{1}{16} \omega_2 \omega_3 \omega_4 u^2 - \frac{11}{16} \omega_2 \omega_3 c_s^2 + \frac{1}{16} \omega_4 u + \frac{3}{8} v^2 \omega_3 \omega_4 - \frac{1}{4} v^2 \omega_4 \omega_1 + \frac{1}{2} \omega_3^2 \omega_1 + \\
& v^2 \omega_4 + \frac{1}{4} \omega_2 \omega_4 u - \omega_3^2 c_s^2 + \frac{1}{2} \omega_2^2 \omega_1 + \frac{1}{8} \omega_2 \omega_3 \omega_4 - \frac{1}{4} v^2 \omega_4^2 - \frac{5}{8} \omega_2 \omega_3 \omega_4 c_s^2 \omega_1 + \omega_2 \omega_4 u^2 + \frac{3}{4} \omega_2^2 \omega_3 u^2 - \frac{5}{16} \omega_2 \omega_3^2 \omega_4 c_s^2 + \\
& \frac{1}{2} \omega_3 - \frac{1}{8} \omega_2 \omega_3 \omega_4 \omega_1 u - \frac{3}{8} \omega_2 v^2 \omega_3 \omega_4^2 - \frac{1}{4} \omega_4 \omega_1 + \frac{1}{2} \omega_2 v^2 \omega_3^2 - \frac{1}{16} \omega_3 \omega_4^2 u + \frac{3}{16} \omega_4^2 u^2 + \frac{1}{4} \omega_2^2 \omega_1 u^2 - \frac{1}{16} \omega_2 \omega_3 \omega_4 u - \\
& \frac{5}{16} \omega_2 \omega_3 \omega_4^2 c_s^2 + \frac{1}{2} \omega_2 \omega_3^2 \omega_1^2 - \frac{1}{8} \omega_4 c_s^2 \omega_1 - \frac{3}{2} \omega_2 \omega_1 u - \frac{37}{16} \omega_3 \omega_4 c_s^2 + 2 \omega_3 u^2 - \frac{1}{16} \omega_3^2 \omega_4 u - \frac{1}{8} \omega_4 \omega_1 u + \frac{7}{4} \omega_2 \omega_3 \omega_1 u^2 + \\
& \frac{8}{16} \omega_2 \omega_4^2 + \frac{1}{8} \omega_3 \omega_4 \omega_1 u - \frac{11}{4} \omega_2 \omega_3 u^2 + \frac{45}{16} \omega_2 \omega_3 \omega_4 c_s^2 - \frac{1}{4} \omega_2^2 \omega_4 u^2 + \frac{5}{16} \omega_3 \omega_4^2 c_s^2 + \frac{1}{8} \omega_2 \omega_4 c_s^2 \omega_1 - \frac{1}{8} \omega_4^2 - \\
& \omega_2^2 \omega_3 \omega_1^2 - \frac{1}{2} \omega_2^2 v^2 \omega_3 \omega_1 - \frac{1}{2} \omega_3^2 u^2 + \frac{1}{16} \omega_2 \omega_3 \omega_4 u - \frac{5}{4} \omega_3 \omega_1 u^2 - \frac{1}{2} \omega_2^2 \omega_3 \omega_1 u + \frac{1}{8} \omega_2 \omega_4 \omega_1 u + \omega_1 u + \frac{5}{8} \omega_3 \omega_4 c_s^2 \omega_1 + \\
& \frac{5}{16} \omega_3 \omega_4 c_s^2 - \frac{1}{2} \frac{1}{2} v^2 \omega_3 + \frac{1}{2} \omega_2^2 \omega_1 u + \omega_4 + \frac{1}{4} \omega_2 \omega_4 \omega_1 - \frac{3}{16} \omega_2 \omega_4^2 u^2 - \frac{1}{4} \omega_2 \omega_3 \omega_1 u^2 + \frac{5}{16} \omega_3 \omega_4 u + \frac{1}{4} \omega_2 v^2 \omega_4^2 + \omega_1 - \\
& \frac{1}{8} \omega_3 \omega_4 + \frac{3}{8} v^2 \omega_3 \omega_4^2 - \frac{1}{2} \omega_2^2 v^2 \omega_3 \omega_4 + \frac{1}{16} \omega_2 \omega_3 \omega_4 u^2 - \frac{3}{4} \omega_4 u^2 - \frac{5}{4} \omega_2 v^2 \omega_4 - \frac{1}{4} \omega_2 \omega_3^2 \omega_1 u - \frac{1}{16} \omega_3 \omega_4 u^2 + \frac{1}{4} \omega_2 v^2 \omega_4 \omega_1 - \\
& \frac{8}{8} \omega_2 \omega_3^2 \omega_4 - \frac{9}{4} v^2 \omega_3 \omega_4 - \omega_2^2 - \frac{1}{4} \omega_4 u + \omega_2 \omega_3^2 c_s^2 + \frac{1}{16} \omega_2 \omega_3 \omega_4 u^2 + \frac{1}{2} v^2 \omega_3 \omega_4 \omega_1 + 2 v^2 \omega_3 - \frac{1}{2} \omega_2 \omega_3^2 c_s^2 \omega_1 - \\
& \frac{5}{8} \omega_2 \omega_1 + 4 \omega_3 c_s^2 - \frac{1}{16} \omega_2 \omega_4 u - \frac{5}{4} v^2 \omega_3 \omega_1 + \frac{1}{16} \omega_2 \omega_3 \omega_4 u^2 + \frac{3}{2} \omega_2^2 \omega_3 \omega_4 c_s^2 - \frac{1}{2} \omega_2 \omega_4 c_s^2 - \frac{1}{2} \omega_2^2 \omega_3 \omega_1 u^2 - \frac{5}{4} \omega_3 \omega_1 u - \\
& \frac{1}{8} \omega_2 \omega_4 \omega_1 u^2 + \frac{3}{4} \omega_2^2 v^2 \omega_3 - \frac{1}{4} \omega_2 v^2 \omega_3^2 \omega_1 - \frac{5}{4} \omega_2 \omega_4 + \frac{1}{4} \omega_2^2 \omega_3 + \frac{1}{8} \omega_3 \omega_4 \omega_1 u^2 - \frac{1}{16} \omega_4^2 c_s^2 - \frac{5}{2} \omega_3 c_s^2 \omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l, y}^{[\mu_5], t-3\delta_t} = & 3 - 4 \omega_2 + \frac{19}{4} \omega_2 \omega_3 - \frac{1}{2} \omega_2^2 \omega_4 - \frac{1}{2} \omega_3 \omega_4 \omega_1 + \frac{3}{8} \omega_2 \omega_3 \omega_4^2 - \frac{1}{2} \omega_2^2 \omega_1 - \frac{25}{8} \omega_2 \omega_3 \omega_4 - \frac{15}{4} \omega_3 + \frac{1}{2} \omega_4 \omega_1 - \\
& \frac{3}{8} \omega_3 \omega_4 - \frac{3}{4} \omega_2 \omega_3^2 + \frac{3}{4} \omega_3^2 - \frac{9}{4} \omega_2 \omega_3 \omega_1 - \frac{1}{4} \omega_3^2 \omega_1 - \frac{3}{8} \omega_2 \omega_4^2 + \frac{1}{2} \omega_2 \omega_3 \omega_4 + \frac{1}{4} \omega_2 \omega_3^2 \omega_1 + \frac{3}{8} \omega_4^2 + \frac{7}{4} \omega_3 \omega_1 - \frac{9}{4} \omega_4 - \\
& \frac{1}{2} \omega_2 \omega_4 \omega_1 + \frac{1}{2} \omega_2^2 \omega_3 \omega_1 + \frac{3}{8} \omega_2 \omega_3^2 \omega_4 - \frac{3}{2} \omega_1 + \frac{21}{8} \omega_3 \omega_4 + \frac{1}{2} \omega_2 \omega_3 \omega_4 \omega_1 - \frac{3}{8} \omega_3 \omega_4^2 + \omega_2^2 + 2 \omega_2 \omega_1 + \frac{11}{4} \omega_2 \omega_4 - \omega_2^2 \omega_3,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y+\delta_l}^{[\mu_1], t-3\delta_t} = & -1 + \frac{1}{2} \omega_2 - \frac{1}{2} \omega_2 v^2 \omega_3 \omega_4 \omega_1 + \frac{1}{4} v^2 \omega_3^2 \omega_1 - \frac{3}{8} \omega_3^2 \omega_4 c_s^2 \omega_1 - \frac{1}{4} \omega_2 v \omega_4 \omega_1 + \frac{1}{4} \omega_2 v^2 \omega_3 \omega_1 + \frac{3}{2} \omega_2 v \omega_1 + \\
& \frac{1}{2} \omega_4 \omega_1 u^2 + \frac{1}{2} \omega_4 c_s^2 + \frac{1}{2} \omega_2 \omega_3 c_s^2 \omega_1 + \frac{1}{4} \omega_4 c_s^2 \omega_1^2 - \frac{1}{4} \omega_2 \omega_3 + \frac{3}{8} v^2 \omega_3^2 \omega_4 \omega_1 + \frac{1}{2} \omega_2 v^2 \omega_3 \omega_4 + \frac{1}{4} \omega_2 v \omega_3 \omega_4 \omega_1 - \omega_2 v +
\end{aligned}$$

$$\begin{aligned}
& \frac{1}{4}\omega_2 v \omega_4 - \frac{1}{4}\omega_2 v^2 \omega_3 - \frac{1}{2}\omega_2 \omega_3 c_s^2 + \frac{1}{8}\omega_4^2 u + \frac{3}{8}v^2 \omega_3^2 \omega_4 - \frac{5}{8}v^2 \omega_4 \omega_1 + \frac{1}{8}\omega_3 \omega_4 \omega_1 + \frac{1}{2}\omega_3^2 c_s^2 \omega_1 + v^2 \omega_4 - \frac{3}{8}v^2 \omega_3 \omega_4^2 \omega_1 - \\
& \frac{1}{2}\omega_3^2 c_s^2 - \frac{1}{4}\omega_4^2 \omega_4^2 - \frac{1}{2}\omega_2 \omega_3 \omega_4 c_s^2 \omega_1 + \frac{1}{4}\omega_2 \omega_4 u^2 - \frac{3}{8}\omega_3 \omega_4^2 c_s^2 \omega_1 + \frac{1}{4}\omega_3 - \frac{3}{4}\omega_4 \omega_1 - \frac{1}{8}\omega_3 \omega_4^2 u + \frac{1}{8}\omega_4^2 u^2 + \frac{1}{4}\omega_3^2 \omega_1 u^2 + \\
& \frac{1}{4}v^2 \omega_4 \omega_1^2 - \frac{3}{4}\omega_4 c_s^2 \omega_1 + \frac{1}{4}\omega_2 \omega_3 \omega_1 - \frac{17}{8}\omega_3 \omega_4 c_s^2 + \frac{1}{4}\omega_3 \omega_1^2 u^2 + \omega_3 u^2 - \frac{1}{8}\omega_3^2 \omega_4 u + \frac{1}{4}\omega_4 \omega_1 u + \frac{1}{4}\omega_2 \omega_3 \omega_1 u^2 - \\
& \frac{1}{4}\omega_2 v \omega_1^2 - \frac{1}{4}\omega_3 \omega_4 \omega_1 u - \frac{1}{4}\omega_2 \omega_3 u^2 + \frac{1}{8}\omega_2 \omega_3 \omega_4 c_s^2 + \frac{3}{8}\omega_3 \omega_4^2 c_s^2 - \frac{1}{8}\omega_4^2 + \frac{1}{2}\omega_3 c_s^2 \omega_1^2 + \frac{1}{4}v^2 \omega_3 \omega_1^2 - \frac{1}{4}\omega_3^2 u^2 - \\
& \frac{5}{8}\omega_3 \omega_1 u^2 + \frac{1}{4}\omega_2 v \omega_3 \omega_4 \omega_1 + \frac{19}{8}\omega_3 \omega_4 c_s^2 \omega_1 + \frac{3}{8}\omega_3^2 \omega_4 c_s^2 - \frac{1}{4}v^2 \omega_3^2 + \frac{3}{4}\omega_4 - \frac{1}{4}v^2 \omega_3 \omega_4 \omega_1^2 + \frac{1}{4}\omega_2 \omega_4 \omega_1 + \frac{1}{8}\omega_4^2 c_s^2 \omega_1 + \\
& \frac{5}{8}\omega_3 \omega_4 u - \frac{1}{4}\omega_2 v \omega_3^2 + \omega_1 - \frac{1}{8}\omega_3 \omega_4 + \frac{1}{2}\omega_2 v \omega_3 \omega_1^2 + \frac{1}{8}\omega_4^2 \omega_1 + \frac{3}{8}v^2 \omega_3 \omega_4^2 - \frac{1}{2}\omega_4 u^2 + \frac{5}{4}\omega_2 v \omega_3 - \frac{1}{4}\omega_2 v^2 \omega_4 - \frac{1}{8}\omega_4 \omega_1 u^2 - \\
& \frac{1}{8}\omega_3 \omega_4 u^2 - \frac{7}{4}\omega_2 v \omega_3 \omega_1 + \frac{1}{4}\omega_2 v^2 \omega_4 \omega_1 + \frac{1}{4}v^2 \omega_4^2 \omega_1 - 2v^2 \omega_3 \omega_4 - \frac{1}{2}\omega_4 u + \frac{9}{4}v^2 \omega_3 \omega_4 \omega_1 + v^2 \omega_3 - \frac{1}{2}\omega_2 \omega_1 + 2\omega_3 c_s^2 - \\
& \frac{5}{4}v^2 \omega_3 \omega_1 - \frac{1}{4}\omega_2 \omega_4 \omega_1 u^2 - \frac{1}{4}\omega_3 \omega_1^2 - \frac{1}{4}\omega_2 v \omega_3 \omega_4 - \frac{1}{4}\omega_3 \omega_4 c_s^2 \omega_1^2 - \frac{1}{4}\omega_2 \omega_4 \omega_1 u^2 - \frac{1}{8}\omega_3 \omega_4^2 c_s^2 \omega_1 - \frac{5}{2}\omega_3 c_s^2 \omega_1,
\end{aligned}$$

$$\alpha_{x,y+\delta_t}^{[\mu_5],t-3\delta_t} = 3 - \frac{3}{2}\omega_2 + \frac{7}{4}\omega_2 \omega_3 + \frac{1}{2}\omega_2 \omega_3 \omega_1^2 - \frac{1}{4}\omega_4 \omega_1^2 - \frac{23}{8}\omega_3 \omega_4 \omega_1 - \frac{3}{4}\omega_2 \omega_3 \omega_4 - \frac{15}{4}\omega_3 + \frac{5}{2}\omega_4 \omega_1 - \frac{3}{8}\omega_3^2 \omega_4 + \\
\frac{1}{4}\omega_3 \omega_4 \omega_1^2 - \frac{1}{4}\omega_2 \omega_3^2 + \frac{3}{4}\omega_3^2 - \frac{9}{8}\omega_2 \omega_3 \omega_1 - \frac{3}{4}\omega_3^2 \omega_1 + \frac{1}{4}\omega_2 \omega_3^2 \omega_1 + \frac{3}{8}\omega_4^2 + \frac{19}{4}\omega_3 \omega_1 - \frac{9}{4}\omega_4 + \omega_1^2 - \frac{3}{4}\omega_2 \omega_4 \omega_1 - \\
\frac{1}{2}\omega_2 \omega_1^2 - 4\omega_1 + \frac{21}{8}\omega_3 \omega_4 - \frac{3}{8}\omega_4^2 \omega_1 + \frac{3}{4}\omega_2 \omega_3 \omega_4 \omega_1 - \frac{3}{8}\omega_3 \omega_4^2 + \frac{3}{8}\omega_3 \omega_4 \omega_1 + 2\omega_2 \omega_1 + \frac{3}{8}\omega_3^2 \omega_4 \omega_1 - \omega_3 \omega_1^2 + \frac{3}{4}\omega_2 \omega_4,$$

$$\alpha_{x,y}^{[\mu_1],t-4\delta_t} = 2 - \frac{1}{8}\omega_2 \omega_4^2 c_s^2 - \frac{1}{4}\omega_2 \omega_4 \omega_1^2 u^2 - 3\omega_2 + \frac{25}{4}v^2 \omega_3 \omega_4 \omega_1 - \frac{1}{2}v^2 \omega_3^2 \omega_1 + \frac{7}{8}\omega_3 \omega_4 c_s^2 \omega_1 - 3\omega_2 v^2 \omega_3 \omega_1 - \\
\frac{1}{2}\omega_2^2 v^2 \omega_4 - \frac{7}{4}\omega_4 \omega_1 u^2 - \frac{1}{2}\omega_4 c_s^2 - 6\omega_2 \omega_3 c_s^2 \omega_1 - \frac{1}{4}\omega_4 c_s^2 \omega_1^2 + \omega_2 \omega_3 - \frac{1}{2}\omega_2^2 \omega_4 - \frac{1}{2}\omega_2 \omega_3 \omega_1^2 + \frac{7}{8}v^2 \omega_3^2 \omega_4 \omega_1 + \\
\omega_2^2 \omega_3 \omega_4 c_s^2 - \frac{1}{4}\omega_4 \omega_1^2 - \frac{11}{8}\omega_2 v^2 \omega_3 \omega_4 + \frac{1}{8}\omega_2 \omega_3 \omega_4 \omega_1 u^2 + \frac{1}{2}\omega_2 v^2 \omega_4^2 \omega_1 + \frac{5}{2}\omega_2 v^2 \omega_3 - \frac{3}{8}\omega_2 \omega_4^2 \omega_1 u^2 - \frac{1}{8}\omega_2 \omega_3 \omega_4 u^2 + \\
5\omega_2 \omega_3 c_s^2 - \frac{1}{4}\omega_2^2 u - \frac{7}{8}v^2 \omega_3^2 \omega_4 + \frac{5}{2}v^2 \omega_4 \omega_1 - \frac{3}{8}\omega_3 \omega_4 \omega_1 - \frac{1}{8}\omega_3 c_s^2 \omega_1 - 2v^2 \omega_4 - \omega_2 v^2 \omega_3 \omega_4 \omega_1 + \frac{7}{8}v^2 \omega_3 \omega_4^2 \omega_1 - \\
\frac{1}{2}\omega_2 \omega_4 u - \frac{3}{8}\omega_2 \omega_3 \omega_4 c_s^2 \omega_1 + \omega_2^2 c_s^2 - \omega_2 \omega_1 - \frac{3}{8}\omega_2 \omega_3 \omega_4 + \frac{3}{8}\omega_2 \omega_4^2 \omega_1 + \frac{1}{8}\omega_2 \omega_4 c_s^2 \omega_1 + \frac{1}{2}v^2 \omega_4^2 + \frac{51}{8}\omega_2 \omega_3 \omega_4 c_s^2 \omega_1 - \\
2\omega_2 \omega_4 u^2 - \frac{1}{2}\omega_2^2 \omega_3 u^2 + \frac{7}{8}\omega_2 \omega_3^2 \omega_4 c_s^2 + \frac{7}{8}\omega_3 \omega_4^2 c_s^2 \omega_1 - \frac{1}{2}\omega_3 - \frac{1}{4}\omega_2 \omega_3 \omega_4 \omega_1 u + \frac{7}{8}\omega_2 v^2 \omega_3 \omega_4^2 + \frac{9}{4}\omega_4 \omega_1 - \frac{1}{2}\omega_2 v^2 \omega_3^2 + \\
\frac{1}{8}\omega_3 \omega_4^2 u - \frac{3}{8}\omega_4^2 u^2 - \frac{1}{2}\omega_3^2 \omega_1 u^2 + \frac{5}{8}\omega_2 \omega_3 \omega_4 u + \frac{1}{2}\omega_2^2 v^2 \omega_4 \omega_1 - \frac{1}{2}v^2 \omega_4 \omega_1^2 + \frac{7}{8}\omega_2 \omega_3 \omega_4^2 c_s^2 - \frac{1}{2}\omega_2 \omega_3^2 u^2 + \omega_2 \omega_3 c_s^2 \omega_1^2 + \\
\frac{3}{4}\omega_4 c_s^2 \omega_1 - \frac{1}{2}\omega_2 \omega_3 \omega_1 + \frac{1}{2}\omega_2^2 \omega_4 \omega_1 + \frac{37}{8}\omega_3 \omega_4 c_s^2 - \frac{1}{2}\omega_3 \omega_1^2 u^2 - 2\omega_3 u^2 - \frac{3}{4}\omega_2 v^2 \omega_3 \omega_4 \omega_1^2 - \omega_2^2 \omega_3 \omega_4 c_s^2 \omega_1 + \\
\frac{1}{2}\omega_2 v^2 \omega_3 \omega_1^2 + \frac{1}{8}\omega_3^2 \omega_4 u - \frac{1}{4}\omega_4 \omega_1 u - \frac{1}{2}\omega_2^2 \omega_4 \omega_1 u^2 - 3\omega_2 \omega_3 \omega_1 u^2 - \frac{3}{8}\omega_2 \omega_4^2 - \frac{7}{8}\omega_2 \omega_3 \omega_4 c_s^2 \omega_1 + \frac{1}{4}\omega_3 \omega_4 \omega_1 u + \\
\frac{5}{8}\omega_2 \omega_3 u^2 - \frac{45}{8}\omega_2 \omega_3 \omega_4 c_s^2 + \frac{1}{2}\omega_2^2 \omega_4 u^2 - \frac{7}{8}\omega_3 \omega_4^2 c_s^2 - \frac{3}{4}\omega_2 \omega_4 c_s^2 \omega_1 + \frac{3}{8}\omega_4^2 - \omega_3 c_s^2 \omega_1^2 + \omega_2^2 \omega_3 c_s^2 \omega_1 + \frac{1}{2}\omega_2^2 v^2 \omega_3 \omega_1 - \\
\frac{1}{2}v^2 \omega_3 \omega_1^2 + \frac{1}{2}\omega_3^2 u^2 - \frac{1}{8}\omega_2 \omega_3^2 \omega_4 u + \frac{5}{2}\omega_3 \omega_1 u^2 + \frac{1}{4}\omega_2 \omega_4 \omega_1 u + \frac{1}{2}\omega_2 \omega_3 \omega_4 u^2 - \frac{43}{8}\omega_3 \omega_4 c_s^2 \omega_1 - \frac{7}{8}\omega_3 \omega_4 c_s^2 + \frac{1}{2}v^2 \omega_3^2 - \\
2\omega_4 + \frac{3}{4}v^2 \omega_3 \omega_4 \omega_1^2 - \frac{11}{8}\omega_2 \omega_4 \omega_1 + \frac{1}{2}\omega_2^2 \omega_3 \omega_1 - \frac{1}{8}\omega_4^2 c_s^2 \omega_1 + \frac{3}{8}\omega_2 \omega_4 u^2 + \frac{1}{2}\omega_2 \omega_3 \omega_1 u^2 - \frac{5}{8}\omega_3 \omega_4 u - \frac{1}{2}\omega_2 v^2 \omega_4^2 - \\
2\omega_1 + \frac{3}{8}\omega_3 \omega_4 + \frac{1}{2}\omega_2 v^2 \omega_4 \omega_1^2 - \frac{3}{8}\omega_4^2 \omega_1 - \frac{7}{8}v^2 \omega_3 \omega_4^2 + \omega_2^2 v^2 \omega_3 \omega_4 - \frac{1}{8}\omega_2 \omega_3 \omega_4^2 u + \frac{3}{8}\omega_4 u^2 + \frac{5}{2}\omega_2 v^2 \omega_4 + \frac{3}{8}\omega_4^2 \omega_1 u^2 + \\
\frac{1}{8}\omega_3 \omega_4 u^2 + \frac{3}{8}\omega_2 \omega_3 \omega_4 \omega_1 - 3\omega_2 v^2 \omega_4 \omega_1 + \frac{7}{8}\omega_2 v^2 \omega_3 \omega_4^2 - \frac{7}{8}\omega_2 v^2 \omega_3 \omega_4 \omega_1 - \frac{1}{2}v^2 \omega_4^2 \omega_1 + \frac{9}{8}v^2 \omega_3 \omega_4 + \omega_2^2 + \frac{1}{2}\omega_4 u - \\
\omega_2 \omega_3^2 c_s^2 - \frac{21}{4}v^2 \omega_3 \omega_4 \omega_1 - 2v^2 \omega_3 - \frac{7}{8}\omega_2 \omega_3^2 \omega_4 c_s^2 \omega_1 + \frac{1}{4}\omega_2 \omega_4 \omega_1^2 + \omega_2 \omega_3^2 c_s^2 \omega_1 + 3\omega_2 \omega_1 - 4\omega_3 c_s^2 + \frac{1}{8}\omega_2 \omega_4 u + \\
\frac{5}{2}v^2 \omega_3 \omega_1 - \frac{7}{8}\omega_2 v^2 \omega_3 \omega_4 \omega_1 - \omega_2 \omega_3 c_s^2 + \frac{1}{2}\omega_2 \omega_4 c_s^2 + \frac{1}{2}\omega_2 \omega_3 \omega_1 u^2 + \frac{9}{4}\omega_2 \omega_4 \omega_1 u^2 + \frac{1}{4}\omega_4 \omega_1 u^2 - \frac{1}{2}\omega_2^2 v^2 \omega_3 + \\
\frac{1}{2}\omega_3 \omega_1^2 + \frac{1}{2}\omega_2 v^2 \omega_3 \omega_1 + \frac{3}{4}\omega_3 \omega_4 c_s^2 \omega_1^2 + \frac{5}{2}\omega_2 \omega_3 - \frac{1}{8}\omega_3 \omega_4 \omega_1 u^2 + \frac{1}{8}\omega_4^2 c_s^2 + \frac{1}{4}\omega_2 \omega_4 c_s^2 \omega_1^2 + 5\omega_3 c_s^2 \omega_1,
\end{aligned}$$

$$\alpha_{x,y}^{[\mu_5],t-4\delta_t} = -4 + 5\omega_2 + \frac{7}{8}\omega_2 \omega_3^2 \omega_4 \omega_1 - 6\omega_2 \omega_3 + \omega_2^2 \omega_4 - \omega_2 \omega_3 \omega_1^2 + \frac{3}{4}\omega_4 \omega_1^2 + \frac{49}{8}\omega_3 \omega_4 \omega_1 - \\
\frac{7}{8}\omega_2 \omega_3 \omega_4^2 + \omega_2^2 \omega_1 + \frac{51}{8}\omega_2 \omega_3 \omega_4 - \frac{7}{8}\omega_2 \omega_4^2 \omega_1 + 5\omega_3 - \frac{21}{4}\omega_4 \omega_1 + \frac{7}{8}\omega_3 \omega_4 - \frac{3}{4}\omega_3 \omega_4 \omega_1^2 + \omega_2^2 \omega_3 \omega_4 \omega_1 + \omega_2 \omega_3^2 - \\
\omega_3^2 + 7\omega_2 \omega_3 \omega_1 - \omega_2^2 \omega_4 \omega_1 + \omega_3^2 \omega_1 + \frac{7}{8}\omega_2 \omega_4^2 - \omega_2^2 \omega_3 \omega_4 - \omega_2 \omega_3^2 \omega_1 - \frac{7}{8}\omega_4^2 - 6\omega_3 \omega_1 + \frac{9}{2}\omega_4 - \omega_1^2 + \frac{25}{4}\omega_2 \omega_4 \omega_1 - \\
\omega_2^2 \omega_3 \omega_1 - \frac{7}{8}\omega_2 \omega_3^2 \omega_4 + \omega_2 \omega_1^2 + 5\omega_1 - \frac{43}{8}\omega_3 \omega_4 + \frac{7}{8}\omega_4^2 \omega_1 + \frac{3}{4}\omega_2 \omega_3 \omega_4 \omega_1^2 - \frac{57}{8}\omega_2 \omega_3 \omega_4 \omega_1 + \frac{7}{8}\omega_3 \omega_4^2 - \frac{7}{8}\omega_3 \omega_4^2 \omega_1 - \\
\omega_2^2 - \frac{3}{4}\omega_2 \omega_4 \omega_1^2 - 6\omega_2 \omega_1 - \frac{7}{8}\omega_3 \omega_4 \omega_1 + \omega_3 \omega_1^2 - \frac{11}{2}\omega_2 \omega_4 + \omega_2 \omega_3 \omega_1,$$

## 5 MRT 3: with orthogonalization and relaxation of $m_{00}$ , $m_{10}$ , $m_{01}$ , $m_{20}$ , $m_{02}$

### 5.1 Definitions

Matrix  $\mathbf{A} = \mathbf{M}^{-1} \mathbf{S} \mathbf{M}$ :

$$\begin{aligned}
\mathbf{A}_{1,1} &= \frac{2}{3}\omega_4 + \frac{2}{15}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{1,2} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{1,3} &= -\frac{1}{3}\omega_4 + \frac{2}{15}\omega_3 + \frac{1}{5}\omega_0,
\end{aligned}$$

$$\begin{aligned}
\mathbf{A}_{1,4} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{1,5} &= -\frac{1}{3}\omega_4 + \frac{2}{15}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{2,1} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{2,2} &= \frac{1}{2}\omega_1 + \frac{3}{10}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{2,3} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{2,4} &= -\frac{1}{2}\omega_1 + \frac{3}{10}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{2,5} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{3,1} &= -\frac{1}{3}\omega_4 + \frac{2}{15}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{3,2} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{3,3} &= \frac{1}{6}\omega_4 + \frac{2}{15}\omega_3 + \frac{1}{5}\omega_0 + \frac{1}{2}\omega_2, \\
\mathbf{A}_{3,4} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{3,5} &= \frac{1}{6}\omega_4 + \frac{2}{15}\omega_3 + \frac{1}{5}\omega_0 - \frac{1}{2}\omega_2, \\
\mathbf{A}_{4,1} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{4,2} &= -\frac{1}{2}\omega_1 + \frac{3}{10}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{4,3} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{4,4} &= \frac{1}{2}\omega_1 + \frac{3}{10}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{4,5} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{5,1} &= -\frac{1}{3}\omega_4 + \frac{2}{15}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{5,2} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{5,3} &= \frac{1}{6}\omega_4 + \frac{2}{15}\omega_3 + \frac{1}{5}\omega_0 - \frac{1}{2}\omega_2, \\
\mathbf{A}_{5,4} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{5,5} &= \frac{1}{6}\omega_4 + \frac{2}{15}\omega_3 + \frac{1}{5}\omega_0 + \frac{1}{2}\omega_2.
\end{aligned}$$

where

$$\mathbf{S} = \text{diag}(\omega_0, \omega_1, \omega_2, \omega_3, \omega_4)$$

and

$$\mathbf{M} = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 0 & -1 & 0 \\ 0 & 0 & 1 & 0 & -1 \\ -2 & 3 & -2 & 3 & -2 \\ -2 & 0 & 1 & 0 & 1 \end{pmatrix}$$

Matrix  $\mathbf{B}$ :

$$\mathbf{B} = \begin{pmatrix} 0 & -1 + \frac{2}{3}\omega_4 + \frac{1}{3}\omega_3 & -1 + \omega_4 & -1 + \frac{2}{3}\omega_4 + \frac{1}{3}\omega_3 & -1 + \omega_4 \\ -1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 & 0 & -1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 & -1 + \omega_1 & -1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 \\ -1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2 & -1 + \frac{1}{6}\omega_4 + \frac{1}{3}\omega_3 + \frac{1}{2}\omega_2 & 0 & -1 + \frac{1}{6}\omega_4 + \frac{1}{3}\omega_3 + \frac{1}{2}\omega_2 & -1 + \omega_2 \\ -1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 & -1 + \omega_1 & -1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 & 0 & -1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 \\ -1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2 & -1 + \frac{1}{6}\omega_4 + \frac{1}{3}\omega_3 + \frac{1}{2}\omega_2 & -1 + \omega_2 & -1 + \frac{1}{6}\omega_4 + \frac{1}{3}\omega_3 + \frac{1}{2}\omega_2 & 0 \end{pmatrix}.$$

## 5.2 EFDE for $\mu_1$

$$\mu_{1,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l, y+j\delta_l}^{[\mu_1], t-\ell\delta_t} \mu_{x+i\delta_l, y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x,y-\delta_l}^{[\mu_1],t} = 1 + \frac{5}{6}\omega_4 c_s^2 + \frac{1}{2}v\omega_2 - \frac{1}{2}\omega_4 - \frac{1}{3}\omega_3 c_s^2 + \frac{1}{3}u^2\omega_4 + \frac{1}{2}\omega_4 v^2 - \frac{1}{2}\omega_2 - \frac{1}{3}\omega_3 u^2.$$

$$\alpha_{x-\delta_l,y}^{[\mu_1],t} = 1 - \frac{1}{2}\omega_3 + \frac{1}{2}\omega_3 c_s^2 - \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 u^2 + \frac{1}{2}u\omega_1.$$

$$\alpha_{x,y}^{[\mu_1],t} = 1 - \frac{5}{3}\omega_4 c_s^2 - \frac{1}{3}\omega_3 c_s^2 - \frac{2}{3}u^2\omega_4 - \omega_4 v^2 - \frac{1}{3}\omega_3 u^2.$$

$$\alpha_{x+\delta_l,y}^{[\mu_1],t} = 1 - \frac{1}{2}\omega_3 + \frac{1}{2}\omega_3 c_s^2 - \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 u^2 - \frac{1}{2}u\omega_1.$$

$$\alpha_{x,y+\delta_l}^{[\mu_1],t} = 1 + \frac{5}{6}\omega_4 c_s^2 - \frac{1}{2}v\omega_2 - \frac{1}{2}\omega_4 - \frac{1}{3}\omega_3 c_s^2 + \frac{1}{3}u^2\omega_4 + \frac{1}{2}\omega_4 v^2 - \frac{1}{2}\omega_2 - \frac{1}{3}\omega_3 u^2.$$

$$\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} = -1 + \frac{1}{2}\omega_3 - \frac{5}{6}\omega_4 c_s^2 + \frac{1}{4}\omega_3 u^2\omega_2 - \frac{1}{2}v\omega_2 - \frac{1}{4}\omega_4 \omega_1 - \frac{1}{4}\omega_3 \omega_4 + \frac{1}{4}\omega_3 \omega_2 c_s^2 + \frac{1}{6}u^2\omega_4 \omega_1 + \frac{1}{2}\omega_4 - \frac{1}{6}\omega_3 c_s^2 - \frac{1}{3}u^2\omega_4 - \frac{1}{2}\omega_4 v^2 - \frac{1}{4}\omega_1 \omega_2 + \frac{1}{2}\omega_1 + \frac{1}{6}\omega_3 u\omega_1 - \frac{1}{6}\omega_3 \omega_1 c_s^2 + \frac{1}{4}\omega_3 v\omega_2 - \frac{1}{6}\omega_3 u^2\omega_1 + \frac{5}{12}\omega_4 \omega_1 c_s^2 + \frac{1}{4}\omega_1 v\omega_2 + \frac{1}{12}u\omega_4 \omega_1 + \frac{1}{2}\omega_3 \omega_4 c_s^2 + \frac{1}{2}\omega_2 - \frac{1}{6}\omega_3 u^2 - \frac{1}{2}u\omega_1 + \frac{1}{4}\omega_4 \omega_1 v^2 + \frac{1}{4}\omega_3 \omega_4 v^2 + \frac{1}{4}u\omega_1 \omega_2 - \frac{1}{4}\omega_3 \omega_2 + \frac{1}{4}\omega_3 u^2\omega_4,$$

$$\alpha_{x,y-\delta_l}^{[\mu_1],t-\delta_t} = -1 + \frac{5}{6}\omega_4 c_s^2 - \frac{1}{6}\omega_3 u^2\omega_2 - \frac{1}{2}v\omega_2 - \frac{1}{6}\omega_3 \omega_2 c_s^2 + \frac{1}{2}\omega_4 + \frac{2}{3}\omega_3 c_s^2 + \frac{1}{3}u^2\omega_4 + \frac{1}{2}\omega_4 v^2 + \frac{1}{2}\omega_4 v\omega_2 - \frac{1}{2}\omega_3 \omega_4 c_s^2 - \frac{1}{2}\omega_4 v^2\omega_2 + \frac{1}{2}\omega_2 + \frac{2}{3}\omega_3 u^2 - \frac{5}{6}\omega_4 \omega_2 c_s^2 - \frac{1}{3}u^2\omega_4 \omega_2 - \frac{1}{2}\omega_3 u^2\omega_4,$$

$$\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} = -1 + \frac{1}{2}\omega_3 - \frac{5}{6}\omega_4 c_s^2 + \frac{1}{4}\omega_3 u^2\omega_2 - \frac{1}{2}v\omega_2 - \frac{1}{4}\omega_4 \omega_1 - \frac{1}{4}\omega_3 \omega_4 + \frac{1}{4}\omega_3 \omega_2 c_s^2 + \frac{1}{6}u^2\omega_4 \omega_1 + \frac{1}{2}\omega_4 - \frac{1}{6}\omega_3 c_s^2 - \frac{1}{3}u^2\omega_4 - \frac{1}{2}\omega_4 v^2 - \frac{1}{4}\omega_1 \omega_2 + \frac{1}{2}\omega_1 - \frac{1}{6}\omega_3 u\omega_1 - \frac{1}{6}\omega_3 \omega_1 c_s^2 + \frac{1}{4}\omega_3 v\omega_2 - \frac{1}{6}\omega_3 u^2\omega_1 + \frac{5}{12}\omega_4 \omega_1 c_s^2 + \frac{1}{4}\omega_1 v\omega_2 - \frac{1}{12}u\omega_4 \omega_1 + \frac{1}{2}\omega_3 \omega_4 c_s^2 + \frac{1}{2}\omega_2 - \frac{1}{6}\omega_3 u^2 + \frac{1}{2}u\omega_1 + \frac{1}{4}\omega_4 \omega_1 v^2 + \frac{1}{4}\omega_3 \omega_4 v^2 - \frac{1}{4}u\omega_1 \omega_2 - \frac{1}{4}\omega_3 \omega_2 + \frac{1}{4}\omega_3 u^2\omega_4,$$

$$\alpha_{x-\delta_l,y}^{[\mu_1],t-\delta_t} = -1 + \frac{1}{2}\omega_3 + \frac{5}{3}\omega_4 c_s^2 - \frac{1}{3}u^2\omega_4 \omega_1 - \frac{1}{6}\omega_3 c_s^2 + \frac{2}{3}u^2\omega_4 + \omega_4 v^2 + \frac{1}{2}\omega_1 + \frac{1}{6}\omega_3 u\omega_1 - \frac{1}{6}\omega_3 \omega_1 c_s^2 - \frac{5}{6}\omega_4 \omega_1 c_s^2 + \frac{1}{3}u\omega_4 \omega_1 - \frac{1}{2}\omega_3 \omega_4 c_s^2 - \frac{1}{6}\omega_3 u^2 - \frac{1}{2}u\omega_1 - \frac{1}{2}\omega_4 \omega_1 v^2 - \frac{1}{2}\omega_3 \omega_4 v^2,$$

$$\alpha_{x,y}^{[\mu_1],t-\delta_t} = -2 + \omega_3 - \frac{5}{3}\omega_4 c_s^2 - \frac{2}{3}\omega_3 u^2\omega_2 - \frac{2}{3}\omega_3 \omega_2 c_s^2 - \omega_3 \omega_1 + \omega_4 - \frac{1}{3}\omega_3 c_s^2 - \frac{2}{3}u^2\omega_4 - \omega_4 v^2 + \omega_1 + \omega_3 \omega_1 c_s^2 + \omega_3 u^2\omega_1 - \omega_4 \omega_2 + \omega_4 v^2\omega_2 + \omega_2 - \frac{1}{3}\omega_3 u^2 + \frac{5}{3}\omega_4 \omega_2 c_s^2 + \frac{2}{3}u^2\omega_4 \omega_2,$$



$$\begin{aligned}
& \frac{1}{6} u^2 w_4 w_1 + \frac{1}{6} u w_4 w_1 w_2 - \frac{1}{12} w_3 u^2 w_1 w_2 - \frac{1}{2} w_4 - \frac{1}{6} w_3 c_s^2 - \frac{1}{3} u^2 w_4 - \frac{1}{2} w_4 v^2 + \frac{1}{4} w_1 w_2 - \frac{1}{2} w_1 - \frac{1}{12} w_3 w_1 w_2 c_s^2 - \\
& \frac{1}{3} w_3 u w_1 + \frac{1}{3} w_3 w_1 c_s^2 + \frac{1}{2} w_4 v w_2 + \frac{1}{12} w_3 u w_1 w_2 + \frac{1}{4} w_3 v w_2 + \frac{1}{3} w_3 u^2 w_1 + \frac{5}{12} w_4 w_1 c_s^2 + \frac{1}{4} w_1 v w_2 - \frac{5}{12} u w_4 w_1 + \\
& \frac{1}{2} w_3 w_4 c_s^2 - \frac{1}{4} w_3 w_4 w_2 c_s^2 - \frac{5}{12} w_4 w_1 w_2 c_s^2 + \frac{1}{2} w_4 v^2 w_2 - \frac{1}{2} w_2 - \frac{1}{6} w_3 u^2 + \frac{1}{2} u w_1 + \frac{1}{4} w_4 w_1 v^2 - \frac{1}{4} w_3 w_4 v^2 w_2 + \frac{1}{4} w_3 w_4 v^2 - \\
& \frac{1}{4} w_4 w_1 v^2 w_2 + \frac{5}{6} w_4 w_2 c_s^2 - \frac{1}{4} u w_1 w_2 - \frac{1}{4} w_3 w_4 w_1 c_s^2 + \frac{1}{4} w_3 u w_4 w_1 - \frac{1}{6} u^2 w_4 w_1 w_2 + \frac{1}{3} u^2 w_4 w_2 + \frac{1}{4} w_3 w_2 + \frac{1}{4} w_3 u^2 w_4, \\
\alpha_{x,y+\delta_t}^{[\mu_1],t-2\delta_t} &= 1 - w_3 + \frac{1}{2} w_3 u^2 w_4 w_1 + \frac{5}{6} w_4 c_s^2 - \frac{1}{2} w_3 u^2 w_2 - \frac{1}{2} v w_2 + \frac{1}{2} w_4 w_1 + \frac{1}{2} w_3 w_4 - \frac{1}{2} w_3 w_2 c_s^2 - \frac{1}{3} u^2 w_4 w_1 + \\
& w_3 w_1 + \frac{1}{2} w_3 u^2 w_1 w_2 - \frac{1}{2} w_4 + \frac{2}{3} w_3 c_s^2 + \frac{1}{3} u^2 w_4 + \frac{1}{2} w_4 v^2 + \frac{1}{2} w_1 w_2 - w_1 + \frac{1}{2} w_3 w_1 w_2 c_s^2 - \frac{2}{3} w_3 w_1 c_s^2 + \\
& \frac{1}{2} w_3 v w_2 - \frac{2}{3} w_3 u^2 w_1 - \frac{5}{6} w_4 w_1 c_s^2 + \frac{1}{2} w_1 v w_2 - w_3 w_4 c_s^2 - \frac{1}{2} w_3 w_4 w_1 + \frac{1}{2} w_3 w_4 w_1 v^2 - \frac{1}{2} w_2 + \frac{2}{3} w_3 u^2 - \\
& \frac{1}{2} w_3 w_1 w_2 - \frac{1}{2} w_4 w_1 v^2 - \frac{1}{2} w_3 w_4 v^2 + w_3 w_4 w_1 c_s^2 - \frac{1}{2} w_3 w_1 v w_2 + \frac{1}{2} w_3 w_2 - \frac{1}{2} w_3 u^2 w_4, \\
\alpha_{x+\delta_t,y+\delta_t}^{[\mu_1],t-2\delta_t} &= \\
& 1 - \frac{1}{2} w_3 - \frac{1}{4} w_3 u^2 w_4 w_1 - \frac{5}{6} w_4 c_s^2 - \frac{1}{4} w_4 w_1 v w_2 - \frac{1}{12} w_3 u^2 w_2 - \frac{1}{2} v w_2 - \frac{1}{4} w_3 w_4 v w_2 + \frac{1}{4} w_4 w_1 + \frac{1}{4} w_3 w_4 - \frac{1}{12} w_3 w_2 c_s^2 + \\
& \frac{1}{6} u^2 w_4 w_1 - \frac{1}{6} u w_4 w_1 w_2 - \frac{1}{12} w_3 u^2 w_1 w_2 - \frac{1}{2} w_4 - \frac{1}{6} w_3 c_s^2 - \frac{1}{3} u^2 w_4 - \frac{1}{2} w_4 v^2 + \frac{1}{4} w_1 w_2 - \frac{1}{2} w_1 - \frac{1}{12} w_3 w_1 w_2 c_s^2 + \\
& \frac{1}{3} w_3 u w_1 + \frac{1}{3} w_3 w_1 c_s^2 + \frac{1}{2} w_4 v w_2 - \frac{1}{12} w_3 u w_1 w_2 + \frac{1}{4} w_3 v w_2 + \frac{1}{3} w_3 u^2 w_1 + \frac{5}{12} w_4 w_1 c_s^2 + \frac{1}{4} w_1 v w_2 + \frac{5}{12} u w_4 w_1 + \\
& \frac{1}{2} w_3 w_4 c_s^2 - \frac{1}{4} w_3 w_4 w_2 c_s^2 - \frac{5}{12} w_4 w_1 w_2 c_s^2 + \frac{1}{2} w_4 v^2 w_2 - \frac{1}{2} w_2 - \frac{1}{6} w_3 u^2 - \frac{1}{2} u w_1 + \frac{1}{4} w_4 w_1 v^2 - \frac{1}{4} w_3 w_4 v^2 w_2 + \frac{1}{4} w_3 w_4 v^2 - \\
& \frac{1}{4} w_4 w_1 v^2 w_2 + \frac{5}{6} w_4 w_2 c_s^2 + \frac{1}{2} u w_1 w_2 - \frac{1}{4} w_3 w_4 w_1 c_s^2 - \frac{1}{4} w_3 u w_4 w_1 - \frac{1}{6} u^2 w_4 w_1 w_2 + \frac{1}{3} u^2 w_4 w_2 + \frac{1}{4} w_3 w_2 + \frac{1}{4} w_3 u^2 w_4, \\
\alpha_{x,y-\delta_t}^{[\mu_1],t-3\delta_t} &= -1 + w_3 + \frac{5}{6} w_4 c_s^2 - \frac{1}{2} w_4 w_1 v w_2 + \frac{1}{3} w_3 u^2 w_2 - \frac{1}{2} v w_2 - \frac{1}{2} w_3 w_4 v w_2 - \frac{1}{2} w_4 w_1 - \frac{1}{2} w_3 w_4 - \frac{1}{2} w_3 w_4 w_1 w_2 c_s^2 + \\
& \frac{1}{3} w_3 w_2 c_s^2 - \frac{1}{3} u^2 w_4 w_1 - w_3 w_1 - \frac{1}{3} w_3 u^2 w_1 w_2 + \frac{1}{2} w_4 - \frac{1}{3} w_3 c_s^2 + \frac{1}{3} u^2 w_4 + \frac{1}{2} w_4 v^2 - \frac{1}{2} w_3 w_4 w_1 v^2 w_2 - \frac{1}{2} w_1 w_2 + w_1 - \\
& \frac{1}{3} w_3 w_1 w_2 c_s^2 + \frac{1}{3} w_3 w_1 c_s^2 + \frac{1}{2} w_4 v w_2 + \frac{1}{2} w_3 w_4 w_1 v w_2 + \frac{1}{2} w_3 v w_2 + \frac{1}{3} w_3 u^2 w_1 - \frac{5}{6} w_4 w_1 c_s^2 + \frac{1}{2} w_1 v w_2 - \frac{1}{2} w_3 w_4 c_s^2 + \\
& \frac{1}{2} w_3 w_4 w_1 + \frac{1}{2} w_3 w_4 w_2 c_s^2 + \frac{1}{2} w_3 w_4 w_1 v^2 + \frac{5}{6} w_4 w_1 w_2 c_s^2 - \frac{1}{2} w_4 v^2 w_2 + \frac{1}{2} w_2 - \frac{1}{3} w_3 u^2 + \frac{1}{2} w_3 w_1 w_2 - \frac{1}{2} w_4 w_1 v^2 + \\
& \frac{1}{2} w_3 w_4 v^2 w_2 - \frac{1}{2} w_3 w_4 v^2 + \frac{1}{2} w_4 w_1 v^2 w_2 - \frac{5}{6} w_4 w_2 c_s^2 + \frac{1}{2} w_3 w_4 w_1 c_s^2 - \frac{1}{2} w_3 w_1 v w_2 + \frac{1}{3} u^2 w_4 w_1 w_2 - \frac{1}{3} u^2 w_4 w_2 - \frac{1}{2} w_3 w_2, \\
\alpha_{x-\delta_t,y}^{[\mu_1],t-3\delta_t} &= -1 + \frac{1}{2} w_3 + \frac{1}{2} w_3 u^2 w_4 w_1 - \frac{1}{2} w_3 u^2 w_2 - \frac{1}{2} w_4 w_1 - \frac{1}{2} w_3 w_4 - \frac{1}{2} w_3 w_4 w_1 w_2 c_s^2 - \frac{1}{2} w_3 w_2 c_s^2 + \frac{1}{2} w_3 w_4 w_2 + \\
& \frac{1}{2} w_4 w_1 w_2 - \frac{1}{2} u w_4 w_1 w_2 + \frac{1}{2} w_3 u^2 w_1 w_2 + w_4 + \frac{1}{2} w_3 c_s^2 - \frac{1}{2} w_1 w_2 + \frac{1}{2} w_3 w_1 w_2 c_s^2 + \frac{1}{2} w_3 u w_1 - \\
& \frac{1}{2} w_3 u^2 w_4 w_1 w_2 - \frac{1}{2} w_3 w_1 c_s^2 - \frac{1}{2} w_3 u w_1 w_2 - \frac{1}{2} w_3 u^2 w_1 + \frac{1}{2} u w_4 w_1 - \frac{1}{2} w_3 w_4 c_s^2 - w_4 w_2 + \frac{1}{2} w_3 w_4 w_2 c_s^2 + \\
& \frac{1}{2} w_3 u^2 w_4 w_2 + w_2 + \frac{1}{2} w_3 u^2 - \frac{1}{2} u w_1 + \frac{1}{2} u w_1 w_2 + \frac{1}{2} w_3 w_4 w_1 c_s^2 - \frac{1}{2} w_3 u w_4 w_1 w_2 - \frac{1}{2} w_3 w_2 - \frac{1}{2} w_3 u^2 w_4, \\
\alpha_{x,y}^{[\mu_1],t-3\delta_t} &= -1 + w_3 - w_3 u^2 w_4 w_1 - \frac{5}{3} w_4 c_s^2 + \frac{1}{3} w_3 u^2 w_2 - w_4 w_1 - w_3 w_4 + 2 w_3 w_4 w_1 w_2 c_s^2 + \frac{1}{3} w_3 w_2 c_s^2 + w_3 w_4 w_2 + \\
& w_4 w_1 w_2 + \frac{2}{3} u^2 w_4 w_1 - w_3 w_1 - \frac{1}{3} w_3 u^2 w_1 w_2 + w_4 - \frac{1}{3} w_3 c_s^2 - \frac{2}{3} u^2 w_4 - w_4 v^2 + w_3 w_4 w_1 v^2 w_2 - w_1 w_2 + w_1 - \\
& \frac{1}{3} w_3 w_1 w_2 c_s^2 - w_3 w_4 w_1 w_2 + w_3 u^2 w_4 w_1 w_2 + \frac{1}{3} w_3 w_1 c_s^2 + \frac{1}{3} w_3 u^2 w_1 + \frac{5}{3} w_4 w_1 c_s^2 + 2 w_3 w_4 c_s^2 - w_4 w_2 + w_3 w_4 w_1 - \\
& 2 w_3 w_4 w_2 c_s^2 - w_3 w_4 w_1 v^2 - \frac{5}{3} w_4 w_1 w_2 c_s^2 + w_4 v^2 w_2 - w_3 u^2 w_4 w_2 + w_2 - \frac{1}{3} w_3 u^2 + w_3 w_1 w_2 + w_4 w_1 v^2 - \\
& w_3 w_4 v^2 w_2 + w_3 w_4 v^2 - w_4 w_1 v^2 w_2 + \frac{5}{3} w_4 w_2 c_s^2 - 2 w_3 w_4 w_1 c_s^2 - \frac{2}{3} u^2 w_4 w_1 w_2 + \frac{2}{3} u^2 w_4 w_2 - w_3 w_2 + w_3 u^2 w_4, \\
\alpha_{x+\delta_t,y}^{[\mu_1],t-3\delta_t} &= -1 + \frac{1}{2} w_3 + \frac{1}{2} w_3 u^2 w_4 w_1 - \frac{1}{2} w_3 u^2 w_2 - \frac{1}{2} w_4 w_1 - \frac{1}{2} w_3 w_4 - \frac{1}{2} w_3 w_4 w_1 w_2 c_s^2 - \frac{1}{2} w_3 w_2 c_s^2 + \frac{1}{2} w_3 w_4 w_2 + \\
& \frac{1}{2} w_4 w_1 w_2 + \frac{1}{2} u w_4 w_1 w_2 + \frac{1}{2} w_3 u^2 w_1 w_2 + w_4 + \frac{1}{2} w_3 c_s^2 - \frac{1}{2} w_1 w_2 + \frac{1}{2} w_3 w_1 w_2 c_s^2 - \frac{1}{2} w_3 u w_1 - \\
& \frac{1}{2} w_3 u^2 w_4 w_1 w_2 - \frac{1}{2} w_3 w_1 c_s^2 + \frac{1}{2} w_3 u w_1 w_2 - \frac{1}{2} w_3 u^2 w_1 - \frac{1}{2} u w_4 w_1 - \frac{1}{2} w_3 w_4 c_s^2 - w_4 w_2 + \frac{1}{2} w_3 w_4 w_2 c_s^2 + \\
& \frac{1}{2} w_3 u^2 w_4 w_2 + w_2 + \frac{1}{2} w_3 u^2 + \frac{1}{2} u w_1 - \frac{1}{2} u w_1 w_2 + \frac{1}{2} w_3 w_4 w_1 c_s^2 + \frac{1}{2} w_3 u w_4 w_1 w_2 - \frac{1}{2} w_3 w_2 - \frac{1}{2} w_3 u^2 w_4, \\
\alpha_{x,y+\delta_t}^{[\mu_1],t-3\delta_t} &= -1 + w_3 + \frac{5}{6} w_4 c_s^2 + \frac{1}{2} w_4 w_1 v w_2 + \frac{1}{3} w_3 u^2 w_2 + \frac{1}{2} v w_2 + \frac{1}{2} w_3 w_4 v w_2 - \frac{1}{2} w_4 w_1 - \frac{1}{2} w_3 w_4 - \frac{1}{2} w_3 w_4 w_1 w_2 c_s^2 + \\
& \frac{1}{3} w_3 w_2 c_s^2 - \frac{1}{3} u^2 w_4 w_1 - w_3 w_1 - \frac{1}{3} w_3 u^2 w_1 w_2 + \frac{1}{2} w_4 - \frac{1}{3} w_3 c_s^2 + \frac{1}{3} u^2 w_4 + \frac{1}{2} w_4 v^2 - \frac{1}{2} w_3 w_4 w_1 v^2 w_2 - \frac{1}{2} w_1 w_2 + w_1 - \\
& \frac{1}{3} w_3 w_1 w_2 c_s^2 + \frac{1}{3} w_3 w_1 c_s^2 - \frac{1}{2} w_4 v w_2 - \frac{1}{2} w_3 w_4 w_1 v w_2 - \frac{1}{2} w_3 v w_2 + \frac{1}{3} w_3 u^2 w_1 - \frac{5}{6} w_4 w_1 c_s^2 - \frac{1}{2} w_1 v w_2 - \frac{1}{2} w_3 w_4 c_s^2 + \\
& \frac{1}{2} w_3 w_4 w_1 + \frac{1}{2} w_3 w_4 w_2 c_s^2 + \frac{1}{2} w_3 w_4 w_1 v^2 + \frac{5}{6} w_4 w_1 w_2 c_s^2 - \frac{1}{2} w_4 v^2 w_2 + \frac{1}{2} w_2 - \frac{1}{3} w_3 u^2 + \frac{1}{2} w_3 w_1 w_2 - \frac{1}{2} w_4 w_1 v^2 + \\
& \frac{1}{2} w_3 w_4 v^2 w_2 - \frac{1}{2} w_3 w_4 v^2 + \frac{1}{2} w_4 w_1 v^2 w_2 - \frac{5}{6} w_4 w_2 c_s^2 + \frac{1}{2} w_3 w_4 w_1 c_s^2 - \frac{1}{2} w_3 w_1 v w_2 + \frac{1}{3} u^2 w_4 w_1 w_2 - \frac{1}{3} u^2 w_4 w_2 - \frac{1}{2} w_3 w_2, \\
\alpha_{x,y}^{[\mu_1],t-4\delta_t} &= 1 - w_3 + w_4 w_1 + w_3 w_4 - w_3 w_4 w_2 - w_4 w_1 w_2 + w_3 w_1 - w_4 + w_1 w_2 - w_1 + w_3 w_4 w_1 w_2 + w_4 w_2 - \\
& w_3 w_4 w_1 - w_2 - w_3 w_1 w_2 + w_3 w_2,
\end{aligned}$$

$$\mu_{2,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l, y+j\delta_l}^{[\mu_1], t-\ell\delta_t} \mu_{x+i\delta_l, y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l, y+j\delta_l}^{[\mu_2], t-\ell\delta_t} \mu_{2,x+i\delta_l, y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x-\delta t,y}^{[\mu_1],t} = 1 - \frac{1}{2}\omega_3 + \frac{1}{2}\omega_3 c_s^2 - \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 u^2 + \frac{1}{2}u\omega_1.$$

$$\alpha_{x+\delta_1 y}^{[\mu_1],t} = -1 + \frac{1}{2}\omega_3 - \frac{1}{2}\omega_3 c_s^2 + \frac{1}{2}\omega_1 - \frac{1}{2}\omega_3 u^2 + \frac{1}{2}u\omega_1.$$

$$\alpha_{x-\delta_1, y-\delta_1}^{[\mu_1], t-\delta_t} = -1 + \frac{1}{2}\omega_3 - \frac{5}{6}\omega_4 c_s^2 - \frac{1}{2}\omega_2 - \frac{1}{4}\omega_4 \omega_1 - \frac{1}{4}\omega_3 \omega_4 + \frac{1}{6}u^2 \omega_4 \omega_1 + \frac{1}{2}\omega_4 + \frac{1}{3}\omega_3 c_s^2 - \frac{1}{6}\omega_3^2 u^2 - \frac{1}{3}u^2 \omega_4 - \frac{1}{2}\omega_4 v^2 - \frac{1}{4}\omega_1 \omega_2 + \frac{1}{2}\omega_1 - \frac{1}{6}\omega_3 \omega_1 c_s^2 + \frac{1}{4}\omega_3 v \omega_2 - \frac{1}{6}\omega_3 u^2 \omega_1 + \frac{5}{12}\omega_4 \omega_1 c_s^2 + \frac{1}{4}\omega_1 v \omega_2 + \frac{5}{12}\omega_3 \omega_4 c_s^2 + \frac{1}{2}\omega_2 + \frac{1}{3}\omega_3 u^2 - \frac{1}{6}\omega_3^2 c_s^2 + \frac{1}{4}\omega_4 \omega_1 v^2 + \frac{1}{4}\omega_3 \omega_4 v^2 - \frac{1}{4}\omega_3 \omega_2 + \frac{1}{6}\omega_3 u^2 \omega_4,$$

$$\alpha_{x-\delta_1, y-\delta_1}^{[\mu_2], t-\delta_t} = 1 - \frac{5}{6}\omega_3 + \frac{1}{12}\omega_4\omega_1 + \frac{1}{12}\omega_3\omega_4 + \frac{1}{6}\omega_3\omega_1 - \frac{1}{6}\omega_4 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{6}\omega_3^2 + \frac{1}{4}\omega_3\omega_2,$$

$$\alpha_{x,y-\delta_l}^{[\mu_2],t-\delta_t} = 1 - \frac{3}{2}\omega_4 + \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_4\omega_2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x+\delta t, y-\delta t}^{[\mu_1], t-\delta t} = 1 - \frac{1}{2}\omega_3 + \frac{5}{6}\omega_4 c_s^2 + \frac{1}{2}v\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{6}u^2\omega_4\omega_1 - \frac{1}{2}\omega_4 - \frac{1}{3}\omega_3 c_s^2 + \frac{1}{6}\omega_3^2 u^2 + \frac{1}{3}u^2\omega_4 + \frac{1}{2}\omega_4 v^2 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{2}\omega_1 + \frac{1}{6}\omega_3\omega_1 c_s^2 - \frac{1}{4}\omega_3 v\omega_2 + \frac{1}{6}\omega_3 u^2\omega_1 - \frac{5}{12}\omega_4\omega_1 c_s^2 - \frac{1}{4}\omega_1 v\omega_2 - \frac{5}{12}\omega_3\omega_4 c_s^2 - \frac{1}{2}\omega_2 - \frac{1}{3}\omega_3 u^2 + \frac{1}{6}\omega_3^2 c_s^2 - \frac{1}{4}\omega_4\omega_1 v^2 - \frac{1}{4}\omega_3\omega_4 v^2 + \frac{1}{4}\omega_3\omega_2 - \frac{1}{6}\omega_3 u^2\omega_4,$$

$$\alpha_{x+\delta_t, y-\delta_t}^{[\mu_2], t-\delta_t} = 1 - \frac{5}{6}\omega_3 + \frac{1}{12}\omega_4\omega_1 + \frac{1}{12}\omega_3\omega_4 + \frac{1}{6}\omega_3\omega_1 - \frac{1}{6}\omega_4 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{6}\omega_3^2 + \frac{1}{4}\omega_3\omega_2,$$

$$\alpha_{x-\delta t,y}^{[\mu_1],t-\delta t} = -1 + \frac{1}{2}\omega_3 + \frac{5}{3}\omega_4 c_s^2 - \frac{1}{3}u^2\omega_4\omega_1 + \frac{1}{3}\omega_3 c_s^2 - \frac{1}{6}\omega_3^2 u^2 + \frac{2}{3}u^2\omega_4 + \omega_4 v^2 + \frac{1}{2}\omega_1 - \frac{1}{6}\omega_3\omega_1 c_s^2 - \frac{1}{6}\omega_3 u^2\omega_1 - \frac{5}{6}\omega_4\omega_1 c_s^2 - \frac{5}{6}\omega_3\omega_4 c_s^2 + \frac{1}{3}\omega_3 u^2 - \frac{1}{6}\omega_3^2 c_s^2 - \frac{1}{2}\omega_4\omega_1 v^2 - \frac{1}{2}\omega_3\omega_4 v^2 - \frac{1}{3}\omega_3 u^2\omega_4,$$

$$\alpha_{x-\delta_t,y}^{[\mu_2],t-\delta_t} = 1 - \frac{5}{6}\omega_3 + \frac{1}{3}\omega_4\omega_1 + \frac{1}{3}\omega_3\omega_4 + \frac{1}{6}\omega_3\omega_1 - \frac{2}{3}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{6}\omega_3^2,$$

$$\alpha_{x,y}^{[\mu_1],t-\delta_t} = -u\omega_1^2 + u\omega_1,$$

$$\alpha_{x,y}^{[\mu_2],t-\delta_t} = 2 + \omega_1^2 - 2\omega_1 - 2\omega_2 + \omega_2^2,$$

$$\alpha_{x+\delta_1, y}^{[\mu_1], t-\delta_1} = 1 - \frac{1}{2}\omega_3 - \frac{5}{3}\omega_4 c_s^2 + \frac{1}{3}u^2\omega_4\omega_1 - \frac{1}{3}\omega_3 c_s^2 + \frac{1}{6}\omega_3^2 u^2 - \frac{2}{3}u^2\omega_4 - \omega_4 v^2 - \frac{1}{2}\omega_1 + \frac{1}{6}\omega_3\omega_1 c_s^2 + \frac{1}{6}\omega_3 u^2\omega_1 + \frac{5}{6}\omega_4\omega_1 c_s^2 + \frac{5}{6}\omega_3\omega_4 c_s^2 - \frac{1}{3}\omega_3 u^2 + \frac{1}{6}\omega_3^2 c_s^2 + \frac{1}{2}\omega_4\omega_1 v^2 + \frac{1}{2}\omega_3\omega_4 v^2 + \frac{1}{3}\omega_3 u^2\omega_4,$$

$$\alpha_{x+\delta_t,y}^{[\mu_2],t-\delta_t} = 1 - \frac{5}{6}\omega_3 + \frac{1}{3}\omega_4\omega_1 + \frac{1}{3}\omega_3\omega_4 + \frac{1}{6}\omega_3\omega_1 - \frac{2}{3}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{6}\omega_3^2,$$

$$\alpha_{x-\delta_t,y+\delta_t}^{[\mu_1,t-\delta_t]} = -1 + \frac{1}{2}\omega_3 - \frac{5}{6}\omega_4 c_s^2 + \frac{1}{2}v\omega_2 - \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4 + \frac{1}{6}u^2\omega_4\omega_1 + \frac{1}{2}\omega_4 + \frac{1}{3}\omega_3 c_s^2 - \frac{1}{6}\omega_3^2 u^2 - \frac{1}{3}u^2\omega_4 - \frac{1}{2}\omega_4 v^2 - \frac{1}{4}\omega_1\omega_2 + \frac{1}{2}\omega_1 - \frac{1}{6}\omega_3\omega_1 c_s^2 - \frac{1}{4}\omega_3 v\omega_2 - \frac{1}{6}\omega_3 u^2\omega_1 + \frac{5}{12}\omega_4\omega_1 c_s^2 - \frac{1}{4}\omega_1 v\omega_2 + \frac{5}{12}\omega_3\omega_4 c_s^2 + \frac{1}{2}\omega_2 + \frac{1}{3}\omega_3 u^2 - \frac{1}{6}\omega_3^2 c_s^2 + \frac{1}{4}\omega_4\omega_1 v^2 + \frac{1}{2}\omega_3\omega_4 v^2 - \frac{1}{4}\omega_3\omega_2 + \frac{1}{6}\omega_3 u^2\omega_4,$$

$$\alpha_{x-\delta_t, y+\delta_t}^{[\mu_2], t-\delta_t} = 1 - \frac{5}{6}\omega_3 + \frac{1}{12}\omega_4\omega_1 + \frac{1}{12}\omega_3\omega_4 + \frac{1}{6}\omega_3\omega_1 - \frac{1}{6}\omega_4 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{6}\omega_3^2 + \frac{1}{4}\omega_3\omega_2,$$

$$\alpha_{x,y+\delta}^{[\mu_2],t-\delta_t} = 1 - \tfrac{3}{2}\omega_4 + \tfrac{1}{2}\omega_4^2 + \tfrac{1}{2}\omega_4\omega_2 - \tfrac{1}{2}\omega_2,$$

$$\alpha_{x+\delta_1, y+\delta_1}^{[\mu_1], t-\delta_t} = 1 - \frac{1}{2}\omega_3 + \frac{5}{6}\omega_4 c_s^2 - \frac{1}{2}v\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{6}u^2\omega_4\omega_1 - \frac{1}{2}\omega_4 - \frac{1}{3}\omega_3 c_s^2 + \frac{1}{6}\omega_3^2 u^2 + \frac{1}{3}u^2\omega_4 + \frac{1}{2}\omega_4 v^2 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{2}\omega_1 + \frac{1}{6}\omega_3\omega_1 c_s^2 + \frac{1}{4}\omega_3 v\omega_2 + \frac{1}{6}\omega_3 u^2\omega_1 - \frac{5}{12}\omega_4\omega_1 c_s^2 + \frac{1}{4}\omega_1 v\omega_2 - \frac{5}{12}\omega_3\omega_4 c_s^2 - \frac{1}{2}\omega_2 - \frac{1}{6}\omega_2 u^2 + \frac{1}{4}\omega_2^2 c_s^2 - \frac{1}{2}\omega_4\omega_1 v^2 - \frac{1}{6}\omega_2\omega_4 v^2 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{6}\omega_2 u^2\omega_4.$$

$$\alpha_{\frac{1}{2}, \frac{1}{2}, \frac{1}{2}}^{[\mu_2], t - \delta_t} = 1 - \frac{5}{2}\omega_3 + \frac{1}{2}\omega_1\omega_1 + \frac{1}{2}\omega_3\omega_1 + \frac{1}{2}\omega_3\omega_1 - \frac{1}{2}\omega_1 + \frac{1}{2}\omega_1\omega_2 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_2^2 + \frac{1}{2}\omega_3\omega_2.$$



$$\begin{aligned}
& \frac{1}{3}u^2\omega_4 - \frac{1}{2}\omega_4v^2 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_4^2c_s^2 - \frac{1}{2}\omega_1 - \frac{1}{4}u\omega_4^2\omega_1 - \frac{1}{12}\omega_3\omega_1\omega_2c_s^2 + \frac{1}{3}\omega_3\omega_1c_s^2 + \frac{1}{2}\omega_4vw_2 - \frac{1}{4}\omega_3u^2\omega_4^2 + \frac{1}{3}\omega_3u^2\omega_1 + \frac{5}{12}\omega_4\omega_1c_s^2 + \frac{1}{4}\omega_1vw_2 + \frac{3}{4}u\omega_4\omega_1 + \frac{5}{3}\omega_3\omega_4c_s^2 - \frac{2}{3}\omega_3\omega_4\omega_2c_s^2 - \frac{5}{12}\omega_4\omega_1\omega_2c_s^2 + \\
& \frac{1}{2}\omega_4v^2\omega_2 - \frac{1}{12}\omega_3u^2\omega_4\omega_2 - \frac{1}{2}\omega_2 - \frac{7}{6}\omega_3u^2 + \frac{1}{3}\omega_3^2c_s^2 - \frac{1}{2}u\omega_1 + \frac{1}{4}\omega_4\omega_1v^2 - \frac{1}{4}\omega_3\omega_4v^2\omega_2 + \frac{1}{4}\omega_3\omega_4v^2 - \frac{1}{4}\omega_4\omega_1v^2\omega_2 + \\
& \frac{5}{6}\omega_4\omega_2c_s^2 + \frac{1}{4}u\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_4\omega_1c_s^2 - \frac{1}{6}u^2\omega_4\omega_1\omega_2 + \frac{1}{3}u^2\omega_4\omega_2 - \frac{1}{12}\omega_3^2u^2\omega_2 + \frac{1}{4}\omega_3\omega_2 + \frac{17}{12}\omega_3u^2\omega_4 - \frac{1}{12}\omega_3^2\omega_2c_s^2, \\
\alpha_{x-\delta_l,y+\delta_l}^{[\mu_2],t-2\delta_t} &= -2 + \frac{5}{3}\omega_3 + \frac{1}{12}\omega_3^2\omega_2 - \frac{7}{6}\omega_4\omega_1 - \frac{5}{3}\omega_3\omega_4 + \frac{5}{12}\omega_3\omega_4\omega_2 + \frac{5}{12}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_4^2 - \frac{1}{3}\omega_3\omega_1 + \frac{7}{3}\omega_4 - \frac{1}{2}\omega_4^2 - \\
& \frac{1}{2}\omega_1\omega_2 + \omega_1 - \frac{5}{6}\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_1 + \omega_2 + \frac{1}{12}\omega_3\omega_1\omega_2 + \frac{1}{4}\omega_4^2\omega_1 + \frac{1}{4}\omega_3^2\omega_4 - \frac{1}{3}\omega_3^2 - \frac{2}{3}\omega_3\omega_2, \\
\alpha_{x,y+\delta_l}^{[\mu_1],t-2\delta_t} &= \\
& -\frac{1}{3}\omega_3uu_1^2 - \frac{1}{2}u\omega_1^2\omega_2 + \frac{5}{3}\omega_3uu_1\omega_1 - \frac{1}{2}\omega_3uu_1\omega_2 + \frac{1}{3}u\omega_4\omega_1 - \frac{1}{3}\omega_3^2uu_1 + u\omega_1^2 - 2u\omega_1 + uu_1\omega_2 - \frac{1}{6}\omega_3uu_4\omega_1 - \frac{1}{6}u\omega_4\omega_1^2, \\
\alpha_{x,y+\delta_l}^{[\mu_2],t-2\delta_t} &= -2 + \frac{5}{3}\omega_3 - \omega_1^2 - \frac{1}{2}\omega_4\omega_1 - \frac{1}{6}\omega_3\omega_4 + \frac{1}{3}\omega_3\omega_1^2 + \frac{1}{6}\omega_4\omega_1^2 - 2\omega_3\omega_1 + \frac{1}{3}\omega_4 - \frac{3}{2}\omega_1\omega_2 + 3\omega_1 + \frac{1}{2}\omega_1^2\omega_2 + \\
& \frac{1}{6}\omega_3\omega_4\omega_1 + \frac{1}{3}\omega_3^2\omega_1 + \omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2 - \frac{1}{3}\omega_3^2 - \frac{1}{2}\omega_3\omega_2, \\
\alpha_{x+\delta_l,y+\delta_l}^{[\mu_1],t-2\delta_t} &= -1 + \frac{1}{2}\omega_3 + \frac{1}{4}\omega_3u^2\omega_4\omega_1 + \frac{5}{6}\omega_4c_s^2 + \frac{1}{4}\omega_4\omega_1vw_2 - \frac{5}{12}\omega_3u^2\omega_2 + \frac{1}{2}vw_2 + \frac{1}{4}\omega_3\omega_4vw_2 - \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4 - \\
& \frac{5}{12}\omega_3\omega_2c_s^2 + \frac{1}{4}\omega_3^2u^2\omega_4 - \frac{1}{6}u^2\omega_4\omega_1 + \frac{1}{4}\omega_3^2\omega_4c_s^2 - \frac{1}{4}u\omega_4\omega_1\omega_2 + \frac{1}{12}\omega_3u^2\omega_1\omega_2 + \frac{1}{2}\omega_4 + \frac{7}{6}\omega_3c_s^2 - \frac{1}{3}\omega_3^2u^2 + \\
& \frac{1}{2}u^2\omega_4 + \frac{1}{2}\omega_4v^2 - \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_4^2c_s^2 + \frac{1}{2}\omega_1 - \frac{1}{4}u\omega_4^2\omega_1 + \frac{1}{12}\omega_3\omega_1\omega_2c_s^2 - \frac{1}{3}\omega_3\omega_1c_s^2 - \frac{1}{4}\omega_4vw_2 - \frac{1}{4}\omega_3\omega_4v^2 + \\
& \frac{1}{4}\omega_3u^2\omega_4^2 - \frac{1}{2}\omega_3u^2\omega_1 - \frac{5}{12}\omega_4\omega_1c_s^2 - \frac{1}{2}\omega_1vw_2 + \frac{3}{4}u\omega_4\omega_1 - \frac{5}{3}\omega_3\omega_4c_s^2 + \frac{2}{3}\omega_3\omega_4\omega_2c_s^2 + \frac{5}{12}\omega_4\omega_1\omega_2c_s^2 - \\
& \frac{5}{12}\omega_4v^2\omega_2 + \frac{5}{12}\omega_3u^2\omega_4\omega_2 + \frac{1}{2}\omega_2 + \frac{7}{6}\omega_3u^2 - \frac{1}{3}\omega_3^2c_s^2 - \frac{1}{2}u\omega_1 - \frac{1}{4}\omega_4\omega_1v^2 + \frac{1}{4}\omega_3\omega_4v^2\omega_2 - \frac{1}{4}\omega_3\omega_4v^2 + \frac{1}{4}\omega_4\omega_1v^2\omega_2 - \\
& \frac{5}{6}\omega_4\omega_2c_s^2 + \frac{1}{4}u\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_1c_s^2 + \frac{1}{6}u^2\omega_4\omega_1\omega_2 - \frac{1}{3}u^2\omega_4\omega_2 + \frac{1}{12}\omega_3^2u^2\omega_2 - \frac{1}{4}\omega_3\omega_2 - \frac{17}{12}\omega_3u^2\omega_4 + \frac{1}{12}\omega_3^2\omega_2c_s^2, \\
\alpha_{x+\delta_l,y+\delta_l}^{[\mu_2],t-2\delta_t} &= -2 + \frac{5}{3}\omega_3 + \frac{1}{12}\omega_3^2\omega_2 - \frac{7}{6}\omega_4\omega_1 - \frac{5}{3}\omega_3\omega_4 + \frac{5}{12}\omega_3\omega_4\omega_2 + \frac{5}{12}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_4^2 - \frac{1}{3}\omega_3\omega_1 + \frac{7}{3}\omega_4 - \frac{1}{2}\omega_4^2 - \\
& \frac{1}{2}\omega_1\omega_2 + \omega_1 - \frac{5}{6}\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_1 + \omega_2 + \frac{1}{12}\omega_3\omega_1\omega_2 + \frac{1}{4}\omega_4^2\omega_1 + \frac{1}{4}\omega_3^2\omega_4 - \frac{1}{3}\omega_3^2 - \frac{2}{3}\omega_3\omega_2, \\
\alpha_{x,y-\delta_l}^{[\mu_1],t-3\delta_t} &= -\frac{1}{6}\omega_3uu_1\omega_2 + \frac{2}{3}\omega_3uu_1^2 + \frac{1}{2}u\omega_1^2\omega_2 - \frac{1}{2}\omega_3uu_4\omega_1 - \frac{1}{2}\omega_3^2uu_4\omega_1 + \frac{7}{6}u\omega_4\omega_1\omega_2 - \frac{1}{6}\omega_3uu_1\omega_2 + \frac{1}{2}u\omega_4\omega_1^2 - \\
& \frac{10}{3}\omega_3uu_1 + \frac{4}{3}\omega_3\omega_1\omega_2 - \frac{19}{6}u\omega_4\omega_1 + \frac{2}{3}\omega_3^2u\omega_1 - \frac{1}{3}u\omega_4\omega_1^2\omega_2 - \frac{1}{2}\omega_3uu_4\omega_1^2 - u\omega_1^2 + 3u\omega_1 - \frac{3}{2}u\omega_1\omega_2 + \\
& \frac{10}{3}\omega_3uu_4\omega_1 - \frac{5}{6}\omega_3\omega_4\omega_1\omega_2 + \frac{5}{6}u\omega_4\omega_1^2, \\
\alpha_{x,y-\delta_l}^{[\mu_2],t-3\delta_t} &= 3 - \frac{10}{3}\omega_3 - \frac{1}{6}\omega_3^2\omega_2 + \frac{1}{6}\omega_3^2\omega_1\omega_2 + \omega_1^2 + \frac{1}{6}\omega_3\omega_1^2\omega_2 + 4\omega_4\omega_1 + \frac{10}{3}\omega_3\omega_4 - \frac{5}{6}\omega_3\omega_4\omega_2 - \frac{3}{2}\omega_4\omega_1\omega_2 - \frac{2}{3}\omega_3\omega_1^2 - \\
& \frac{1}{2}\omega_3\omega_4^2 - \frac{5}{6}\omega_4\omega_1^2 + 4\omega_3\omega_1 + \frac{1}{2}\omega_3^2\omega_4\omega_1 - \frac{19}{6}\omega_4 + \frac{1}{2}\omega_4^2 + 2\omega_1\omega_2 - 4\omega_1 + \frac{5}{6}\omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4^2\omega_1 - \frac{1}{2}\omega_1^2\omega_2 + \\
& \frac{7}{6}\omega_4\omega_2 - \frac{23}{6}\omega_3\omega_4\omega_1 - \frac{2}{3}\omega_3^2\omega_1 - \frac{3}{2}\omega_2 - \frac{3}{2}\omega_3\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 - \frac{1}{2}\omega_3^2\omega_4 + \frac{1}{3}\omega_4\omega_1^2\omega_2 + \frac{2}{3}\omega_3^2 + \frac{1}{2}\omega_3\omega_4\omega_1^2 + \frac{4}{3}\omega_3\omega_2, \\
\alpha_{x-\delta_l,y}^{[\mu_1],t-3\delta_t} &= -1 - \frac{1}{2}\omega_3^2\omega_4\omega_2c_s^2 + \frac{1}{2}\omega_3 + \frac{1}{2}\omega_3u^2\omega_4\omega_1 - \frac{5}{2}\omega_3u^2\omega_2 - \frac{1}{2}\omega_3^2u^2\omega_4\omega_2 - \frac{1}{2}\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4 - \\
& \frac{1}{2}\omega_3\omega_4\omega_1\omega_2c_s^2 - \frac{1}{2}u\omega_4\omega_1\omega_2^2 - \frac{5}{2}\omega_3\omega_2c_s^2 + \frac{1}{2}\omega_3^2u^2\omega_4 + \frac{1}{2}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4c_s^2 + 2u\omega_4\omega_1\omega_2 + \\
& \frac{1}{2}\omega_3u^2\omega_1\omega_2 - \frac{1}{2}\omega_3u^2\omega_4^2\omega_2 - \frac{1}{2}\omega_3\omega_4^2\omega_2c_s^2 + w_4 + 2\omega_3c_s^2 + \frac{1}{2}\omega_3u^2\omega_2^2 - \frac{1}{2}\omega_3^2u^2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4^2c_s^2 + \frac{1}{2}\omega_1 + \\
& \frac{1}{2}u\omega_4^2\omega_1 + \frac{1}{2}\omega_3\omega_1\omega_2c_s^2 - \frac{1}{2}\omega_3u^2\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_1\omega_2^2 - \frac{1}{2}\omega_3\omega_4\omega_2^2c_s^2 + \frac{1}{2}\omega_3u^2\omega_4^2 - \frac{1}{2}\omega_3u^2\omega_1 - \frac{1}{2}\omega_4^2\omega_1\omega_2 - \\
& \frac{3}{2}u\omega_4\omega_1 - \frac{5}{2}\omega_3\omega_4\omega_1^2 - \omega_4\omega_2 + 3\omega_3\omega_4\omega_2c_s^2 + \frac{1}{2}u\omega_1\omega_2^2 + 3\omega_3u^2\omega_4\omega_2 + w_2 + 2\omega_3u^2 - \frac{1}{2}\omega_3^2c_s^2 + u\omega_1 - \\
& \frac{1}{2}\omega_3u^2\omega_4\omega_2^2 + \frac{1}{2}\omega_3\omega_2^2c_s^2 - \frac{3}{2}u\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4\omega_1c_s^2 + \frac{1}{2}\omega_3^2u^2\omega_2 - \frac{1}{2}\omega_3\omega_2 - \frac{5}{2}\omega_3u^2\omega_4 + \frac{1}{2}\omega_3^2\omega_2c_s^2, \\
\alpha_{x-\delta_l,y}^{[\mu_2],t-3\delta_t} &= 3 - \frac{5}{2}\omega_3 - \frac{1}{2}\omega_3^2\omega_2 - \frac{1}{2}\omega_1\omega_2^2 + 2\omega_4\omega_1 + 3\omega_3\omega_4 - \frac{7}{2}\omega_3\omega_4\omega_2 - \frac{5}{2}\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4^2 + \frac{1}{2}\omega_4\omega_1\omega_2^2 + \\
& \frac{1}{2}\omega_3\omega_4\omega_2^2 + \frac{1}{2}\omega_3\omega_1 - 4\omega_4 + \omega_4^2 + 2\omega_1\omega_2 - \frac{3}{2}\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1\omega_2 - \omega_4^2\omega_2 + 5\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_2^2 - 4\omega_2 + \\
& \omega_2^2 - \frac{1}{2}\omega_3\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 - \frac{1}{2}\omega_3^2\omega_4 + \frac{1}{2}\omega_3^2 + \frac{1}{2}\omega_3\omega_4^2\omega_2 - \omega_4\omega_2^2 + 3\omega_3\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_2 + \frac{1}{2}\omega_4^2\omega_1\omega_2, \\
\alpha_{x,y}^{[\mu_1],t-3\delta_t} &= -\frac{2}{3}\omega_3^2u\omega_1\omega_2 + \frac{2}{3}\omega_3\omega_1u\omega_1^2 + u\omega_1^2\omega_2 + \frac{2}{3}u\omega_4\omega_1\omega_2 - \frac{2}{3}\omega_3uu_1\omega_2 - \frac{10}{3}\omega_3uu_1 + \frac{13}{3}\omega_3uu_1\omega_2 - \frac{2}{3}u\omega_4\omega_1 + \\
& \frac{2}{3}\omega_3^2u\omega_1 - \frac{1}{3}u\omega_4\omega_1\omega_2 + u\omega_1\omega_2^2 - u\omega_1^2 + 3u\omega_1 - 4u\omega_1\omega_2 + \frac{1}{3}\omega_3uu_4\omega_1 - \frac{1}{3}\omega_3uu_1\omega_2 - \omega_3uu_1\omega_2^2 + \frac{1}{3}u\omega_4\omega_1^2, \\
\alpha_{x,y}^{[\mu_2],t-3\delta_t} &= 3 - \frac{10}{3}\omega_3 - \frac{2}{3}\omega_3^2\omega_2 + \frac{2}{3}\omega_3^2\omega_1\omega_2 - \omega_1\omega_2^2 + \omega_1^2 + \frac{2}{3}\omega_3\omega_1^2\omega_2 + \omega_4\omega_1 + \frac{1}{3}\omega_3\omega_4 - \frac{1}{3}\omega_3\omega_4\omega_2 - \omega_4\omega_1\omega_2 - \\
& \frac{2}{3}\omega_3\omega_1^2 - \frac{1}{3}\omega_4\omega_1^2 + 4\omega_3\omega_1 - \frac{2}{3}\omega_4 + 5\omega_1\omega_2 - 4\omega_1 + \frac{1}{3}\omega_3\omega_4\omega_1\omega_2 - \omega_1\omega_2^2 + \frac{2}{3}\omega_4\omega_2 - \frac{1}{3}\omega_3\omega_4\omega_1 - \omega_3\omega_2^2 - \\
& \frac{2}{3}\omega_3\omega_1 + \omega_3\omega_1\omega_2^2 - 4\omega_2 + \omega_2^2 - 5\omega_3\omega_1\omega_2 + \frac{1}{3}\omega_4\omega_1^2\omega_2 + \frac{2}{3}\omega_3^2 + \frac{13}{3}\omega_3\omega_2, \\
\alpha_{x+\delta_l,y}^{[\mu_1],t-3\delta_t} &= 1 + \frac{1}{2}\omega_3^2\omega_4\omega_2c_s^2 - \frac{1}{2}\omega_3 - \frac{1}{2}\omega_3u^2\omega_4\omega_1 + \frac{5}{2}\omega_3u^2\omega_2 + \frac{1}{2}\omega_3^2u^2\omega_4\omega_2 + \frac{1}{2}\omega_4\omega_1 + \frac{1}{2}\omega_3\omega_4 + \\
& \frac{1}{2}\omega_3\omega_4\omega_1\omega_2c_s^2 - \frac{1}{2}u\omega_4\omega_1\omega_2^2 + \frac{5}{2}\omega_3\omega_2c_s^2 - \frac{1}{2}\omega_3^2u^2\omega_4 - \frac{1}{2}\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_2c_s^2 + 2u\omega_4\omega_1\omega_2 -
\end{aligned}$$

$$\begin{aligned}
& \frac{1}{2}\omega_3 u^2 \omega_1 \omega_2 + \frac{1}{2}\omega_3 u^2 \omega_4^2 \omega_2 + \frac{1}{2}\omega_3 \omega_4^2 \omega_2 c_s^2 - \omega_4 - 2\omega_3 c_s^2 - \frac{1}{2}\omega_3 u^2 \omega_2^2 + \frac{1}{2}\omega_3^2 u^2 + \frac{1}{2}\omega_1 \omega_2 - \frac{1}{2}\omega_3 \omega_4^2 c_s^2 - \frac{1}{2}\omega_1 + \\
& \frac{1}{2}u\omega_4^2 \omega_1 - \frac{1}{2}\omega_3 \omega_1 \omega_2 c_s^2 + \frac{1}{2}\omega_3 u^2 \omega_4 \omega_1 \omega_2 + \frac{1}{2}\omega_3 \omega_1 c_s^2 + \frac{1}{2}\omega_3 \omega_4 \omega_2^2 c_s^2 - \frac{1}{2}\omega_3 u^2 \omega_4^2 + \frac{1}{2}\omega_3 u^2 \omega_1 - \frac{1}{2}u\omega_4^2 \omega_1 \omega_2 - \\
& \frac{3}{2}u\omega_4 \omega_1 + \frac{5}{2}\omega_3 \omega_4 c_s^2 + \omega_4 \omega_2 - 3\omega_3 \omega_4 \omega_2 c_s^2 + \frac{1}{2}u\omega_1 \omega_2^2 - 3\omega_3 u^2 \omega_4 \omega_2 - \omega_2 - 2\omega_3 u^2 + \frac{1}{2}\omega_3^2 c_s^2 + u\omega_1 + \\
& \frac{1}{2}\omega_3 u^2 \omega_4 \omega_2^2 - \frac{1}{2}\omega_3 \omega_2^2 c_s^2 - \frac{3}{2}u\omega_1 \omega_2 - \frac{1}{2}\omega_3 \omega_4 \omega_1 c_s^2 - \frac{1}{2}\omega_3^2 u^2 \omega_2 + \frac{1}{2}\omega_3 \omega_2 + \frac{5}{2}\omega_3 u^2 \omega_4 - \frac{1}{2}\omega_3^2 \omega_2 c_s^2, \\
\alpha_{x+\delta_l, y}^{[\mu_2], t-3\delta_t} &= 3 - \frac{5}{2}\omega_3 - \frac{1}{2}\omega_3^2 \omega_2 - \frac{1}{2}\omega_1 \omega_2^2 + 2\omega_4 \omega_1 + 3\omega_3 \omega_4 - \frac{7}{2}\omega_3 \omega_4 \omega_2 - \frac{5}{2}\omega_4 \omega_1 \omega_2 - \frac{1}{2}\omega_3 \omega_4^2 + \frac{1}{2}\omega_4 \omega_1 \omega_2^2 + \\
& \frac{1}{2}\omega_3 \omega_4 \omega_2^2 + \frac{1}{2}\omega_3 \omega_1 - 4\omega_4 + \omega_4^2 + 2\omega_1 \omega_2 - \frac{3}{2}\omega_1 + \frac{1}{2}\omega_3 \omega_4 \omega_1 \omega_2 - \omega_4^2 \omega_2 + 5\omega_4 \omega_2 - \frac{1}{2}\omega_3 \omega_4 \omega_1 - \frac{1}{2}\omega_3 \omega_2^2 - 4\omega_2 + \\
& \omega_2^2 - \frac{1}{2}\omega_3 \omega_1 \omega_2 - \frac{1}{2}\omega_4^2 \omega_1 - \frac{1}{2}\omega_3^2 \omega_4 + \frac{1}{2}\omega_3^2 + \frac{1}{2}\omega_3 \omega_4^2 \omega_2 - \omega_4 \omega_2^2 + 3\omega_3 \omega_2 + \frac{1}{2}\omega_3^2 \omega_4 \omega_2 + \frac{1}{2}\omega_4^2 \omega_1 \omega_2, \\
\alpha_{x, y+\delta_l}^{[\mu_1], t-3\delta_t} &= -\frac{1}{6}\omega_3^2 u\omega_1 \omega_2 + \frac{2}{3}\omega_3 u\omega_1^2 + \frac{1}{2}u\omega_1^2 \omega_2 - \frac{1}{2}\omega_3 u\omega_4^2 \omega_1 - \frac{1}{2}\omega_3^2 u\omega_4 \omega_1 + \frac{7}{6}u\omega_4 \omega_1 \omega_2 - \frac{1}{6}\omega_3 u\omega_1^2 \omega_2 + \frac{1}{2}u\omega_4^2 \omega_1 - \\
& \frac{10}{3}\omega_3 u\omega_1 + \frac{4}{3}\omega_3 u\omega_1 \omega_2 - \frac{19}{6}u\omega_4 \omega_1 + \frac{2}{3}\omega_3^2 u\omega_1 - \frac{1}{3}u\omega_4 \omega_1^2 \omega_2 - \frac{1}{2}\omega_3 u\omega_4 \omega_1^2 - u\omega_1^2 + 3u\omega_1 - \frac{3}{2}u\omega_1 \omega_2 + \\
& \frac{10}{3}\omega_3 u\omega_4 \omega_1 - \frac{5}{6}\omega_3 u\omega_4 \omega_1 \omega_2 + \frac{5}{6}u\omega_4 \omega_1^2, \\
\alpha_{x, y+\delta_l}^{[\mu_2], t-3\delta_t} &= 3 - \frac{10}{3}\omega_3 - \frac{1}{6}\omega_3^2 \omega_2 + \frac{1}{6}\omega_3^2 \omega_1 \omega_2 + \omega_1^2 + \frac{1}{6}\omega_3 \omega_1^2 \omega_2 + 4\omega_4 \omega_1 + \frac{10}{3}\omega_3 \omega_4 - \frac{5}{6}\omega_3 \omega_4 \omega_2 - \frac{3}{2}\omega_4 \omega_1 \omega_2 - \frac{2}{3}\omega_3 \omega_1^2 - \\
& \frac{1}{2}\omega_3 \omega_2^2 - \frac{5}{6}\omega_4 \omega_1^2 + 4\omega_3 \omega_1 + \frac{1}{2}\omega_3^2 \omega_4 \omega_1 - \frac{19}{6}\omega_4 + \frac{1}{2}\omega_4^2 + 2\omega_1 \omega_2 - 4\omega_1 + \frac{5}{6}\omega_3 \omega_4 \omega_1 \omega_2 + \frac{1}{2}\omega_3 \omega_4^2 \omega_1 - \frac{1}{2}\omega_1^2 \omega_2 + \\
& \frac{5}{6}\omega_4 \omega_2 - \frac{23}{6}\omega_3 \omega_4 \omega_1 - \frac{2}{3}\omega_3^2 \omega_1 - \frac{3}{2}\omega_2 - \frac{3}{2}\omega_3 \omega_1 \omega_2 - \frac{1}{2}\omega_4^2 \omega_1 - \frac{1}{2}\omega_3^2 \omega_4 + \frac{1}{3}\omega_4 \omega_1^2 \omega_2 + \frac{2}{3}\omega_3^2 + \frac{1}{2}\omega_3 \omega_4 \omega_1^2 + \frac{4}{3}\omega_3 \omega_2, \\
\alpha_{x, y}^{[\mu_1], t-4\delta_t} &= -\omega_3 u\omega_4 \omega_1^2 \omega_2 + \omega_3^2 u\omega_1 \omega_2 - \omega_3 u\omega_1^2 - \omega_3 u\omega_4^2 \omega_1 \omega_2 - u\omega_1^2 \omega_2 + u\omega_4 \omega_1 \omega_2^2 + \omega_3 u\omega_4^2 \omega_1 + \omega_3^2 u\omega_4 \omega_1 - \\
& 6u\omega_4 \omega_1 \omega_2 + \omega_3 u\omega_1^2 \omega_2 - u\omega_4^2 \omega_1 + 5\omega_3 u\omega_1 - 6\omega_3 u\omega_1 \omega_2 + u\omega_4^2 \omega_1 \omega_2 + 5u\omega_4 \omega_1 - \omega_3 u\omega_4 \omega_1 \omega_2^2 - \omega_3^2 u\omega_1 + u\omega_4 \omega_1^2 \omega_2 - \\
& u\omega_1 \omega_2^2 + \omega_3 u\omega_4 \omega_1^2 + u\omega_1^2 - 4u\omega_1 + 5u\omega_1 \omega_2 - 6\omega_3 u\omega_4 \omega_1 - \omega_3 u\omega_4 \omega_1 \omega_2 + 7\omega_3 u\omega_4 \omega_1 \omega_2 + \omega_3 u\omega_1 \omega_2^2 - u\omega_4 \omega_1^2, \\
\alpha_{x, y}^{[\mu_2], t-4\delta_t} &= -4 + 5\omega_3 + \omega_3^2 \omega_2 - \omega_3^2 \omega_1 \omega_2 + \omega_1 \omega_2^2 + \omega_3 \omega_4 \omega_1 \omega_2^2 - \omega_1^2 - \omega_3 \omega_1^2 \omega_2 - 6\omega_4 \omega_1 - 6\omega_3 \omega_4 + 7\omega_3 \omega_4 \omega_2 + 7\omega_4 \omega_1 \omega_2 + \\
& \omega_3 \omega_1^2 + \omega_3 \omega_2^2 + \omega_4 \omega_1^2 - \omega_4 \omega_1 \omega_2^2 - \omega_3 \omega_4 \omega_2^2 - 6\omega_3 \omega_1 - \omega_3^2 \omega_4 \omega_1 + 5\omega_4 - \omega_4^2 - 6\omega_1 \omega_2 + 5\omega_1 - 8\omega_3 \omega_4 \omega_1 \omega_2 + \\
& \omega_4^2 \omega_2 - \omega_3 \omega_4^2 \omega_1 + \omega_3 \omega_4 \omega_1^2 \omega_2 + \omega_1^2 \omega_2 - 6\omega_4 \omega_2 + 7\omega_3 \omega_4 \omega_1 + \omega_3 \omega_2^2 + \omega_3 \omega_4^2 \omega_1 \omega_2 + \omega_3^2 \omega_1 - \omega_3 \omega_1 \omega_2^2 + 5\omega_2 - \omega_2^2 + \\
& 7\omega_3 \omega_1 \omega_2 + \omega_4^2 \omega_1 + \omega_3^2 \omega_4 - \omega_4 \omega_1^2 \omega_2 - \omega_3^2 - \omega_3 \omega_4^2 \omega_2 + \omega_4 \omega_2^2 - \omega_3 \omega_4 \omega_1^2 - 6\omega_3 \omega_2 - \omega_3^2 \omega_4 \omega_2 - \omega_4^2 \omega_1 \omega_2 + \omega_3^2 \omega_4 \omega_1 \omega_2,
\end{aligned}$$

## 5.4 EFDE for $\mu_3$

$$\mu_{3, x, y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i, j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l, y+j\delta_l}^{[\mu_1], t-\ell\delta_t} \mu_{x+i\delta_l, y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i, j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l, y+j\delta_l}^{[\mu_3], t-\ell\delta_t} \mu_{3, x+i\delta_l, y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\begin{aligned}
\alpha_{x, y-\delta_l}^{[\mu_1], t} &= 1 + \frac{5}{6}\omega_4 c_s^2 + \frac{1}{2}v\omega_2 - \frac{1}{2}\omega_4 - \frac{1}{3}\omega_3 c_s^2 + \frac{1}{3}u^2 \omega_4 + \frac{1}{2}\omega_4 v^2 - \frac{1}{2}\omega_2 - \frac{1}{3}\omega_3 u^2. \\
\alpha_{x, y+\delta_l}^{[\mu_1], t} &= -1 - \frac{5}{6}\omega_4 c_s^2 + \frac{1}{2}v\omega_2 + \frac{1}{2}\omega_4 + \frac{1}{3}\omega_3 c_s^2 - \frac{1}{3}u^2 \omega_4 - \frac{1}{2}\omega_4 v^2 + \frac{1}{2}\omega_2 + \frac{1}{3}\omega_3 u^2. \\
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_1], t-\delta_t} &= -1 + \frac{5}{6}\omega_3 + \frac{1}{4}\omega_3 u^2 \omega_2 - \frac{1}{12}\omega_4 \omega_1 - \frac{1}{12}\omega_3 \omega_4 + \frac{1}{4}\omega_3 \omega_2 c_s^2 - \frac{1}{6}\omega_3 \omega_1 + \frac{1}{6}\omega_4 - \frac{1}{2}\omega_3 c_s^2 + \frac{1}{6}\omega_3^2 u^2 - \frac{1}{4}\omega_1 \omega_2 + \\
& \frac{1}{2}\omega_1 + \frac{1}{6}\omega_3 u\omega_1 + \frac{1}{12}u\omega_4 \omega_1 + \frac{1}{12}\omega_3 \omega_4 c_s^2 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3 u^2 + \frac{1}{6}\omega_3^2 c_s^2 - \frac{1}{2}u\omega_1 + \frac{1}{4}u\omega_1 \omega_2 - \frac{1}{6}\omega_3^2 - \frac{1}{4}\omega_3 \omega_2 + \frac{1}{12}\omega_3 u^2 \omega_4, \\
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_3], t-\delta_t} &= 1 - \frac{5}{6}\omega_3 + \frac{1}{12}\omega_4 \omega_1 + \frac{1}{12}\omega_3 \omega_4 + \frac{1}{6}\omega_3 \omega_1 - \frac{1}{6}\omega_4 + \frac{1}{4}\omega_1 \omega_2 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{6}\omega_3^2 + \frac{1}{4}\omega_3 \omega_2, \\
\alpha_{x, y-\delta_l}^{[\mu_1], t-\delta_t} &= -1 + \frac{5}{3}\omega_4 c_s^2 - \frac{1}{6}\omega_3 u^2 \omega_2 - \frac{1}{3}u^2 \omega_4^2 - \frac{1}{6}\omega_3 \omega_2 c_s^2 + \frac{1}{2}\omega_4 + \frac{1}{3}\omega_3 c_s^2 + \frac{2}{3}u^2 \omega_4 + \omega_4 v^2 - \frac{1}{2}\omega_4^2 v^2 - \\
& \frac{1}{6}\omega_3 \omega_4 c_s^2 - \frac{1}{2}\omega_4 v^2 \omega_2 + \frac{1}{2}\omega_2 + \frac{1}{3}\omega_3 u^2 - \frac{5}{6}\omega_4^2 c_s^2 - \frac{5}{6}\omega_4 \omega_2 c_s^2 - \frac{1}{3}u^2 \omega_4 \omega_2 - \frac{1}{6}\omega_3 u^2 \omega_4, \\
\alpha_{x, y-\delta_l}^{[\mu_3], t-\delta_t} &= 1 - \frac{3}{2}\omega_4 + \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_4 \omega_2 - \frac{1}{2}\omega_2,
\end{aligned}$$







$$\begin{aligned}
& \frac{7}{6}\omega_4\omega_2 - \frac{23}{6}\omega_3\omega_4\omega_1 - \frac{2}{3}\omega_3^2\omega_1 - \frac{3}{2}\omega_2 - \frac{3}{2}\omega_3\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 - \frac{1}{2}\omega_3^2\omega_4 + \frac{1}{3}\omega_4\omega_1^2\omega_2 + \frac{2}{3}\omega_3^2 + \frac{1}{2}\omega_3\omega_4\omega_1^2 + \frac{4}{3}\omega_3\omega_2, \\
\alpha_{x,y}^{[\mu_1],t-4\delta_t} &= -\omega_4v\omega_2^2 + \omega_3\omega_1^2vw_2 - \omega_3\omega_4^2\omega_1vw_2 - 6\omega_4\omega_1vw_2 - 4vw_2 - 6\omega_3\omega_4vw_2 + \omega_3^2\omega_1vw_2 - \omega_1^2vw_2 - \omega_3\omega_4\omega_1^2vw_2 - \omega_3^2v\omega_2 + v\omega_2^2 + \omega_4\omega_1v\omega_2^2 + \omega_3\omega_4v\omega_2^2 + 5\omega_4vw_2 + 7\omega_3\omega_4\omega_1vw_2 + 5\omega_3vw_2 + 5\omega_1vw_2 + \omega_3\omega_1vw_2^2 + \omega_4^2\omega_1vw_2 - \omega_3^2\omega_4\omega_1vw_2 + \omega_3^2\omega_4vw_2 - \omega_4^2vw_2 - 6\omega_3\omega_1vw_2 + \omega_3\omega_4^2vw_2 + \omega_4\omega_1^2vw_2 - \omega_3vw_2^2 - \omega_3\omega_4\omega_1vw_2^2 - \omega_1vw_2^2, \\
\alpha_{x,y}^{[\mu_3],t-4\delta_t} &= -4 + 5\omega_3 + \omega_3^2\omega_2 - \omega_3^2\omega_1\omega_2 + \omega_1\omega_2^2 + \omega_3\omega_4\omega_1\omega_2^2 - \omega_1^2 - \omega_3\omega_1^2\omega_2 - 6\omega_4\omega_1 - 6\omega_3\omega_4 + 7\omega_3\omega_4\omega_2 + 7\omega_4\omega_1\omega_2 + \omega_3\omega_1^2 + \omega_3\omega_4^2 + \omega_4\omega_1^2 - \omega_4\omega_1\omega_2^2 - \omega_3\omega_4\omega_2^2 - 6\omega_3\omega_1 - \omega_3^2\omega_4\omega_1 + 5\omega_4 - \omega_4^2 - 6\omega_1\omega_2 + 5\omega_1 - 8\omega_3\omega_4\omega_1\omega_2 + \omega_4^2\omega_2 - \omega_3\omega_4^2\omega_1 + \omega_3\omega_4\omega_1^2\omega_2 + \omega_1^2\omega_2 - 6\omega_4\omega_2 + 7\omega_3\omega_4\omega_1 + \omega_3\omega_2^2 + \omega_3\omega_4^2\omega_1\omega_2 + \omega_3^2\omega_1 - \omega_3\omega_1\omega_2^2 + 5\omega_2 - \omega_2^2 + 7\omega_3\omega_1\omega_2 + \omega_4^2\omega_1 + \omega_3^2\omega_4 - \omega_4\omega_1^2\omega_2 - \omega_3^2 - \omega_3\omega_4\omega_2 + \omega_4\omega_2^2 - \omega_3\omega_4\omega_1^2 - 6\omega_3\omega_2 - \omega_3^2\omega_4\omega_2 - \omega_4^2\omega_1\omega_2 + \omega_3^2\omega_4\omega_1\omega_2,
\end{aligned}$$

## 5.5 EFDE for $\mu_4$

$$\mu_{4,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_4],t-\ell\delta_t} \mu_{4,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\begin{aligned}
\alpha_{x-\delta_l,y}^{[\mu_1],t} &= 1 - \frac{1}{2}\omega_3 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3u^2 + \frac{1}{2}u\omega_1. \\
\alpha_{x+\delta_l,y}^{[\mu_1],t} &= 1 - \frac{1}{2}\omega_3 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3u^2 - \frac{1}{2}u\omega_1. \\
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{2}\omega_3 - \frac{5}{6}\omega_4c_s^2 - \frac{1}{2}v\omega_2 - \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4 + \frac{1}{6}u^2\omega_4\omega_1 + \frac{1}{2}\omega_4 + \frac{1}{3}\omega_3c_s^2 - \frac{1}{6}\omega_3^2u^2 - \frac{1}{3}u^2\omega_4 - \frac{1}{2}\omega_4v^2 - \frac{1}{4}\omega_1\omega_2 + \frac{1}{2}\omega_1 - \frac{1}{6}\omega_3\omega_1c_s^2 + \frac{1}{4}\omega_3vw_2 - \frac{1}{6}\omega_3u^2\omega_1 + \frac{5}{12}\omega_4\omega_1c_s^2 + \frac{1}{4}\omega_1vw_2 + \frac{5}{12}\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_2 + \frac{1}{3}\omega_3u^2 - \frac{1}{6}\omega_3^2c_s^2 + \frac{1}{4}\omega_4\omega_1v^2 + \frac{1}{4}\omega_3\omega_4v^2 - \frac{1}{4}\omega_3\omega_2 + \frac{1}{6}\omega_3u^2\omega_4, \\
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_4],t-\delta_t} &= 1 - \frac{5}{6}\omega_3 + \frac{1}{12}\omega_4\omega_1 + \frac{1}{12}\omega_3\omega_4 + \frac{1}{6}\omega_3\omega_1 - \frac{1}{6}\omega_4 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{6}\omega_3^2 + \frac{1}{4}\omega_3\omega_2, \\
\alpha_{x,y-\delta_l}^{[\mu_4],t-\delta_t} &= 1 - \frac{3}{2}\omega_4 + \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_4\omega_2 - \frac{1}{2}\omega_2, \\
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{2}\omega_3 - \frac{5}{6}\omega_4c_s^2 - \frac{1}{2}v\omega_2 - \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4 + \frac{1}{6}u^2\omega_4\omega_1 + \frac{1}{2}\omega_4 + \frac{1}{3}\omega_3c_s^2 - \frac{1}{6}\omega_3^2u^2 - \frac{1}{3}u^2\omega_4 - \frac{1}{2}\omega_4v^2 - \frac{1}{4}\omega_1\omega_2 + \frac{1}{2}\omega_1 - \frac{1}{6}\omega_3\omega_1c_s^2 + \frac{1}{4}\omega_3vw_2 - \frac{1}{6}\omega_3u^2\omega_1 + \frac{5}{12}\omega_4\omega_1c_s^2 + \frac{1}{4}\omega_1vw_2 + \frac{5}{12}\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_2 + \frac{1}{3}\omega_3u^2 - \frac{1}{6}\omega_3^2c_s^2 + \frac{1}{4}\omega_4\omega_1v^2 + \frac{1}{4}\omega_3\omega_4v^2 - \frac{1}{4}\omega_3\omega_2 + \frac{1}{6}\omega_3u^2\omega_4, \\
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_4],t-\delta_t} &= 1 - \frac{5}{6}\omega_3 + \frac{1}{12}\omega_4\omega_1 + \frac{1}{12}\omega_3\omega_4 + \frac{1}{6}\omega_3\omega_1 - \frac{1}{6}\omega_4 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{6}\omega_3^2 + \frac{1}{4}\omega_3\omega_2, \\
\alpha_{x-\delta_l,y}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{2}\omega_3 + \frac{5}{3}\omega_4c_s^2 - \frac{1}{3}u^2\omega_4\omega_1 + \frac{1}{3}\omega_3c_s^2 - \frac{1}{6}\omega_3^2u^2 + \frac{2}{3}u^2\omega_4 + \omega_4v^2 + \frac{1}{2}\omega_1 - \frac{1}{6}\omega_3\omega_1c_s^2 - \frac{1}{6}\omega_3u^2\omega_1 - \frac{5}{6}\omega_4\omega_1c_s^2 - \frac{5}{6}\omega_3\omega_4c_s^2 + \frac{1}{3}\omega_3u^2 - \frac{1}{6}\omega_3^2c_s^2 - \frac{1}{2}\omega_4\omega_1v^2 - \frac{1}{2}\omega_3\omega_4v^2 - \frac{1}{3}\omega_3u^2\omega_4, \\
\alpha_{x-\delta_l,y}^{[\mu_4],t-\delta_t} &= 1 - \frac{5}{6}\omega_3 + \frac{1}{3}\omega_4\omega_1 + \frac{1}{3}\omega_3\omega_4 + \frac{1}{6}\omega_3\omega_1 - \frac{2}{3}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{6}\omega_3^2, \\
\alpha_{x,y}^{[\mu_1],t-\delta_t} &= -2 + \omega_3 - \omega_1^2 - \omega_3\omega_1 - \omega_3c_s^2 + 3\omega_1 + \omega_3\omega_1c_s^2 + \omega_3u^2\omega_1 - \omega_3u^2, \\
\alpha_{x,y}^{[\mu_4],t-\delta_t} &= 2 + \omega_1^2 - 2\omega_1 - 2\omega_2 + \omega_2^2, \\
\alpha_{x+\delta_l,y}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{2}\omega_3 + \frac{5}{3}\omega_4c_s^2 - \frac{1}{3}u^2\omega_4\omega_1 + \frac{1}{3}\omega_3c_s^2 - \frac{1}{6}\omega_3^2u^2 + \frac{2}{3}u^2\omega_4 + \omega_4v^2 + \frac{1}{2}\omega_1 - \frac{1}{6}\omega_3\omega_1c_s^2 - \frac{1}{6}\omega_3u^2\omega_1 - \frac{5}{6}\omega_4\omega_1c_s^2 - \frac{5}{6}\omega_3\omega_4c_s^2 + \frac{1}{3}\omega_3u^2 - \frac{1}{6}\omega_3^2c_s^2 - \frac{1}{2}\omega_4\omega_1v^2 - \frac{1}{2}\omega_3\omega_4v^2 - \frac{1}{3}\omega_3u^2\omega_4, \\
\alpha_{x+\delta_l,y}^{[\mu_4],t-\delta_t} &= 1 - \frac{5}{6}\omega_3 + \frac{1}{3}\omega_4\omega_1 + \frac{1}{3}\omega_3\omega_4 + \frac{1}{6}\omega_3\omega_1 - \frac{2}{3}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{6}\omega_3^2,
\end{aligned}$$



$$\begin{aligned}
\alpha_{x,y}^{[\mu_1],t-2\delta_t} &= 2 - \omega_3 - \frac{2}{3}\omega_3u^2\omega_4\omega_1 + \omega_1^2 - \frac{10}{3}\omega_4c_s^2 - \omega_4\omega_1^2v^2 - \frac{2}{3}u^2\omega_4\omega_1^2 + 2u^2\omega_4\omega_1 - \frac{1}{3}\omega_3^2u^2\omega_1 + \omega_3\omega_1 - \frac{2}{3}\omega_3c_s^2 + \\
&\quad \frac{1}{3}\omega_3^2u^2 - \frac{4}{3}u^2\omega_4 - 2\omega_4v^2 - 3\omega_1 - \frac{5}{3}\omega_4\omega_1^2c_s^2 + \omega_3\omega_1c_s^2 + \omega_3u^2\omega_1 + 5\omega_4\omega_1c_s^2 + \frac{5}{3}\omega_3\omega_4c_s^2 - \frac{1}{3}\omega_3\omega_1^2c_s^2 - \\
&\quad \omega_3\omega_4\omega_1v^2 - \frac{1}{3}\omega_3^2\omega_1c_s^2 - \frac{2}{3}\omega_3u^2 + \frac{1}{3}\omega_3^2c_s^2 + 3\omega_4\omega_1v^2 + \omega_3\omega_4v^2 - \frac{5}{3}\omega_3\omega_4\omega_1c_s^2 + \frac{2}{3}\omega_3u^2\omega_4 - \frac{1}{3}\omega_3u^2\omega_1^2, \\
\alpha_{x,y}^{[\mu_4],t-2\delta_t} &= -4 + \frac{5}{3}\omega_3 - \omega_1^2 - 2\omega_4\omega_1 - \frac{2}{3}\omega_3\omega_4 + \frac{1}{3}\omega_3\omega_1^2 + \frac{2}{3}\omega_4\omega_1^2 - 2\omega_3\omega_1 + \frac{13}{3}\omega_4 - \omega_4^2 + 3\omega_1 + \omega_4^2\omega_2 - 4\omega_4\omega_2 + \\
&\quad \frac{2}{3}\omega_3\omega_4\omega_1 + \frac{1}{3}\omega_3^2\omega_1 + 3\omega_2 - \omega_2^2 - \frac{5}{3}\omega_3^2 + \omega_4\omega_2^2, \\
\alpha_{x+\delta_l,y}^{[\mu_1],t-2\delta_t} &= 1 - \frac{1}{2}\omega_3 + \frac{5}{3}\omega_4c_s^2 + \frac{5}{3}\omega_3u^2\omega_2 + \frac{1}{2}\omega_4\omega_1 + \frac{1}{2}\omega_3\omega_4 + \frac{5}{3}\omega_3\omega_2c_s^2 - \frac{1}{2}\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_4\omega_1\omega_2 - \frac{1}{3}u^2\omega_4\omega_1 - \\
&\quad \frac{1}{3}\omega_3u^2\omega_1\omega_2 - \omega_4 - \frac{7}{6}\omega_3c_s^2 - \frac{1}{2}\omega_3u^2\omega_2^2 + \frac{1}{3}\omega_3^2u^2 + \frac{2}{3}u^2\omega_4 + \omega_4v^2 + \frac{1}{2}\omega_1\omega_2 - \frac{1}{2}\omega_1 - \frac{1}{3}\omega_3\omega_1\omega_2c_s^2 + \\
&\quad \frac{1}{3}\omega_3\omega_1c_s^2 + \frac{1}{3}\omega_3u^2\omega_1 - \frac{5}{6}\omega_4\omega_1c_s^2 - \frac{5}{6}\omega_3\omega_4c_s^2 + \omega_4\omega_2 + \frac{5}{6}\omega_3\omega_4\omega_2c_s^2 + \frac{5}{6}\omega_4\omega_1\omega_2c_s^2 - \omega_4v^2\omega_2 + \frac{1}{2}u\omega_1\omega_2^2 + \\
&\quad \frac{1}{3}\omega_3u^2\omega_4\omega_2 - \omega_2 - \frac{7}{6}\omega_3u^2 + \frac{1}{3}\omega_3^2c_s^2 + \frac{1}{2}u\omega_1 - \frac{1}{2}\omega_4\omega_1v^2 + \frac{1}{2}\omega_3\omega_4v^2\omega_2 - \frac{1}{2}\omega_3\omega_4v^2 + \frac{1}{2}\omega_4\omega_1v^2\omega_2 - \\
&\quad \frac{5}{3}\omega_4\omega_2c_s^2 - \frac{1}{2}\omega_3\omega_2c_s^2 - u\omega_1\omega_2 + \frac{1}{3}u^2\omega_4\omega_1\omega_2 - \frac{2}{3}u^2\omega_4\omega_2 - \frac{1}{3}\omega_3^2u^2\omega_2 + \frac{1}{2}\omega_3\omega_2 - \frac{1}{3}\omega_3u^2\omega_4 - \frac{1}{3}\omega_3^2\omega_2c_s^2, \\
\alpha_{x+\delta_l,y}^{[\mu_4],t-2\delta_t} &= -2 + \frac{5}{3}\omega_3 + \frac{1}{3}\omega_3^2\omega_2 + \frac{1}{2}\omega_1\omega_2^2 - \frac{1}{6}\omega_4\omega_1 - \frac{1}{6}\omega_3\omega_4 + \frac{1}{6}\omega_3\omega_4\omega_2 + \frac{1}{6}\omega_4\omega_1\omega_2 - \frac{1}{3}\omega_3\omega_1 + \frac{1}{3}\omega_4 - \frac{3}{2}\omega_1\omega_2 + \\
&\quad \omega_1 - \frac{1}{3}\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_2^2 + 3\omega_2 - \omega_2^2 + \frac{1}{3}\omega_3\omega_1\omega_2 - \frac{1}{3}\omega_3^2 - \frac{13}{6}\omega_3\omega_2, \\
\alpha_{x-\delta_l,y+\delta_l}^{[\mu_1],t-2\delta_t} &= 1 - \frac{1}{2}\omega_3 - \frac{1}{4}\omega_3u^2\omega_4\omega_1 - \frac{5}{6}\omega_4c_s^2 - \frac{1}{4}\omega_4\omega_1v\omega_2 + \frac{5}{12}\omega_3u^2\omega_2 - \frac{1}{2}v\omega_2 - \frac{1}{4}\omega_3\omega_4v\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4 + \\
&\quad \frac{5}{12}\omega_3\omega_2c_s^2 - \frac{1}{4}\omega_3^2u^2\omega_4 + \frac{1}{6}u^2\omega_4\omega_1 - \frac{1}{4}\omega_3^2\omega_4c_s^2 - \frac{1}{4}u\omega_4\omega_1\omega_2 - \frac{1}{12}\omega_3u^2\omega_1\omega_2 - \frac{1}{2}\omega_4 - \frac{7}{6}\omega_3c_s^2 + \frac{1}{3}\omega_3^2u^2 - \\
&\quad \frac{1}{3}u^2\omega_4 - \frac{1}{2}\omega_4v^2 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_4^2c_s^2 - \frac{1}{2}\omega_1 - \frac{1}{4}u\omega_2^2\omega_1 - \frac{1}{12}\omega_3\omega_1\omega_2c_s^2 + \frac{1}{3}\omega_3\omega_1c_s^2 + \frac{1}{2}\omega_4v\omega_2 + \frac{1}{4}\omega_3v\omega_2 - \\
&\quad \frac{1}{3}\omega_3u^2\omega_2^2 + \frac{1}{3}\omega_3u^2\omega_1 + \frac{5}{12}\omega_4\omega_1c_s^2 + \frac{1}{4}\omega_1\omega_2 + \frac{3}{4}u\omega_4\omega_1 + \frac{5}{3}\omega_3\omega_4c_s^2 - \frac{2}{3}\omega_3\omega_4\omega_2c_s^2 - \frac{5}{12}\omega_4\omega_1\omega_2c_s^2 + \\
&\quad \frac{1}{4}\omega_4v^2\omega_2 - \frac{5}{12}\omega_3u^2\omega_4\omega_2 - \frac{1}{2}\omega_2 - \frac{7}{6}\omega_3u^2 + \frac{1}{3}\omega_3^2c_s^2 - \frac{1}{2}u\omega_1 + \frac{1}{4}\omega_4\omega_1v^2 - \frac{1}{4}\omega_3\omega_4v^2\omega_2 + \frac{1}{4}\omega_3\omega_4v^2 + \frac{1}{4}\omega_4\omega_1v^2\omega_2 + \\
&\quad \frac{5}{6}\omega_4\omega_2c_s^2 + \frac{1}{4}u\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_4\omega_1c_s^2 - \frac{1}{6}u^2\omega_4\omega_1\omega_2 + \frac{1}{3}u^2\omega_4\omega_2 - \frac{1}{12}\omega_3^2u^2\omega_2 + \frac{1}{4}\omega_3\omega_2 + \frac{17}{12}\omega_3u^2\omega_4 - \frac{1}{12}\omega_3^2\omega_2c_s^2, \\
\alpha_{x-\delta_l,y+\delta_l}^{[\mu_4],t-2\delta_t} &= -2 + \frac{5}{3}\omega_3 + \frac{1}{12}\omega_3^2\omega_2 - \frac{7}{6}\omega_4\omega_1 - \frac{5}{3}\omega_3\omega_4 + \frac{5}{12}\omega_3\omega_4\omega_2 + \frac{5}{12}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_4^2 - \frac{1}{3}\omega_3\omega_1 + \frac{7}{3}\omega_4 - \frac{1}{2}\omega_4^2 - \\
&\quad \frac{1}{2}\omega_1\omega_2 + \omega_1 - \frac{5}{6}\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_1 + \omega_2 + \frac{1}{12}\omega_3\omega_1\omega_2 + \frac{1}{4}\omega_4^2\omega_1 + \frac{1}{4}\omega_3^2\omega_4 - \frac{1}{3}\omega_3^2 - \frac{2}{3}\omega_3\omega_2, \\
\alpha_{x,y+\delta_l}^{[\mu_1],t-2\delta_t} &= 2 - \omega_3 + \frac{1}{3}\omega_3u^2\omega_4\omega_1 + \omega_1^2 + \frac{5}{3}\omega_4c_s^2 - v\omega_2 + \frac{1}{2}\omega_4\omega_1^2v^2 + \frac{3}{2}\omega_4\omega_1 + \frac{1}{3}u^2\omega_4\omega_1^2 + \frac{1}{2}\omega_3\omega_4 - \frac{1}{2}\omega_4\omega_1^2 - \frac{1}{2}\omega_1^2v\omega_2 - u^2\omega_4\omega_1 - \\
&\quad \frac{1}{3}\omega_3^2u^2\omega_1 + \omega_3\omega_1 - \omega_4 - \frac{2}{3}\omega_3c_s^2 + \frac{1}{3}\omega_3^2u^2 + \frac{2}{3}u^2\omega_4 + \omega_4v^2 + \frac{3}{2}\omega_1\omega_2 - 3\omega_1 + \frac{5}{6}\omega_4\omega_1^2c_s^2 + \omega_3\omega_1c_s^2 + \frac{1}{2}\omega_3v\omega_2 + \\
&\quad \omega_3u^2\omega_1 - \frac{5}{2}\omega_4\omega_1c_s^2 + \frac{3}{2}\omega_1v\omega_2 - \frac{1}{2}\omega_1^2\omega_2 - \frac{5}{6}\omega_3\omega_4c_s^2 - \frac{1}{3}\omega_3\omega_1^2c_s^2 - \frac{1}{2}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1v^2 - \frac{1}{3}\omega_3\omega_1c_s^2 - \omega_2 - \\
&\quad \frac{2}{3}\omega_3u^2 + \frac{1}{3}\omega_3^2c_s^2 - \frac{1}{2}\omega_3\omega_1\omega_2 - \frac{3}{2}\omega_4\omega_1v^2 - \frac{1}{2}\omega_3\omega_4v^2 + \frac{5}{6}\omega_3\omega_4\omega_1c_s^2 - \frac{1}{2}\omega_3\omega_1v\omega_2 + \frac{1}{2}\omega_3\omega_2 - \frac{1}{3}\omega_3u^2\omega_4 - \frac{1}{3}\omega_3u^2\omega_1^2, \\
\alpha_{x,y+\delta_l}^{[\mu_4],t-2\delta_t} &= -2 + \frac{5}{3}\omega_3 - \omega_1^2 - \frac{1}{2}\omega_4\omega_1 - \frac{1}{6}\omega_3\omega_4 + \frac{1}{3}\omega_3\omega_1^2 + \frac{1}{6}\omega_4\omega_1^2 - 2\omega_3\omega_1 + \frac{1}{3}\omega_4 - \frac{3}{2}\omega_1\omega_2 + 3\omega_1 + \frac{1}{2}\omega_1^2\omega_2 + \\
&\quad \frac{1}{6}\omega_3\omega_4\omega_1 + \frac{1}{3}\omega_3^2\omega_1 + \omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2 - \frac{1}{3}\omega_3^2 - \frac{1}{2}\omega_3\omega_2, \\
\alpha_{x+\delta_l,y+\delta_l}^{[\mu_1],t-2\delta_t} &= 1 - \frac{1}{2}\omega_3 - \frac{1}{4}\omega_3u^2\omega_4\omega_1 - \frac{5}{6}\omega_4c_s^2 - \frac{1}{4}\omega_4\omega_1v\omega_2 + \frac{5}{12}\omega_3u^2\omega_2 - \frac{1}{2}v\omega_2 - \frac{1}{4}\omega_3\omega_4v\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4 + \\
&\quad \frac{5}{12}\omega_3\omega_2c_s^2 - \frac{1}{4}\omega_3^2u^2\omega_4 + \frac{1}{6}u^2\omega_4\omega_1 - \frac{1}{4}\omega_3^2\omega_4c_s^2 + \frac{1}{4}u\omega_4\omega_1\omega_2 - \frac{1}{12}\omega_3u^2\omega_1\omega_2 - \frac{1}{2}\omega_4 - \frac{7}{6}\omega_3c_s^2 + \frac{1}{3}\omega_3^2u^2 - \\
&\quad \frac{1}{3}u^2\omega_4 - \frac{1}{2}\omega_4v^2 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_4^2c_s^2 - \frac{1}{2}\omega_1 + \frac{1}{4}u\omega_2^2\omega_1 - \frac{1}{12}\omega_3\omega_1\omega_2c_s^2 + \frac{1}{3}\omega_3\omega_1c_s^2 + \frac{1}{2}\omega_4v\omega_2 + \frac{1}{4}\omega_3v\omega_2 - \\
&\quad \frac{1}{4}\omega_3u^2\omega_4^2 + \frac{1}{3}\omega_3u^2\omega_1 + \frac{5}{12}\omega_4\omega_1c_s^2 + \frac{1}{4}\omega_1\omega_2 + \frac{3}{4}u\omega_4\omega_1 + \frac{5}{3}\omega_3\omega_4c_s^2 - \frac{2}{3}\omega_3\omega_4\omega_2c_s^2 - \frac{5}{12}\omega_4\omega_1\omega_2c_s^2 + \\
&\quad \frac{1}{2}\omega_4v^2\omega_2 - \frac{5}{12}\omega_3u^2\omega_4\omega_2 - \frac{1}{2}\omega_2 - \frac{7}{6}\omega_3u^2 + \frac{1}{3}\omega_3^2c_s^2 + \frac{1}{2}u\omega_1 + \frac{1}{4}\omega_4\omega_1v^2 - \frac{1}{4}\omega_3\omega_4v^2\omega_2 + \frac{1}{4}\omega_3\omega_4v^2 + \frac{1}{4}\omega_4\omega_1v^2\omega_2 + \\
&\quad \frac{5}{6}\omega_4\omega_2c_s^2 - \frac{1}{4}u\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_4\omega_1c_s^2 - \frac{1}{6}u^2\omega_4\omega_1\omega_2 + \frac{1}{3}u^2\omega_4\omega_2 - \frac{1}{12}\omega_3^2u^2\omega_2 + \frac{1}{4}\omega_3\omega_2 + \frac{17}{12}\omega_3u^2\omega_4 - \frac{1}{12}\omega_3^2\omega_2c_s^2, \\
\alpha_{x+\delta_l,y+\delta_l}^{[\mu_4],t-2\delta_t} &= -2 + \frac{5}{3}\omega_3 + \frac{1}{12}\omega_3^2\omega_2 - \frac{7}{6}\omega_4\omega_1 - \frac{5}{3}\omega_3\omega_4 + \frac{5}{12}\omega_3\omega_4\omega_2 + \frac{5}{12}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_4^2 - \frac{1}{3}\omega_3\omega_1 + \frac{7}{3}\omega_4 - \frac{1}{2}\omega_4^2 - \\
&\quad \frac{1}{2}\omega_1\omega_2 + \omega_1 - \frac{5}{6}\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_1 + \omega_2 + \frac{1}{12}\omega_3\omega_1\omega_2 + \frac{1}{4}\omega_4^2\omega_1 + \frac{1}{4}\omega_3^2\omega_4 - \frac{1}{3}\omega_3^2 - \frac{2}{3}\omega_3\omega_2, \\
\alpha_{x,y-\delta_l}^{[\mu_1],t-2\delta_t} &= -2 - \frac{1}{2}\omega_4\omega_1^2v^2\omega_2 + \omega_3 - \frac{1}{2}\omega_3\omega_4^2\omega_1c_s^2 + \frac{10}{3}\omega_3u^2\omega_4\omega_1 - \omega_1^2 + \frac{5}{3}\omega_4c_s^2 - \frac{3}{2}\omega_4\omega_1v\omega_2 - \frac{5}{6}\omega_3u^2\omega_2 - \\
&\quad uv_2 + \frac{1}{2}\omega_4\omega_1^2v^2 - \frac{1}{2}\omega_3\omega_4v\omega_2 - \frac{3}{2}\omega_4\omega_1 + \frac{1}{3}u^2\omega_4\omega_1^2 - \frac{1}{2}\omega_3\omega_4 - \frac{4}{3}\omega_3\omega_4\omega_1\omega_2c_s^2 - \frac{5}{6}\omega_3\omega_2c_s^2 + \frac{1}{2}\omega_3^2u^2\omega_4 - \\
&\quad \frac{1}{3}u^2\omega_4\omega_1^2\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1^2c_s^2 + \frac{1}{2}\omega_4\omega_1^2 - \frac{1}{2}\omega_1^2v\omega_2 - u^2\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4\omega_1c_s^2 + \frac{1}{2}\omega_3^2\omega_4c_s^2 + \frac{2}{3}\omega_3^2u^2\omega_1 - \omega_3\omega_1 + \\
&\quad \omega_3u^2\omega_1\omega_2 - \frac{5}{6}\omega_4\omega_1^2\omega_2c_s^2 + \omega_4 + \frac{7}{3}\omega_3c_s^2 - \frac{2}{3}\omega_3^2u^2 + \frac{2}{3}u^2\omega_4 + \omega_4v^2 - \frac{1}{2}\omega_3u^2\omega_4\omega_1^2 - \frac{1}{2}\omega_3\omega_4\omega_1v\omega_2 - \\
&\quad \frac{3}{2}\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4^2c_s^2 + 3\omega_1 + \frac{5}{6}\omega_4\omega_1^2c_s^2 + \omega_3\omega_1\omega_2c_s^2 - \frac{5}{6}\omega_3u^2\omega_4\omega_1\omega_2 - 3\omega_3\omega_1c_s^2 + \omega_4v\omega_2 + \frac{1}{2}\omega_3\omega_4\omega_1v\omega_2 + \\
&\quad \frac{1}{2}\omega_3v\omega_2 + \frac{1}{2}\omega_3u^2\omega_4^2 - 3\omega_3u^2\omega_1 - \frac{5}{2}\omega_4\omega_1c_s^2 - \frac{1}{2}\omega_3^2u^2\omega_4\omega_1 + \frac{3}{2}\omega_1v\omega_2 + \frac{1}{2}\omega_1^2\omega_2 - \frac{10}{3}\omega_3\omega_4c_s^2 + \frac{2}{3}\omega_3\omega_1^2c_s^2 +
\end{aligned}$$

$$\begin{aligned} & \frac{1}{2}\omega_3\omega_4\omega_1 + \frac{4}{3}\omega_3\omega_4\omega_2c_s^2 + \frac{1}{2}\omega_3\omega_4\omega_1v^2 + \frac{5}{2}\omega_4\omega_1\omega_2c_s^2 - \omega_4v^2\omega_2 - \frac{1}{6}\omega_3\omega_1^2\omega_2c_s^2 - \frac{1}{6}\omega_3u^2\omega_1^2\omega_2 + \\ & \frac{5}{2}\omega_3u^2\omega_4\omega_2 + \frac{2}{3}\omega_3^2\omega_1c_s^2 + \omega_2 + \frac{7}{3}\omega_3u^2 - \frac{2}{3}\omega_3^2c_s^2 + \frac{1}{2}\omega_3\omega_1\omega_2 - \frac{3}{2}\omega_4\omega_1v^2 + \frac{1}{2}\omega_3\omega_4v^2\omega_2 - \frac{1}{2}\omega_3\omega_4v^2 + \\ & \frac{3}{2}\omega_4\omega_1v^2\omega_2 - \frac{5}{3}\omega_4\omega_2c_s^2 - \frac{1}{6}\omega_3^2u^2\omega_1\omega_2 + \frac{23}{6}\omega_3\omega_4\omega_1c_s^2 - \frac{1}{2}\omega_3\omega_1v\omega_2 + u^2\omega_4\omega_1\omega_2 - \frac{2}{3}u^2\omega_4\omega_2 + \frac{1}{2}\omega_4\omega_1^2v\omega_2 + \\ & \frac{1}{6}\omega_3^2u^2\omega_2 - \frac{1}{2}\omega_3\omega_2 - \frac{1}{2}\omega_3u^2\omega_4^2\omega_1 - \frac{1}{6}\omega_3^2\omega_1\omega_2c_s^2 - \frac{17}{6}\omega_3u^7\omega_4 + \frac{1}{6}\omega_3^2\omega_2c_s^2 + \frac{2}{3}\omega_3u^2\omega_1^2, \end{aligned}$$

$$\alpha_{x,y-\delta t}^{[\mu_4],t-3\delta t} = 3 - \frac{10}{3}\omega_3 - \frac{1}{6}\omega_3^2\omega_2 + \frac{1}{6}\omega_3^2\omega_1\omega_2 + \omega_1^2 + \frac{1}{6}\omega_3\omega_2^2\omega_2 + 4\omega_4\omega_1 + \frac{10}{3}\omega_3\omega_4 - \frac{5}{6}\omega_3\omega_4\omega_2 - \frac{3}{2}\omega_4\omega_1\omega_2 - \frac{2}{3}\omega_3\omega_1^2 - \frac{1}{2}\omega_3\omega_4^2 - \frac{5}{6}\omega_4\omega_1^2 + 4\omega_3\omega_1 + \frac{1}{2}\omega_3^2\omega_4\omega_1 - \frac{19}{6}\omega_4 + \frac{1}{2}\omega_4^2 + 2\omega_1\omega_2 - 4\omega_1 + \frac{5}{6}\omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4^2\omega_1 - \frac{1}{2}\omega_1^2\omega_2 + \frac{5}{6}\omega_4\omega_2 - \frac{23}{6}\omega_3\omega_4\omega_1 - \frac{2}{3}\omega_3^2\omega_1 - \frac{3}{2}\omega_2 - \frac{3}{2}\omega_3\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 - \frac{1}{2}\omega_3^2\omega_4 + \frac{1}{3}\omega_4\omega_1^2\omega_2 + \frac{2}{3}\omega_3^2 + \frac{1}{2}\omega_3\omega_4\omega_1^2 + \frac{4}{3}\omega_3\omega_2,$$

$$\alpha_{x-\delta_1,y}^{[\mu_1],t-3\delta_t} = -1 - \frac{1}{2}\omega_3^2 w_4 w_2 c_s^2 + \frac{1}{2}w_3 + \frac{1}{2}w_3 u^2 w_4 w_1 - \frac{5}{2}\omega_3 u^2 \omega_2 - \frac{1}{2}\omega_3^2 u^2 w_4 w_2 - \frac{1}{2}w_4 w_1 - \frac{1}{2}w_3 w_4 - \frac{1}{2}w_3 w_4 w_1 w_2 c_s^2 - \frac{1}{2}u w_4 w_1 \omega_2^2 - \frac{5}{2}\omega_3 w_2 c_s^2 + \frac{1}{2}\omega_3^2 u^2 w_4 + \frac{1}{2}w_3 w_4 w_2 + \frac{1}{2}w_4 w_1 \omega_2 + \frac{1}{2}\omega_3^2 w_4 c_s^2 + 2u w_4 w_1 \omega_2 + \frac{1}{2}\omega_3 u^2 \omega_1 \omega_2 - \frac{1}{2}w_3 u^2 w_4^2 \omega_2 - \frac{1}{2}w_3 w_4^2 w_2 c_s^2 + w_4 + 2w_3 c_s^2 + \frac{1}{2}w_3 u^2 \omega_2^2 - \frac{1}{2}\omega_3^2 u^2 - \frac{1}{2}w_1 \omega_2 + \frac{1}{2}w_3 w_4^2 c_s^2 + \frac{1}{2}\omega_1 + \frac{1}{2}w_4^2 w_1 + \frac{1}{2}w_3 w_1 w_2 c_s^2 - \frac{1}{2}w_3 u^2 w_4 w_1 \omega_2 - \frac{1}{2}w_3 w_1 c_s^2 - \frac{1}{2}w_3 w_4 w_2^2 c_s^2 + \frac{1}{2}w_3 u^2 w_4^2 - \frac{1}{2}w_3 u^2 \omega_1 - \frac{1}{2}u w_4^2 w_1 \omega_2 - \frac{3}{2}w_4 w_1 - \frac{5}{2}w_3 w_4 c_s^2 - w_4 \omega_2 + 3w_3 w_4 w_2 c_s^2 + \frac{1}{2}u w_1 \omega_2^2 + 3w_3 u^2 w_4 w_2 + w_2 + 2w_3 u^2 - \frac{1}{2}\omega_3^2 c_s^2 + u \omega_1 - \frac{1}{2}w_3 u^2 w_4 \omega_2^2 + \frac{1}{2}w_3 w_2^2 c_s^2 - \frac{3}{2}u w_1 \omega_2 + \frac{1}{2}w_3 w_4 w_1 c_s^2 + \frac{1}{2}\omega_3^2 u^2 \omega_2 - \frac{1}{2}w_3 \omega_2 - \frac{5}{2}w_3 u^2 w_4 + \frac{1}{2}\omega_3^2 w_2 c_s^2,$$

$$\alpha_{x-\delta t,y}^{[\mu_4],t-3\delta t} = 3 - \frac{5}{2}\omega_3 - \frac{1}{2}\omega_3^2\omega_2 - \frac{1}{2}\omega_1\omega_2^2 + 2\omega_4\omega_1 + 3\omega_3\omega_4 - \frac{7}{2}\omega_3\omega_4\omega_2 - \frac{5}{2}\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4^2 + \frac{1}{2}\omega_4\omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_2^2 + \frac{1}{2}\omega_3\omega_1 - 4\omega_4 + \omega_4^2 + 2\omega_1\omega_2 - \frac{3}{2}\omega_1 + \frac{1}{8}\omega_3\omega_4\omega_1\omega_2 - \omega_4^2\omega_2 + 5\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_2^2 - 4\omega_2 + \omega_2^2 - \frac{1}{2}\omega_3\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 - \frac{1}{2}\omega_3^2\omega_4 + \frac{1}{2}\omega_3^2 + \frac{1}{2}\omega_3\omega_4^2\omega_2 - \omega_4\omega_2^2 + 3\omega_3\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_2 + \frac{1}{2}\omega_4^2\omega_1\omega_2,$$

$$\alpha_{x,y}^{[\mu_1],t-\delta t} = -2 + \omega_4 w_1^2 v^2 \omega_2 + \omega_3 - \frac{2}{3} \omega_3 u^2 \omega_4 \omega_1 - \omega_1^2 - \frac{10}{3} \omega_4 c_s^2 - \frac{10}{3} \omega_3 u^2 \omega_2 - \omega_4 w_1^2 v^2 - 3 \omega_4 \omega_1 - \frac{2}{3} u^2 \omega_4 w_1^2 - \omega_3 \omega_4 + \frac{5}{3} \omega_3 \omega_4 \omega_1 \omega_2 c_s^2 - \frac{10}{3} \omega_3 \omega_2 c_s^2 + \omega_3 \omega_4 \omega_2 + 3 \omega_4 \omega_1 \omega_2 + \frac{2}{3} u^2 \omega_4 w_1^2 \omega_2 - \omega_3 u^2 \omega_1 \omega_2^2 + \omega_4 \omega_1^2 + 2 u^2 \omega_4 \omega_1 + \frac{2}{3} \omega_3^2 u^2 \omega_1 - \omega_3 \omega_1 + 4 \omega_3 u^2 \omega_1 \omega_2 + \frac{5}{3} \omega_4 w_1^2 \omega_2 c_s^2 + 2 \omega_4 + \frac{7}{3} \omega_3 c_s^2 + \omega_3 u^2 \omega_2^2 - \frac{2}{3} \omega_3^2 u^2 - \frac{4}{3} u^2 \omega_4 - 2 \omega_4 v^2 + \omega_3 \omega_4 \omega_1 v^2 \omega_2 - 3 \omega_1 \omega_2 + 3 \omega_1 - \frac{5}{3} \omega_4 w_1^2 c_s^2 + 4 \omega_3 \omega_1 \omega_2 c_s^2 - \omega_3 \omega_4 \omega_1 \omega_2 + \frac{2}{3} \omega_3 u^2 \omega_4 \omega_1 \omega_2 - 3 \omega_3 \omega_1 c_s^2 - 3 \omega_3 u^2 \omega_1 - \omega_3 \omega_1 \omega_2^2 c_s^2 + 5 \omega_4 \omega_1 c_s^2 + \omega_1^2 \omega_2 + \frac{5}{3} \omega_3 \omega_4 c_s^2 + \frac{2}{3} \omega_3 \omega_1^2 c_s^2 - 2 \omega_4 \omega_2 + \omega_3 \omega_4 \omega_1 - \frac{5}{3} \omega_3 \omega_4 \omega_2 c_s^2 - \omega_3 \omega_4 \omega_1 v^2 - 5 \omega_4 \omega_1 \omega_2 c_s^2 + 2 \omega_4 v^2 \omega_2 - \frac{2}{3} \omega_3 w_1^2 \omega_2 c_s^2 - \frac{2}{3} \omega_3 u^2 \omega_1^2 \omega_2 - \frac{2}{3} \omega_3 u^2 \omega_4 \omega_2 + \frac{2}{3} \omega_3^2 \omega_1 c_s^2 + 2 \omega_2 + \frac{7}{3} \omega_3 u^2 - \frac{2}{3} \omega_3^2 c_s^2 + \omega_3 \omega_1 \omega_2 + 3 \omega_4 \omega_1 v^2 - \omega_3 \omega_4 v^2 \omega_2 + \omega_3 \omega_4 v^2 - 3 \omega_4 \omega_1 v^2 \omega_2 + \frac{10}{3} \omega_4 \omega_2 c_s^2 + \omega_3 \omega_2^2 c_s^2 - \frac{2}{3} \omega_3^2 u^2 \omega_1 \omega_2 - \frac{5}{3} \omega_3 \omega_4 \omega_1 c_s^2 - \omega_4 w_1^2 \omega_2 - 2 u^2 \omega_4 \omega_1 \omega_2 + \frac{4}{3} u^2 \omega_4 \omega_2 + \frac{2}{3} \omega_3^2 u^2 \omega_2 - \omega_3 \omega_2 - \frac{2}{3} \omega_3^2 \omega_1 \omega_2 c_s^2 + \frac{2}{3} \omega_3 u^2 \omega_4 + \frac{2}{3} \omega_3^2 \omega_2 c_s^2 + \frac{2}{3} \omega_3 u^2 \omega_1^2,$$

$$\alpha_{x,y}^{[\mu_4], t=3\delta_t} = 3 - \frac{10}{3}\omega_3 - \frac{2}{3}\omega_3^2\omega_2 + \frac{2}{3}\omega_3^2\omega_1\omega_2 - \omega_1\omega_2^2 + \omega_1^2 + \frac{2}{3}\omega_3\omega_1^2\omega_2 + \omega_4\omega_1 + \frac{1}{3}\omega_3\omega_4 - \frac{1}{3}\omega_3\omega_4\omega_2 - \omega_4\omega_1\omega_2 - \frac{2}{3}\omega_3\omega_1^2 - \frac{1}{3}\omega_4\omega_1^2 + 4\omega_3\omega_1 - \frac{2}{3}\omega_4 + 5\omega_1\omega_2 - 4\omega_1 + \frac{1}{3}\omega_3\omega_4\omega_1\omega_2 - \omega_1^2\omega_2 + \frac{1}{3}\omega_4\omega_2 - \frac{1}{3}\omega_3\omega_4\omega_1 - \omega_3\omega_2^2 - \frac{2}{3}\omega_3^2\omega_1 + \omega_3\omega_1\omega_2^2 - 4\omega_2 + \omega_2^2 - 5\omega_3\omega_1\omega_2 + \frac{1}{3}\omega_4\omega_1^2\omega_2 + \frac{2}{3}\omega_3^2 + \frac{13}{3}\omega_3\omega_2,$$

$$\begin{aligned} \alpha_{x+1,t,y}^{[\mu_1],t-3\delta_t} = & -1 - \frac{1}{2}\omega_3^2\omega_4\omega_2c_s^2 + \frac{1}{2}\omega_3 + \frac{1}{2}\omega_3u^2\omega_4\omega_1 - \frac{5}{2}\omega_3u^2\omega_2 - \frac{1}{2}\omega_3^2u^2\omega_4\omega_2 - \frac{1}{2}\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4 - \\ & \frac{1}{2}\omega_3\omega_4\omega_1\omega_2c_s^2 + \frac{1}{2}u\omega_4\omega_1\omega_2^2 - \frac{5}{2}\omega_3\omega_2c_s^2 + \frac{1}{2}\omega_3^2u^2\omega_4 + \frac{1}{2}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_3^2\omega_4c_s^2 - 2u\omega_4\omega_1\omega_2 + \\ & \frac{1}{2}\omega_3u^2\omega_1\omega_2 - \frac{1}{2}\omega_3u^2\omega_4^2\omega_2 - \frac{1}{2}\omega_3\omega_4^2\omega_2c_s^2 + \omega_4 + 2\omega_3c_s^2 + \frac{1}{2}\omega_3u^2\omega_2^2 - \frac{1}{2}\omega_3^2u^2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4^2c_s^2 + \frac{1}{2}\omega_1 - \\ & \frac{1}{2}u\omega_4^2\omega_1 + \frac{1}{2}\omega_3\omega_1\omega_2c_s^2 - \frac{1}{2}\omega_3u^2\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_1c_s^2 - \frac{1}{2}\omega_3\omega_4\omega_2^2c_s^2 + \frac{1}{2}\omega_3u^2\omega_4^2 - \frac{1}{2}\omega_3u^2\omega_1 + \frac{1}{2}u\omega_4^2\omega_1\omega_2 + \\ & \frac{3}{2}\omega_4\omega_1 - \frac{5}{2}\omega_3\omega_4c_s^2 - \omega_4\omega_2 + 3\omega_3\omega_4\omega_2c_s^2 - \frac{1}{2}u\omega_1\omega_2^2 + 3\omega_3u^2\omega_4\omega_2 + \omega_2 + 2\omega_3u^2 - \frac{1}{2}\omega_3^2c_s^2 - u\omega_1 - \\ & \frac{1}{2}\omega_3u^2\omega_4\omega_2^2 + \frac{1}{2}\omega_3\omega_2^2c_s^2 + \frac{3}{2}u\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4\omega_1c_s^2 + \frac{1}{2}\omega_3^2u^2\omega_2 - \frac{1}{2}\omega_3\omega_2 - \frac{5}{2}\omega_3u^2\omega_4 + \frac{1}{2}\omega_3^2\omega_2c_s^2, \end{aligned}$$

$$\alpha_{x+\delta t, y}^{[\mu_4], t-3\delta t} = 3 - \frac{5}{2}\omega_3 - \frac{1}{2}\omega_3^2\omega_2 - \frac{1}{2}\omega_1\omega_2^2 + 2\omega_4\omega_1 + 3\omega_3\omega_4 - \frac{7}{2}\omega_3\omega_4\omega_2 - \frac{5}{2}\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4^2 + \frac{1}{2}\omega_4\omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_2^2 + \frac{1}{2}\omega_3\omega_1 - 4\omega_4 + \omega_4^2 + 2\omega_1\omega_2 - \frac{3}{2}\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1\omega_2 - \omega_4^2\omega_2 + 5\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_2^2 - 4\omega_2 + \omega_2^2 - \frac{1}{2}\omega_3\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 - \frac{1}{2}\omega_3^2\omega_4 + \frac{1}{2}\omega_3^2 + \frac{1}{2}\omega_3\omega_4^2\omega_2 - \omega_4\omega_2^2 + 3\omega_3\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_2 + \frac{1}{2}\omega_4^2\omega_1\omega_2,$$

$$\alpha_{x,y+\delta_l}^{[\mu_1],t-3\delta t} = -2 - \frac{1}{2}\omega_4\omega_1^2v^2\omega_2 + \omega_3 - \frac{1}{2}\omega_3\omega_4^2\omega_1c_s^2 + \frac{10}{3}\omega_3u^2\omega_4\omega_1 - \omega_1^2 + \frac{5}{3}\omega_4c_s^2 + \frac{3}{2}\omega_4\omega_1vw_2 - \frac{5}{6}\omega_3u^2\omega_2 + \\ v\omega_2 + \frac{1}{2}\omega_4\omega_1^2v^2 + \frac{1}{2}\omega_3\omega_4vw_2 - \frac{3}{2}\omega_4\omega_1 + \frac{1}{3}u^2\omega_4\omega_1^2 - \frac{1}{2}\omega_3\omega_4 - \frac{4}{3}\omega_3\omega_4\omega_1\omega_2c_s^2 - \frac{5}{6}\omega_3\omega_2c_s^2 + \frac{1}{2}\omega_3^2u^2\omega_4 - \\ \frac{1}{3}u^2\omega_4\omega_1^2\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1^2c_s^2 + \frac{1}{2}\omega_4\omega_1^2 + \frac{1}{2}\omega_1^2vw_2 - u^2\omega_4\omega_1 - \frac{1}{2}\omega_3^2\omega_4\omega_1c_s^2 + \frac{1}{2}\omega_3^2\omega_4c_s^2 + \frac{2}{3}\omega_3^2u^2\omega_1 - \omega_3\omega_1 + \\ \omega_3u^2\omega_1\omega_2 - \frac{5}{6}\omega_4\omega_1^2\omega_2c_s^2 + \omega_4 + \frac{7}{3}\omega_3c_s^2 - \frac{2}{3}\omega_3^2u^2 + \frac{2}{3}u^2\omega_4 + \omega_4v^2 - \frac{1}{2}\omega_3u^2\omega_4\omega_1^2 - \frac{1}{2}\omega_3\omega_4\omega_1v^2\omega_2 - \\ \frac{3}{2}\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4^2c_s^2 + 3\omega_1 + \frac{5}{6}\omega_4\omega_1^2c_s^2 + \omega_3\omega_1\omega_2c_s^2 - \frac{5}{6}\omega_3u^2\omega_4\omega_1\omega_2 - 3\omega_3\omega_1c_s^2 - \omega_4vw_2 - \frac{1}{2}\omega_3\omega_4\omega_1vw_2 - \\ \frac{1}{2}\omega_3v\omega_2 + \frac{1}{2}\omega_3u^2\omega_4^2 - 3\omega_3u^2\omega_1 - \frac{5}{2}\omega_4\omega_1c_s^2 - \frac{1}{2}\omega_3^2u^2\omega_4\omega_1 - \frac{3}{2}\omega_1vw_2 + \frac{1}{2}\omega_1^2\omega_2 - \frac{10}{3}\omega_3\omega_4c_s^2 + \frac{2}{3}\omega_3\omega_1^2c_s^2 + \\ \frac{1}{2}\omega_3\omega_4\omega_1 + \frac{4}{3}\omega_3\omega_4\omega_2c_s^2 + \frac{1}{2}\omega_3\omega_4\omega_1v^2 + \frac{5}{2}\omega_4\omega_1\omega_2c_s^2 - \omega_4v^2\omega_2 - \frac{1}{6}\omega_3\omega_1^2\omega_2c_s^2 - \frac{1}{6}\omega_3u^2\omega_1^2\omega_2 +$$

$$\begin{aligned}
& \frac{5}{6}\omega_3 u^2 \omega_4 \omega_2 + \frac{2}{3}\omega_3^2 \omega_1 c_s^2 + \omega_2 + \frac{7}{3}\omega_3 u^2 - \frac{2}{3}\omega_3^2 c_s^2 + \frac{1}{2}\omega_3 \omega_1 \omega_2 - \frac{3}{2}\omega_4 \omega_1 v^2 + \frac{1}{2}\omega_3 \omega_4 v^2 \omega_2 - \frac{1}{2}\omega_3 \omega_4 v^2 + \\
& \frac{3}{2}\omega_4 \omega_1 v^2 \omega_2 - \frac{5}{3}\omega_4 \omega_2 c_s^2 - \frac{1}{6}\omega_3^2 u^2 \omega_1 \omega_2 + \frac{23}{6}\omega_3 \omega_4 \omega_1 c_s^2 + \frac{1}{2}\omega_3 \omega_1 v \omega_2 + u^2 \omega_4 \omega_1 \omega_2 - \frac{2}{3}u^2 \omega_4 \omega_2 - \frac{1}{2}\omega_4 \omega_1^2 v \omega_2 + \\
& \frac{1}{6}\omega_3^2 u^2 \omega_2 - \frac{1}{2}\omega_3 \omega_2 - \frac{1}{2}\omega_3 u^2 \omega_4^2 \omega_1 - \frac{1}{6}\omega_3^2 \omega_1 \omega_2 c_s^2 - \frac{17}{6}\omega_3 u^2 \omega_4 + \frac{1}{6}\omega_3^2 \omega_2 c_s^2 + \frac{2}{3}\omega_3 u^2 \omega_1^2, \\
\alpha_{x,y+\delta_l}^{[\mu_4],t-3\delta_t} &= 3 - \frac{10}{3}\omega_3 - \frac{1}{6}\omega_3^2 \omega_2 + \frac{1}{6}\omega_3^2 \omega_1 \omega_2 + \omega_1^2 + \frac{1}{6}\omega_3 \omega_1^2 \omega_2 + 4\omega_4 \omega_1 + \frac{10}{3}\omega_3 \omega_4 - \frac{5}{6}\omega_3 \omega_4 \omega_2 - \frac{3}{2}\omega_4 \omega_1 \omega_2 - \frac{2}{3}\omega_3 \omega_1^2 - \\
& \frac{1}{2}\omega_3 \omega_4^2 - \frac{5}{6}\omega_4 \omega_1^2 + 4\omega_3 \omega_1 + \frac{1}{2}\omega_3^2 \omega_4 \omega_1 - \frac{19}{6}\omega_4 + \frac{1}{2}\omega_4^2 + 2\omega_1 \omega_2 - 4\omega_1 + \frac{5}{6}\omega_3 \omega_4 \omega_1 \omega_2 + \frac{1}{2}\omega_3 \omega_4^2 \omega_1 - \frac{1}{2}\omega_1^2 \omega_2 + \\
& \frac{7}{6}\omega_4 \omega_2 - \frac{23}{6}\omega_3 \omega_4 \omega_1 - \frac{2}{3}\omega_3^2 \omega_1 - \frac{3}{2}\omega_2 - \frac{3}{2}\omega_3 \omega_1 \omega_2 - \frac{1}{2}\omega_4^2 \omega_1 - \frac{1}{2}\omega_3^2 \omega_4 + \frac{1}{3}\omega_4 \omega_1^2 \omega_2 + \frac{2}{3}\omega_3^2 + \frac{1}{2}\omega_3 \omega_4 \omega_1^2 + \frac{4}{3}\omega_3 \omega_2, \\
\alpha_{x,y}^{[\mu_1],t-4\delta_t} &= 2 + \omega_3^2 \omega_4 \omega_2 c_s^2 - \omega_3^2 \omega_4 \omega_1 \omega_2 c_s^2 - \omega_3 u^2 \omega_4 \omega_1 \omega_2^2 - \omega_3 + \omega_3 \omega_4^2 \omega_1 c_s^2 - 6\omega_3 u^2 \omega_4 \omega_1 + \omega_1^2 + 5\omega_3 u^2 \omega_2 + \\
& \omega_3^2 u^2 \omega_4 \omega_2 + 3\omega_4 \omega_1 + \omega_3 \omega_4 + 7\omega_3 \omega_4 \omega_1 \omega_2 c_s^2 + 5\omega_3 \omega_2 c_s^2 - \omega_3^2 u^2 \omega_4 - \omega_3 \omega_4 \omega_2 - 3\omega_4 \omega_1 \omega_2 + \omega_3 u^2 \omega_1 \omega_2^2 + \\
& \omega_3 \omega_4 \omega_1^2 c_s^2 - \omega_4 \omega_1^2 + \omega_3^2 \omega_4 \omega_1 c_s^2 - \omega_3^2 \omega_4 c_s^2 - \omega_3 u^2 \omega_1 - \omega_3^2 u^2 \omega_4 \omega_1 \omega_2 + \omega_3 \omega_1 - 6\omega_3 u^2 \omega_1 \omega_2 + \omega_3 u^2 \omega_4^2 \omega_2 + \\
& \omega_3 \omega_4^2 \omega_2 c_s^2 - 2\omega_4 - 4\omega_3 c_s^2 - \omega_3 u^2 \omega_2^2 + \omega_3^2 u^2 + \omega_3 u^2 \omega_4 \omega_1^2 + 3\omega_1 \omega_2 - \omega_3 \omega_4^2 c_s^2 - 3\omega_1 - 6\omega_3 \omega_1 \omega_2 c_s^2 + \\
& \omega_3 \omega_4 \omega_1 \omega_2 + 7\omega_3 u^2 \omega_4 \omega_1 \omega_2 + 5\omega_3 \omega_1 c_s^2 + \omega_3 \omega_4 \omega_2^2 c_s^2 - \omega_3 u^2 \omega_4^2 + 5\omega_3 u^2 \omega_1 + \omega_3 \omega_1 \omega_2^2 c_s^2 + \omega_3^2 u^2 \omega_4 \omega_1 - \\
& \omega_1 \omega_2 + 5\omega_3 \omega_4 c_s^2 - \omega_3 u^2 \omega_4 \omega_1 \omega_2 - \omega_3 \omega_1^2 c_s^2 + 2\omega_4 \omega_2 - \omega_3 \omega_4 \omega_1 - 6\omega_3 \omega_4 \omega_2 c_s^2 + \omega_3 \omega_1 \omega_2 c_s^2 + \omega_3 u^2 \omega_1 \omega_2 - \\
& \omega_3 \omega_4^2 \omega_1 \omega_2 c_s^2 - 6\omega_3 u^2 \omega_4 \omega_2 - \omega_3^2 \omega_1 c_s^2 - \omega_3 u^2 \omega_4^2 \omega_1 \omega_2 - 2\omega_2 - 4\omega_3 u^2 + \omega_3^2 c_s^2 - \omega_3 \omega_1 \omega_2 + \omega_3 u^2 \omega_4 \omega_2^2 - \\
& \omega_3 \omega_2^2 c_s^2 - \omega_3 \omega_4 \omega_1 \omega_2^2 c_s^2 + \omega_3^2 u^2 \omega_1 \omega_2 - 6\omega_3 \omega_4 \omega_1 c_s^2 + \omega_4 \omega_1^2 \omega_2 - \omega_3^2 u^2 \omega_2 + \omega_3 \omega_2 + \omega_3 u^2 \omega_4^2 \omega_1 + \\
& \omega_3^2 \omega_1 \omega_2 c_s^2 + 5\omega_3 u^2 \omega_4 - \omega_3 \omega_4 \omega_1^2 \omega_2 c_s^2 - \omega_3^2 \omega_2 c_s^2 - \omega_3 u^2 \omega_1^2, \\
\alpha_{x,y}^{[\mu_4],t-4\delta_t} &= -4 + 5\omega_3 + \omega_3^2 \omega_2 - \omega_3^2 \omega_1 \omega_2 + \omega_1 \omega_2^2 + \omega_3 \omega_4 \omega_1 \omega_2^2 - \omega_1^2 - \omega_3 \omega_1^2 \omega_2 - 6\omega_4 \omega_1 - 6\omega_3 \omega_4 + 7\omega_3 \omega_4 \omega_2 + 7\omega_4 \omega_1 \omega_2 + \\
& \omega_3 \omega_1^2 + \omega_3 \omega_4^2 + \omega_4 \omega_1^2 - \omega_4 \omega_1 \omega_2^2 - \omega_3 \omega_4 \omega_2^2 - 6\omega_3 \omega_1 - \omega_3^2 \omega_4 \omega_1 + 5\omega_4 - \omega_4^2 - 6\omega_1 \omega_2 + 5\omega_1 - 8\omega_3 \omega_4 \omega_1 \omega_2 + \\
& \omega_4^2 \omega_2 - \omega_3 \omega_4^2 \omega_1 + \omega_3 \omega_4 \omega_1^2 \omega_2 + \omega_1^2 \omega_2 - 6\omega_4 \omega_2 + 7\omega_3 \omega_4 \omega_1 + \omega_3 \omega_2^2 + \omega_3 \omega_4^2 \omega_1 \omega_2 + \omega_3^2 \omega_1 - \omega_3 \omega_1 \omega_2^2 + 5\omega_2 - \omega_2^2 + \\
& 7\omega_3 \omega_1 \omega_2 + \omega_4^2 \omega_1 + \omega_3^2 \omega_4 - \omega_4 \omega_1^2 \omega_2 - \omega_3^2 - \omega_3 \omega_4 \omega_2^2 + \omega_4 \omega_2^2 - \omega_3 \omega_4 \omega_1^2 - 6\omega_3 \omega_2 - \omega_3^2 \omega_4 \omega_2 - \omega_4^2 \omega_1 \omega_2 + \omega_3^2 \omega_4 \omega_1 \omega_2,
\end{aligned}$$

## 5.6 EFDE for $\mu_5$

$$\mu_{5,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l, y+j\delta_l}^{[\mu_1], t-\ell\delta_t} \mu_{x+i\delta_l, y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l, y+j\delta_l}^{[\mu_5], t-\ell\delta_t} \mu_{5,x+i\delta_l, y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_1],t} &= 1 + \frac{5}{6}\omega_4 c_s^2 + \frac{1}{2}v\omega_2 - \frac{1}{2}\omega_4 - \frac{1}{3}\omega_3 c_s^2 + \frac{1}{3}u^2 \omega_4 + \frac{1}{2}\omega_4 v^2 - \frac{1}{2}\omega_2 - \frac{1}{3}\omega_3 u^2. \\
\alpha_{x,y+\delta_l}^{[\mu_1],t} &= 1 + \frac{5}{6}\omega_4 c_s^2 - \frac{1}{2}v\omega_2 - \frac{1}{2}\omega_4 - \frac{1}{3}\omega_3 c_s^2 + \frac{1}{3}u^2 \omega_4 + \frac{1}{2}\omega_4 v^2 - \frac{1}{2}\omega_2 - \frac{1}{3}\omega_3 u^2. \\
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{5}{6}\omega_3 + \frac{1}{4}\omega_3 u^2 \omega_2 - \frac{1}{12}\omega_4 \omega_1 - \frac{1}{12}\omega_3 \omega_4 + \frac{1}{4}\omega_3 \omega_2 c_s^2 - \frac{1}{6}\omega_3 \omega_1 + \frac{1}{6}\omega_4 - \frac{1}{2}\omega_3 c_s^2 + \frac{1}{6}\omega_3^2 u^2 - \frac{1}{4}\omega_1 \omega_2 + \\
& \frac{1}{2}\omega_1 + \frac{1}{6}\omega_3 u \omega_1 + \frac{1}{12}u \omega_4 \omega_1 + \frac{1}{12}\omega_3 \omega_4 c_s^2 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3 u^2 + \frac{1}{6}\omega_3^2 c_s^2 - \frac{1}{2}u \omega_1 + \frac{1}{4}u \omega_1 \omega_2 - \frac{1}{6}\omega_3^2 - \frac{1}{4}\omega_3 \omega_2 + \frac{1}{12}\omega_3 u^2 \omega_4, \\
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_5],t-\delta_t} &= 1 - \frac{5}{6}\omega_3 + \frac{1}{12}\omega_4 \omega_1 + \frac{1}{12}\omega_3 \omega_4 + \frac{1}{6}\omega_3 \omega_1 - \frac{1}{6}\omega_4 + \frac{1}{4}\omega_1 \omega_2 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{6}\omega_3^2 + \frac{1}{4}\omega_3 \omega_2, \\
\alpha_{x,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{5}{3}\omega_4 c_s^2 - \frac{1}{6}\omega_3 u^2 \omega_2 - \frac{1}{3}u^2 \omega_4^2 - \frac{1}{6}\omega_3 \omega_2 c_s^2 + \frac{1}{2}\omega_4 + \frac{1}{3}\omega_3 c_s^2 + \frac{2}{3}u^2 \omega_4 + \omega_4 v^2 - \frac{1}{2}\omega_4^2 v^2 - \\
& \frac{1}{6}\omega_3 \omega_4 c_s^2 - \frac{1}{2}\omega_4 v^2 \omega_2 + \frac{1}{2}\omega_2 + \frac{1}{3}\omega_3 u^2 - \frac{5}{6}\omega_4^2 c_s^2 - \frac{5}{6}\omega_4 \omega_2 c_s^2 - \frac{1}{3}u^2 \omega_4 \omega_2 - \frac{1}{6}\omega_3 u^2 \omega_4, \\
\alpha_{x,y-\delta_l}^{[\mu_5],t-\delta_t} &= 1 - \frac{3}{2}\omega_4 + \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_4 \omega_2 - \frac{1}{2}\omega_2, \\
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{5}{6}\omega_3 + \frac{1}{4}\omega_3 u^2 \omega_2 - \frac{1}{12}\omega_4 \omega_1 - \frac{1}{12}\omega_3 \omega_4 + \frac{1}{4}\omega_3 \omega_2 c_s^2 - \frac{1}{6}\omega_3 \omega_1 + \frac{1}{6}\omega_4 - \frac{1}{2}\omega_3 c_s^2 + \frac{1}{6}\omega_3^2 u^2 - \frac{1}{4}\omega_1 \omega_2 + \\
& \frac{1}{2}\omega_1 - \frac{1}{6}\omega_3 u \omega_1 - \frac{1}{12}u \omega_4 \omega_1 + \frac{1}{12}\omega_3 \omega_4 c_s^2 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3 u^2 + \frac{1}{6}\omega_3^2 c_s^2 + \frac{1}{2}u \omega_1 - \frac{1}{4}u \omega_1 \omega_2 - \frac{1}{6}\omega_3^2 - \frac{1}{4}\omega_3 \omega_2 + \frac{1}{12}\omega_3 u^2 \omega_4,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l, y-\delta_l}^{[\mu_5], t-\delta_t} &= 1 - \frac{5}{6}\omega_3 + \frac{1}{12}\omega_4\omega_1 + \frac{1}{12}\omega_3\omega_4 + \frac{1}{6}\omega_3\omega_1 - \frac{1}{6}\omega_4 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{6}\omega_3^2 + \frac{1}{4}\omega_3\omega_2, \\
\alpha_{x-\delta_l, y}^{[\mu_5], t-\delta_t} &= 1 - \frac{5}{6}\omega_3 + \frac{1}{3}\omega_4\omega_1 + \frac{1}{3}\omega_3\omega_4 + \frac{1}{6}\omega_3\omega_1 - \frac{2}{3}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{6}\omega_3^2, \\
\alpha_{x, y}^{[\mu_1], t-\delta_t} &= -2 - \frac{5}{3}\omega_4c_s^2 - \frac{2}{3}\omega_3u^2\omega_2 - \frac{2}{3}\omega_3\omega_2c_s^2 + \omega_4 + \frac{2}{3}\omega_3c_s^2 - \frac{2}{3}u^2\omega_4 - \omega_4v^2 - \omega_4\omega_2 + \omega_4v^2\omega_2 + 3\omega_2 + \\
&\quad \frac{2}{3}\omega_3u^2 - \omega_2^2 + \frac{5}{3}\omega_4\omega_2c_s^2 + \frac{2}{3}u^2\omega_4\omega_2, \\
\alpha_{x, y}^{[\mu_5], t-\delta_t} &= 2 + \omega_1^2 - 2\omega_1 - 2\omega_2 + \omega_2^2, \\
\alpha_{x+\delta_l, y}^{[\mu_5], t-\delta_t} &= 1 - \frac{5}{6}\omega_3 + \frac{1}{3}\omega_4\omega_1 + \frac{1}{3}\omega_3\omega_4 + \frac{1}{6}\omega_3\omega_1 - \frac{2}{3}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{6}\omega_3^2, \\
\alpha_{x-\delta_l, y+\delta_l}^{[\mu_1], t-\delta_t} &= -1 + \frac{5}{6}\omega_3 + \frac{1}{4}\omega_3u^2\omega_2 - \frac{1}{12}\omega_4\omega_1 - \frac{1}{12}\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_2c_s^2 - \frac{1}{6}\omega_3\omega_1 + \frac{1}{6}\omega_4 - \frac{1}{2}\omega_3c_s^2 + \frac{1}{6}\omega_3^2u^2 - \frac{1}{4}\omega_1\omega_2 + \\
&\quad \frac{1}{2}\omega_1 + \frac{1}{6}\omega_3u\omega_1 + \frac{1}{12}u\omega_4\omega_1 + \frac{1}{12}\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3u^2 + \frac{1}{6}\omega_3^2c_s^2 - \frac{1}{2}u\omega_1 + \frac{1}{4}u\omega_1\omega_2 - \frac{1}{6}\omega_3^2 - \frac{1}{4}\omega_3\omega_2 + \frac{1}{12}\omega_3u^2\omega_4, \\
\alpha_{x-\delta_l, y+\delta_l}^{[\mu_5], t-\delta_t} &= 1 - \frac{5}{6}\omega_3 + \frac{1}{12}\omega_4\omega_1 + \frac{1}{12}\omega_3\omega_4 + \frac{1}{6}\omega_3\omega_1 - \frac{1}{6}\omega_4 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{6}\omega_3^2 + \frac{1}{4}\omega_3\omega_2, \\
\alpha_{x, y+\delta_l}^{[\mu_1], t-\delta_t} &= -1 + \frac{5}{3}\omega_4c_s^2 - \frac{1}{6}\omega_3u^2\omega_2 - \frac{1}{3}u^2\omega_4^2 - \frac{1}{6}\omega_3\omega_2c_s^2 + \frac{1}{2}\omega_4 + \frac{1}{3}\omega_3c_s^2 + \frac{2}{3}u^2\omega_4 + \omega_4v^2 - \frac{1}{2}\omega_4^2v^2 - \\
&\quad \frac{1}{6}\omega_3\omega_4c_s^2 - \frac{1}{2}\omega_4v^2\omega_2 + \frac{1}{2}\omega_2 + \frac{1}{3}\omega_3u^2 - \frac{5}{6}\omega_4^2c_s^2 - \frac{5}{6}\omega_4\omega_2c_s^2 - \frac{1}{3}u^2\omega_4\omega_2 - \frac{1}{6}\omega_3u^2\omega_4, \\
\alpha_{x, y+\delta_l}^{[\mu_5], t-\delta_t} &= 1 - \frac{3}{2}\omega_4 + \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_4\omega_2 - \frac{1}{2}\omega_2, \\
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_1], t-\delta_t} &= -1 + \frac{5}{6}\omega_3 + \frac{1}{4}\omega_3u^2\omega_2 - \frac{1}{12}\omega_4\omega_1 - \frac{1}{12}\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_2c_s^2 - \frac{1}{6}\omega_3\omega_1 + \frac{1}{6}\omega_4 - \frac{1}{2}\omega_3c_s^2 + \frac{1}{6}\omega_3^2u^2 - \frac{1}{4}\omega_1\omega_2 + \\
&\quad \frac{1}{2}\omega_1 - \frac{1}{6}\omega_3u\omega_1 - \frac{1}{12}u\omega_4\omega_1 + \frac{1}{12}\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3u^2 + \frac{1}{6}\omega_3^2c_s^2 + \frac{1}{2}u\omega_1 - \frac{1}{4}u\omega_1\omega_2 - \frac{1}{6}\omega_3^2 - \frac{1}{4}\omega_3\omega_2 + \frac{1}{12}\omega_3u^2\omega_4, \\
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_5], t-\delta_t} &= 1 - \frac{5}{6}\omega_3 + \frac{1}{12}\omega_4\omega_1 + \frac{1}{12}\omega_3\omega_4 + \frac{1}{6}\omega_3\omega_1 - \frac{1}{6}\omega_4 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{6}\omega_3^2 + \frac{1}{4}\omega_3\omega_2, \\
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_1], t-2\delta_t} &= 1 - \frac{1}{4}\omega_4^2\omega_1v^2 - \frac{1}{4}\omega_3^2\omega_4v^2 - \frac{5}{6}\omega_3 - \frac{1}{12}\omega_3u^2\omega_4\omega_1 - \frac{5}{2}\omega_4c_s^2 - \frac{1}{6}\omega_4\omega_1v\omega_2 - \frac{1}{12}\omega_3u^2\omega_2 - \frac{1}{2}v\omega_2 + \frac{1}{3}u^2\omega_4^2 - \\
&\quad \frac{1}{4}\omega_3\omega_4^2v^2 - \frac{1}{6}\omega_3\omega_4v\omega_2 + \frac{1}{12}\omega_4\omega_1 + \frac{1}{12}\omega_3\omega_4 - \frac{1}{12}\omega_3\omega_2c_s^2 - \frac{5}{12}\omega_4^2\omega_1c_s^2 + \frac{1}{2}u^2\omega_4\omega_1 - \frac{1}{4}\omega_3^2\omega_4c_s^2 + \frac{1}{6}u\omega_4\omega_1\omega_2 + \\
&\quad \frac{1}{6}\omega_3\omega_1 - \frac{1}{12}\omega_3^2v\omega_2 - \frac{1}{12}\omega_3u^2\omega_1\omega_2 - \frac{1}{6}\omega_4 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{6}\omega_3^2u^2 - u^2\omega_4 - \frac{3}{2}\omega_4v^2 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_4^2c_s^2 - \frac{1}{2}\omega_1 + \\
&\quad \frac{6}{7}u\omega_4^2\omega_1 - \frac{1}{12}\omega_3\omega_1\omega_2c_s^2 - \frac{1}{6}\omega_3u\omega_1 + \frac{1}{3}\omega_4v\omega_2 + \frac{1}{12}\omega_3u\omega_1\omega_2 + \frac{1}{12}\omega_3v\omega_2 + \frac{1}{2}\omega_4^2v^2 + \frac{5}{4}\omega_4\omega_1c_s^2 + \frac{1}{4}\omega_1v\omega_2 - \\
&\quad \frac{7}{12}u\omega_4\omega_1 + \frac{3}{4}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_3\omega_4\omega_2c_s^2 - \frac{1}{4}\omega_3\omega_4\omega_1v^2 - \frac{1}{12}\omega_4\omega_1\omega_2c_s^2 + \frac{1}{2}\omega_4v^2\omega_2 - \frac{1}{6}u^2\omega_4^2\omega_1 - \frac{1}{2}\omega_2 + \\
&\quad \frac{2}{3}\omega_3u^2 - \frac{1}{6}\omega_3^2c_s^2 + \frac{5}{6}\omega_4^2c_s^2 + \frac{1}{2}u\omega_1 + \frac{3}{4}\omega_4\omega_1v^2 - \frac{1}{4}\omega_3\omega_4v^2\omega_2 + \frac{5}{4}\omega_3\omega_4v^2 - \frac{1}{4}\omega_4\omega_1v^2\omega_2 + \frac{5}{6}\omega_4\omega_2c_s^2 - \\
&\quad \frac{1}{4}u\omega_1\omega_2 - \frac{1}{3}\omega_3\omega_4\omega_1c_s^2 + \frac{1}{12}\omega_3u\omega_4\omega_1 - \frac{1}{12}\omega_3\omega_1v\omega_2 - \frac{1}{6}u^2\omega_4\omega_1\omega_2 + \frac{1}{6}\omega_3^2 + \frac{1}{3}u^2\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_2 + \frac{1}{12}\omega_3u^2\omega_4, \\
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_5], t-2\delta_t} &= -2 + \frac{5}{3}\omega_3 + \frac{1}{12}\omega_3^2\omega_2 - \frac{7}{6}\omega_4\omega_1 - \frac{5}{3}\omega_3\omega_4 + \frac{5}{12}\omega_3\omega_4\omega_2 + \frac{5}{12}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_4^2 - \frac{1}{3}\omega_3\omega_1 + \frac{7}{3}\omega_4 - \frac{1}{2}\omega_4^2 - \\
&\quad \frac{1}{2}\omega_1\omega_2 + \omega_1 - \frac{5}{6}\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_1 + \omega_2 + \frac{1}{12}\omega_3\omega_1\omega_2 + \frac{1}{4}\omega_4^2\omega_1 + \frac{1}{4}\omega_3^2\omega_4 - \frac{1}{3}\omega_3^2 - \frac{2}{3}\omega_3\omega_2, \\
\alpha_{x, y-\delta_l}^{[\mu_1], t-2\delta_t} &= 1 - \frac{5}{3}\omega_3 + \frac{1}{6}\omega_3u^2\omega_4\omega_1 - \frac{5}{6}\omega_4c_s^2 - \frac{1}{2}\omega_3u^2\omega_2 - \frac{1}{2}v\omega_2 - \frac{1}{2}\omega_4\omega_1v^2 - \frac{1}{2}\omega_4\omega_1 - \frac{1}{3}u^2\omega_4\omega_1^2 + \frac{1}{6}\omega_3\omega_4 - \\
&\quad \frac{1}{2}\omega_3\omega_2c_s^2 - \frac{1}{3}\omega_3\omega_1^2 + \frac{1}{3}\omega_4\omega_1^2 - \frac{1}{2}\omega_1^2v\omega_2 + \frac{2}{3}u^2\omega_4\omega_1 + \frac{1}{3}\omega_3^2u^2\omega_1 + 2\omega_3\omega_1 + \frac{1}{2}\omega_3u^2\omega_1\omega_2 + \frac{1}{6}\omega_4 + \frac{4}{3}\omega_3c_s^2 - \\
&\quad \frac{1}{3}\omega_3^2u^2 - \frac{1}{3}u^2\omega_4 - \frac{1}{2}\omega_4v^2 + \frac{1}{2}\omega_1\omega_2 - \omega_1 - \frac{5}{6}\omega_4\omega_1^2c_s^2 + \frac{1}{2}\omega_3\omega_1\omega_2c_s^2 - \frac{5}{3}\omega_3u^2\omega_1 + \frac{5}{3}\omega_4\omega_1c_s^2 + \\
&\quad \omega_1v\omega_2 - \frac{1}{6}\omega_3\omega_4c_s^2 + \frac{1}{3}\omega_3\omega_1^2c_s^2 - \frac{1}{6}\omega_3\omega_4\omega_1 - \frac{1}{3}\omega_3^2\omega_1 + \frac{1}{3}\omega_3\omega_1c_s^2 - \frac{1}{2}\omega_2 + \frac{4}{3}\omega_3u^2 - \frac{1}{3}\omega_3^2c_s^2 - \frac{1}{2}\omega_3\omega_1\omega_2 + \\
&\quad \omega_4\omega_1v^2 + \frac{1}{6}\omega_3\omega_4\omega_1c_s^2 + \frac{1}{3}\omega_3^2 + \frac{1}{2}\omega_3\omega_2 - \frac{1}{6}\omega_3u^2\omega_4 + \frac{1}{3}\omega_3u^2\omega_1^2, \\
\alpha_{x, y-\delta_l}^{[\mu_5], t-2\delta_t} &= -2 + \frac{5}{3}\omega_3 - \omega_1^2 - \frac{1}{2}\omega_4\omega_1 - \frac{1}{6}\omega_3\omega_4 + \frac{1}{3}\omega_3\omega_1^2 + \frac{1}{6}\omega_4\omega_1^2 - 2\omega_3\omega_1 + \frac{1}{3}\omega_4 - \frac{3}{2}\omega_1\omega_2 + 3\omega_1 + \frac{1}{2}\omega_1^2\omega_2 + \\
&\quad \frac{1}{6}\omega_3\omega_4\omega_1 + \frac{1}{3}\omega_3^2\omega_1 + \omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2 - \frac{1}{3}\omega_3^2 - \frac{1}{2}\omega_3\omega_2, \\
\alpha_{x+\delta_l, y-\delta_l}^{[\mu_1], t-2\delta_t} &= 1 - \frac{1}{4}\omega_4^2\omega_1v^2 - \frac{1}{4}\omega_3^2\omega_4v^2 - \frac{5}{6}\omega_3 - \frac{1}{12}\omega_3u^2\omega_4\omega_1 - \frac{5}{2}\omega_4c_s^2 - \frac{1}{6}\omega_4\omega_1v\omega_2 - \frac{1}{12}\omega_3u^2\omega_2 - \frac{1}{2}v\omega_2 + \frac{1}{3}u^2\omega_4^2 - \\
&\quad \frac{1}{4}\omega_3\omega_4^2v^2 - \frac{1}{6}\omega_3\omega_4v\omega_2 + \frac{1}{12}\omega_4\omega_1 + \frac{1}{12}\omega_3\omega_4 - \frac{1}{12}\omega_3\omega_2c_s^2 - \frac{5}{12}\omega_4^2\omega_1c_s^2 + \frac{1}{2}u^2\omega_4\omega_1 - \frac{1}{4}\omega_3^2\omega_4c_s^2 + \frac{1}{6}u\omega_4\omega_1\omega_2 + \\
&\quad \frac{1}{6}\omega_3\omega_1 - \frac{1}{12}\omega_3^2v\omega_2 - \frac{1}{12}\omega_3u^2\omega_1\omega_2 - \frac{1}{6}\omega_4 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{6}\omega_3^2u^2 - u^2\omega_4 - \frac{3}{2}\omega_4v^2 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_4^2c_s^2 - \frac{1}{2}\omega_1 + \\
&\quad \frac{7}{12}u\omega_4\omega_1 - \frac{1}{12}\omega_3\omega_1\omega_2c_s^2 - \frac{1}{6}\omega_3u\omega_1 + \frac{1}{3}\omega_4v\omega_2 - \frac{1}{12}\omega_3u\omega_1\omega_2 + \frac{1}{12}\omega_3v\omega_2 + \frac{1}{2}\omega_4^2v^2 + \frac{5}{4}\omega_4\omega_1c_s^2 + \frac{1}{4}\omega_1v\omega_2 + \\
&\quad \frac{1}{2}\omega_3u^2 - \frac{1}{6}\omega_3^2c_s^2 + \frac{5}{6}\omega_4^2c_s^2 - \frac{1}{2}u\omega_1 + \frac{3}{4}\omega_4\omega_1v^2 - \frac{1}{4}\omega_3\omega_4v^2\omega_2 + \frac{5}{4}\omega_3\omega_4v^2 - \frac{1}{4}\omega_4\omega_1v^2\omega_2 + \frac{5}{6}\omega_4\omega_2c_s^2 + 
\end{aligned}$$



$$\begin{aligned}
& \frac{7}{12}uw_4w_1 + \frac{4}{3}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_3\omega_4\omega_2c_s^2 - \frac{1}{4}\omega_3\omega_4\omega_1v^2 - \frac{5}{12}\omega_4\omega_1\omega_2c_s^2 + \frac{1}{2}\omega_4v^2\omega_2 - \frac{1}{6}u^2\omega_4^2\omega_1 - \frac{1}{2}\omega_2 + \\
& \frac{1}{2}\omega_3u^2 - \frac{1}{6}\omega_3^2c_s^2 + \frac{5}{6}\omega_4^2c_s^2 - \frac{1}{2}uw_1 + \frac{3}{4}\omega_4\omega_1v^2 - \frac{1}{4}\omega_3\omega_4v^2\omega_2 + \frac{5}{4}\omega_3\omega_4v^2 - \frac{1}{4}\omega_4\omega_1v^2\omega_2 + \frac{5}{6}\omega_4\omega_2c_s^2 + \\
& \frac{1}{4}uw_1\omega_2 - \frac{1}{3}\omega_3\omega_4\omega_1c_s^2 - \frac{1}{12}\omega_3uw_4\omega_1 + \frac{1}{12}\omega_3\omega_1vw_2 - \frac{1}{6}u^2\omega_4\omega_1\omega_2 + \frac{1}{6}\omega_3^2 + \frac{1}{3}u^2\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_2 + \frac{1}{12}\omega_3u^2\omega_4, \\
\alpha_{x+\delta_l,y+\delta_l}^{[\mu_5],t-2\delta_t} &= -2 + \frac{5}{3}\omega_3 + \frac{1}{12}\omega_3^2\omega_2 - \frac{7}{6}\omega_4\omega_1 - \frac{5}{3}\omega_3\omega_4 + \frac{5}{12}\omega_3\omega_4\omega_2 + \frac{5}{12}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_4^2 - \frac{1}{3}\omega_3\omega_1 + \frac{7}{3}\omega_4 - \frac{1}{2}\omega_4^2 - \\
& \frac{1}{2}\omega_1\omega_2 + \omega_1 - \frac{5}{6}\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_1 + \omega_2 + \frac{1}{12}\omega_3\omega_1\omega_2 + \frac{1}{4}\omega_4^2\omega_1 + \frac{1}{4}\omega_3^2\omega_4 - \frac{1}{3}\omega_3^2 - \frac{2}{3}\omega_3\omega_2, \\
\alpha_{x,y-\delta_l}^{[\mu_1],t-3\delta_t} &= -1 + \frac{1}{2}\omega_4^2\omega_1v^2 - \frac{1}{2}\omega_3^2\omega_4\omega_1v^2 + \frac{1}{2}\omega_3^2\omega_4v^2 + \frac{5}{3}\omega_3 - \frac{1}{2}\omega_3\omega_4^2\omega_1c_s^2 - \frac{1}{6}\omega_3\omega_1^2v\omega_2 + \frac{10}{3}\omega_4c_s^2 + \omega_4\omega_1v\omega_2 + \\
& \frac{1}{3}\omega_3u^2\omega_2 + v\omega_2 - \frac{1}{3}u^2\omega_4^2 + \frac{1}{2}\omega_3\omega_4^2v^2 + \frac{1}{2}\omega_4\omega_1^2v^2 + \frac{1}{3}\omega_3\omega_4v\omega_2 + \frac{1}{2}\omega_4\omega_1 + \frac{1}{3}u^2\omega_4\omega_1^2 - \frac{1}{6}\omega_3\omega_4 - \frac{1}{2}\omega_3\omega_4\omega_1\omega_2c_s^2 + \\
& \frac{1}{3}\omega_3\omega_2c_s^2 + \frac{1}{3}\omega_3\omega_1^2 - \frac{1}{2}\omega_3\omega_4\omega_1^2c_s^2 - \frac{1}{6}\omega_3^2\omega_1vw_2 + \frac{5}{6}\omega_4^2\omega_1c_s^2 - \frac{1}{3}\omega_4\omega_1^2 + \frac{1}{2}\omega_1^2v\omega_2 - \frac{5}{3}u^2\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4\omega_1c_s^2 + \\
& \frac{1}{2}\omega_3^2\omega_4c_s^2 - \frac{1}{3}\omega_3^2u^2\omega_1 - 2\omega_3\omega_1 + \frac{1}{6}\omega_3^2v\omega_2 - \frac{1}{3}\omega_3^2\omega_1^2\omega_2 - \frac{1}{6}\omega_3\omega_4^2\omega_1v^2 - \frac{4}{3}\omega_3\omega_4^2 + \frac{1}{3}\omega_3^2u^2 + \frac{4}{3}u^2\omega_4 + \\
& 2\omega_4v^2 - \frac{1}{2}\omega_3\omega_4\omega_1v^2\omega_2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4^2c_s^2 + \omega_1 + \frac{5}{6}\omega_4\omega_1^2c_s^2 - \frac{1}{3}\omega_3\omega_1\omega_2c_s^2 + \frac{5}{3}\omega_3\omega_1c_s^2 - \frac{1}{2}\omega_3\omega_4\omega_1^2v^2 - \\
& \frac{2}{3}\omega_4v\omega_2 - \frac{1}{3}\omega_3\omega_4\omega_1v\omega_2 - \frac{5}{6}\omega_3v\omega_2 - \frac{1}{2}\omega_4^2v^2 + \frac{5}{3}\omega_3u^2\omega_1 - \frac{25}{6}\omega_4\omega_1c_s^2 - \frac{3}{2}\omega_1v\omega_2 - \frac{5}{2}\omega_3\omega_4c_s^2 - \frac{1}{3}\omega_3\omega_1^2c_s^2 + \\
& \frac{1}{3}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_2c_s^2 + 3\omega_3\omega_4\omega_1v^2 + \frac{5}{6}\omega_4\omega_1\omega_2c_s^2 - \frac{1}{2}\omega_4v^2\omega_2 + \frac{1}{3}u^2\omega_4^2\omega_1 + \frac{1}{3}\omega_3^2\omega_1 - \frac{1}{3}\omega_3\omega_1c_s^2 + \frac{1}{2}\omega_2 - \\
& \frac{9}{3}\omega_3u^2 + \frac{1}{3}\omega_3^2c_s^2 + \frac{1}{2}\omega_3\omega_1\omega_2 - \frac{5}{6}\omega_4^2c_s^2 - \frac{5}{2}\omega_4\omega_1v^2 + \frac{1}{2}\omega_3\omega_4v^2\omega_2 - \frac{9}{2}\omega_3\omega_4v^2 + \frac{1}{2}\omega_4\omega_1v^2\omega_2 - \frac{5}{6}\omega_4\omega_2c_s^2 + \\
& 3\omega_3\omega_4\omega_1c_s^2 + \omega_3\omega_1v\omega_2 + \frac{1}{3}u^2\omega_4\omega_1\omega_2 - \frac{1}{3}\omega_3^2 - \frac{1}{3}u^2\omega_4\omega_2 - \frac{1}{3}\omega_4\omega_1v\omega_2 - \frac{1}{2}\omega_3\omega_2 - \frac{1}{3}\omega_3u^2\omega_1^2, \\
\alpha_{x,y-\delta_l}^{[\mu_5],t-3\delta_t} &= 3 - \frac{10}{3}\omega_3 - \frac{1}{6}\omega_3^2\omega_2 + \frac{1}{6}\omega_3^2\omega_1\omega_2 + \omega_1^2 + \frac{1}{6}\omega_3\omega_1^2\omega_2 + 4\omega_4\omega_1 + \frac{10}{3}\omega_3\omega_4 - \frac{5}{6}\omega_3\omega_4\omega_2 - \frac{3}{2}\omega_4\omega_1\omega_2 - \frac{2}{3}\omega_3\omega_1^2 - \\
& \frac{1}{2}\omega_3\omega_4^2 - \frac{5}{6}\omega_4\omega_1^2 + 4\omega_3\omega_1 + \frac{1}{2}\omega_3^2\omega_4\omega_1 - \frac{19}{6}\omega_4 + \frac{1}{2}\omega_4^2 + 2\omega_1\omega_2 - 4\omega_1 + \frac{5}{6}\omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4^2\omega_1 - \frac{1}{2}\omega_1^2\omega_2 + \\
& \frac{6}{6}\omega_4\omega_2 - \frac{23}{6}\omega_3\omega_4\omega_1 - \frac{2}{3}\omega_3^2\omega_1 - \frac{3}{2}\omega_2 - \frac{3}{2}\omega_3\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 - \frac{1}{2}\omega_3^2\omega_4 + \frac{1}{3}\omega_4\omega_1^2\omega_2 + \frac{2}{3}\omega_3^2 + \frac{1}{2}\omega_3\omega_4\omega_1^2 + \frac{4}{3}\omega_3\omega_2, \\
\alpha_{x-\delta_l,y}^{[\mu_1],t-3\delta_t} &= -2 - \frac{1}{2}\omega_3^2\omega_4\omega_2c_s^2 + \frac{5}{3}\omega_4^2\omega_2c_s^2 + \frac{1}{2}\omega_4^2\omega_1v^2 - \frac{5}{6}\omega_4^2\omega_1\omega_2c_s^2 - \frac{1}{2}\omega_3\omega_4^2v^2\omega_2 + \frac{2}{3}u^2\omega_4^2\omega_2 + \frac{1}{2}\omega_3^2\omega_4v^2 + \\
& \frac{5}{3}\omega_3 + \frac{1}{3}\omega_3^2\omega_2 - \frac{1}{3}u^2\omega_4^2\omega_1\omega_2 + \frac{1}{6}\omega_3u^2\omega_4\omega_1 + \frac{1}{2}\omega_1\omega_2^2 + \frac{5}{6}\omega_4c_s^2 + \frac{7}{6}\omega_3u^2\omega_2 + \frac{2}{3}\omega_4\omega_2c_s^2 - \frac{2}{3}u^2\omega_4^2 + \frac{1}{2}\omega_3\omega_4^2v^2 - \\
& \frac{1}{6}\omega_4\omega_1 - \frac{1}{6}\omega_3\omega_4 - \frac{2}{3}\omega_3\omega_4\omega_1\omega_2c_s^2 + \frac{1}{3}\omega_4\omega_1\omega_2^2 + \frac{7}{6}\omega_3\omega_2c_s^2 + \frac{1}{6}\omega_3\omega_4\omega_2 + \frac{1}{6}\omega_4\omega_1\omega_2 - \frac{1}{6}\omega_3u^2\omega_1\omega_2^2 + \\
& \frac{5}{6}\omega_4^2\omega_1c_s^2 - u^2\omega_4\omega_1 + \frac{1}{2}\omega_3^2\omega_4c_s^2 - \frac{3}{2}u\omega_4\omega_1\omega_2 - \frac{1}{3}\omega_3\omega_1 + \frac{1}{6}\omega_3u^2\omega_1\omega_2 - \frac{1}{2}\omega_3^2\omega_4v^2\omega_2 + \omega_4^2v^2\omega_2 - \frac{1}{2}\omega_4^2\omega_1v^2\omega_2 - \\
& \frac{1}{2}\omega_3\omega_4^2\omega_2c_s^2 + \frac{1}{3}\omega_4 - \omega_3c_s^2 - \frac{1}{6}\omega_3u^2\omega_2^2 + \frac{1}{3}\omega_3^2u^2 + 2u^2\omega_4 + 3\omega_4v^2 - \frac{1}{2}\omega_3\omega_4\omega_1v^2\omega_2 - \frac{3}{2}\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4^2c_s^2 + \\
& \omega_1 - \frac{1}{3}u\omega_4^2\omega_1 + \frac{1}{6}\omega_3\omega_1\omega_2c_s^2 + \frac{1}{3}\omega_3u\omega_1 - \frac{1}{6}\omega_3u^2\omega_4\omega_1\omega_2 - \frac{5}{6}\omega_4\omega_1\omega_2c_s^2 - \frac{1}{2}\omega_3\omega_4\omega_2c_s^2 - \frac{1}{2}\omega_3\omega_1\omega_2 - \\
& \omega_4^2v^2 + \frac{1}{3}u\omega_4^2\omega_1\omega_2 - \frac{1}{6}\omega_3\omega_1\omega_2c_s^2 - \frac{5}{2}\omega_4\omega_1c_s^2 + \frac{7}{6}u\omega_4\omega_1 - \frac{8}{3}\omega_3\omega_4c_s^2 + \frac{2}{3}u^2\omega_4\omega_2^2 - \frac{1}{3}\omega_4\omega_2 + \frac{19}{6}\omega_3\omega_4\omega_2c_s^2 + \\
& \frac{1}{3}\omega_3\omega_4\omega_1v^2 + \frac{1}{2}\omega_3\omega_2^2 + \frac{10}{3}\omega_4\omega_1\omega_2c_s^2 - 4\omega_4v^2\omega_2 - \frac{1}{2}u\omega_1\omega_2^2 + \frac{1}{3}u^2\omega_4^2\omega_1 - \frac{1}{3}u^2\omega_4\omega_1\omega_2^2 + \frac{1}{6}\omega_3u^2\omega_4\omega_2 + 3\omega_2 - \\
& \frac{1}{2}\omega_3\omega_4v^2\omega_2^2 - \omega_3u^2 - \frac{1}{2}\omega_4\omega_1v^2\omega_2^2 - \omega_2^2 + \frac{1}{3}\omega_3^2c_s^2 + \frac{1}{3}\omega_3\omega_1\omega_2 - \frac{5}{3}\omega_4^2c_s^2 - uw_1 - \frac{3}{2}\omega_4\omega_1v^2 + 3\omega_3\omega_4v^2\omega_2 - \\
& \frac{5}{3}\omega_3\omega_4v^2 + 2\omega_4\omega_1v^2\omega_2 - \frac{20}{3}\omega_4\omega_2c_s^2 - \frac{1}{6}\omega_3\omega_2c_s^2 + \frac{3}{2}u\omega_1\omega_2 + \frac{2}{3}\omega_3\omega_4\omega_1c_s^2 - \frac{1}{6}\omega_3u\omega_4\omega_1 + \frac{4}{3}u^2\omega_4\omega_1\omega_2 - \\
& \frac{1}{3}\omega_3^2 - \frac{8}{3}u^2\omega_4\omega_2 - \frac{1}{3}\omega_3^2u^2\omega_2 + \frac{1}{6}\omega_3u\omega_4\omega_1\omega_2 + \omega_4v^2\omega_2^2 - \frac{13}{6}\omega_3\omega_2 + \frac{1}{6}\omega_3u\omega_1\omega_2^2 - \frac{1}{6}\omega_3u^2\omega_4 - \frac{1}{3}\omega_3^2\omega_2c_s^2, \\
\alpha_{x-\delta_l,y}^{[\mu_5],t-3\delta_t} &= 3 - \frac{5}{2}\omega_3 - \frac{1}{2}\omega_3^2\omega_2 - \frac{1}{2}\omega_1\omega_2^2 + 2\omega_4\omega_1 + 3\omega_3\omega_4 - \frac{7}{2}\omega_3\omega_4\omega_2 - \frac{5}{2}\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4^2 + \frac{1}{2}\omega_4\omega_1\omega_2^2 + \\
& \frac{1}{2}\omega_3\omega_4\omega_4\omega_2^2 + \frac{1}{2}\omega_3\omega_1 - 4\omega_4 + \omega_4^2 + 2\omega_1\omega_2 - \frac{3}{2}\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1\omega_2 - \omega_4^2\omega_2 + 5\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_2^2 - 4\omega_2 + \\
& \omega_2^2 - \frac{1}{2}\omega_3\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 - \frac{1}{2}\omega_3^2\omega_4 + \frac{1}{2}\omega_3^2 + \frac{1}{2}\omega_3\omega_4^2\omega_2 - \omega_4\omega_2^2 + 3\omega_3\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2, \\
\alpha_{x,y}^{[\mu_1],t-3\delta_t} &= -2 - \omega_4\omega_1^2v^2\omega_2 + \frac{10}{3}\omega_3 + \frac{2}{3}\omega_3^2\omega_2 - \frac{2}{3}\omega_2^2\omega_1\omega_2 - \frac{1}{3}\omega_3u^2\omega_4\omega_1 + \omega_1\omega_2^2 - \frac{2}{3}\omega_3\omega_1^2\omega_2 + \frac{5}{3}\omega_4c_s^2 + \\
& \frac{11}{3}\omega_3u^2\omega_2 + \omega_4\omega_1^2v^2 + \omega_4\omega_1 + \frac{2}{3}u^2\omega_4\omega_1^2 - \frac{1}{3}\omega_3\omega_4 + \frac{1}{3}\omega_3\omega_4\omega_1\omega_2c_s^2 + \frac{11}{3}\omega_3\omega_2c_s^2 + \frac{1}{3}\omega_3\omega_4\omega_2 - \omega_4\omega_1\omega_2 - \\
& \frac{2}{3}u^2\omega_4\omega_1^2\omega_2 + \omega_3u^2\omega_1\omega_2^2 + \frac{2}{3}\omega_3\omega_1^2 - \frac{2}{3}\omega_4\omega_1^2 - \frac{4}{3}u^2\omega_4\omega_1 - \frac{2}{3}\omega_3^2u^2\omega_1 - 4\omega_3\omega_1 - \frac{13}{3}\omega_3u^2\omega_1\omega_2 - \\
& \frac{3}{3}\omega_4\omega_1^2\omega_2c_s^2 - \frac{1}{3}\omega_4 - \frac{8}{3}\omega_3c_s^2 - \omega_3u^2\omega_2^2 + \frac{2}{3}\omega_3^2u^2 + \frac{2}{3}u^2\omega_4 + \omega_4v^2 - \frac{3}{2}\omega_1\omega_2 + 2\omega_1 + \frac{1}{3}\omega_4\omega_1^2c_s^2 - \\
& \frac{13}{3}\omega_3\omega_1\omega_2c_s^2 - \frac{1}{3}\omega_3\omega_4\omega_1\omega_2 + \frac{1}{3}\omega_3u^2\omega_4\omega_1\omega_2 + \frac{10}{3}\omega_3\omega_1c_s^2 + \frac{10}{3}\omega_3u^2\omega_1 + \omega_3\omega_1\omega_2c_s^2 - \frac{10}{3}\omega_4\omega_1c_s^2 + \\
& \frac{1}{3}\omega_3\omega_4c_s^2 - \frac{2}{3}\omega_3\omega_1^2c_s^2 + \frac{1}{3}\omega_4\omega_2 + \frac{1}{3}\omega_3\omega_4\omega_1 - \frac{1}{3}\omega_3\omega_4\omega_2c_s^2 + \omega_3\omega_2^2 + \frac{10}{3}\omega_4\omega_1\omega_2c_s^2 - \omega_4v^2\omega_2 + \\
& \frac{2}{3}\omega_3\omega_1^2\omega_2c_s^2 + \frac{2}{3}\omega_3^2\omega_1 + \frac{2}{3}\omega_3u^2\omega_1^2\omega_2 - \omega_3\omega_1\omega_2^2 - \frac{1}{3}\omega_3u^2\omega_4\omega_2 - \frac{2}{3}\omega_3\omega_1^2c_s^2 + 3\omega_2 - \frac{8}{3}\omega_3u^2 - \omega_2^2 + \frac{2}{3}\omega_3^2c_s^2 + \\
& 5\omega_3\omega_1\omega_2 - 2\omega_4\omega_1v^2 + 2\omega_4\omega_1v^2\omega_2 - \frac{5}{3}\omega_4\omega_2c_s^2 - \omega_3\omega_2^2c_s^2 + \frac{2}{3}\omega_3^2u^2\omega_1\omega_2 - \frac{1}{3}\omega_3\omega_4\omega_1c_s^2 + \frac{2}{3}\omega_4\omega_1^2\omega_2 + \\
& \frac{4}{3}u^2\omega_4\omega_1\omega_2 - \frac{2}{3}\omega_3^2 - \frac{2}{3}u^2\omega_4\omega_2 - \frac{2}{3}\omega_3^2u^2\omega_2 - \frac{13}{3}\omega_3\omega_2 + \frac{2}{3}\omega_3\omega_1\omega_2c_s^2 + \frac{1}{3}\omega_3u^2\omega_4 - \frac{2}{3}\omega_3^2\omega_2c_s^2 - \frac{2}{3}\omega_3u^2\omega_1^2, \\
\alpha_{x,y}^{[\mu_5],t-3\delta_t} &= 3 - \frac{10}{3}\omega_3 - \frac{2}{3}\omega_3^2\omega_2 + \frac{2}{3}\omega_3^2\omega_1\omega_2 - \omega_1\omega_2^2 + \omega_1^2 + \frac{2}{3}\omega_3\omega_1^2\omega_2 + \omega_4\omega_1 + \frac{1}{3}\omega_3\omega_4 - \frac{1}{3}\omega_3\omega_4\omega_2 - \omega_4\omega_1\omega_2 - \\
& \frac{2}{3}\omega_3\omega_1^2 - \frac{1}{3}\omega_4\omega_1^2 + 4\omega_3\omega_1 - \frac{2}{3}\omega_4 + 5\omega_1\omega_2 - 4\omega_1 + \frac{1}{3}\omega_3\omega_4\omega_1\omega_2 - \omega_1^2\omega_2 + \frac{2}{3}\omega_4\omega_2 - \frac{1}{3}\omega_3\omega_4\omega_1 - \omega_3\omega_2^2 - \\
& \frac{2}{3}\omega_3\omega_1 + \omega_3\omega_1\omega_2^2 - 4\omega_2 + \omega_2^2 - 5\omega_3\omega_1\omega_2 + \frac{1}{3}\omega_4\omega_1^2\omega_2 + \frac{2}{3}\omega_3^2 + \frac{13}{3}\omega_3\omega_2,
\end{aligned}$$

$$\alpha_{x+\delta t, y}^{[\mu_1, t-\delta t]} = -2 - \frac{1}{2}\omega_3^2\omega_4\omega_2c_s^2 + \frac{5}{3}\omega_4^2\omega_2c_s^2 + \frac{1}{2}\omega_4^2\omega_1v^2 - \frac{5}{6}\omega_4^2\omega_1\omega_2c_s^2 - \frac{1}{2}\omega_3\omega_4^2v^2\omega_2 + \frac{2}{3}u^2\omega_4^2\omega_2 + \frac{1}{2}\omega_3^2\omega_4v^2 + \frac{5}{3}\omega_3 + \frac{1}{3}\omega_3^2\omega_2 - \frac{1}{3}u^2\omega_4^2\omega_1\omega_2 + \frac{1}{6}\omega_3u^2\omega_4\omega_1 + \frac{1}{2}\omega_1\omega_2^2 + 5\omega_4c_s^2 + \frac{7}{6}\omega_3u^2\omega_2 + \frac{5}{3}\omega_4\omega_2^2c_s^2 - \frac{2}{3}u^2\omega_4^2 + \frac{1}{2}\omega_3\omega_4^2v^2 - \frac{5}{6}\omega_4\omega_1 - \frac{1}{6}\omega_3\omega_4 - \frac{2}{3}\omega_3\omega_4\omega_1\omega_2c_s^2 - \frac{1}{3}u\omega_4\omega_1\omega_2^2 + \frac{7}{6}\omega_3\omega_2c_s^2 + \frac{1}{6}\omega_3\omega_4\omega_2 + \frac{1}{6}\omega_4\omega_1\omega_2 - \frac{1}{6}\omega_3u^2\omega_1\omega_2^2 + \frac{5}{6}\omega_4^2\omega_1c_s^2 - u^2\omega_4\omega_1 + \frac{1}{2}\omega_3^2\omega_4c_s^2 + \frac{3}{2}u\omega_4\omega_1\omega_2 - \frac{1}{3}\omega_3\omega_1 + \frac{1}{6}\omega_3u^2\omega_1\omega_2 - \frac{1}{2}\omega_3^2\omega_4v^2\omega_2 + \omega_4^2v^2\omega_2 - \frac{1}{2}\omega_3\omega_4^2\omega_2c_s^2 + \frac{1}{3}\omega_4 - \omega_3c_s^2 - \frac{1}{6}\omega_3u^2\omega_2^2 + \frac{1}{3}\omega_3^2u^2 + 2u^2\omega_4 + 3\omega_4v^2 - \frac{1}{2}\omega_3\omega_4\omega_1v^2\omega_2 - \frac{3}{2}\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4^2c_s^2 + \omega_1 + \frac{1}{3}u\omega_4\omega_1 + \frac{1}{6}\omega_3\omega_1\omega_2c_s^2 - \frac{1}{3}\omega_3u\omega_1 - \frac{1}{6}\omega_3u^2\omega_4\omega_1\omega_2 - \frac{5}{6}\omega_4\omega_1\omega_2^2c_s^2 - \frac{1}{2}\omega_3\omega_4\omega_2^2c_s^2 + \frac{1}{2}\omega_3u\omega_1\omega_2 - \omega_4^2v^2 - \frac{1}{3}u\omega_4^2\omega_1\omega_2 - \frac{1}{6}\omega_3\omega_1\omega_2^2c_s^2 - \frac{5}{6}\omega_4\omega_1c_s^2 - \frac{7}{6}u\omega_4\omega_1 - \frac{8}{3}\omega_3\omega_4c_s^2 + \frac{2}{3}u^2\omega_4\omega_2^2 - \frac{1}{3}\omega_4\omega_2 + \frac{19}{6}\omega_3\omega_4\omega_2c_s^2 + \frac{1}{2}\omega_3\omega_4\omega_1v^2 + \frac{1}{2}\omega_3\omega_2^2 + \frac{10}{3}\omega_4\omega_1\omega_2c_s^2 - 4\omega_4v^2\omega_2 + \frac{1}{2}u\omega_1\omega_2^2 + \frac{1}{3}u^2\omega_4^2\omega_1 - \frac{1}{3}u^2\omega_4\omega_1\omega_2^2 + \frac{1}{6}\omega_3u^2\omega_4\omega_2 + 3\omega_2 - \frac{1}{2}\omega_3\omega_4v^2\omega_2 - \omega_3u^2 - \frac{1}{2}\omega_4\omega_1v^2\omega_2^2 - \omega_2^2 + \frac{1}{3}\omega_3^2c_s^2 + \frac{1}{3}\omega_3\omega_1\omega_2 - \frac{5}{3}\omega_4^2c_s^2 + u\omega_1 - \frac{3}{2}\omega_4\omega_1v^2 + 3\omega_3\omega_4v^2\omega_2 - \frac{5}{2}\omega_3\omega_4v^2 + 2\omega_4\omega_1v^2\omega_2 - \frac{20}{3}\omega_4\omega_2c_s^2 - \frac{1}{6}\omega_3\omega_2^2c_s^2 - \frac{3}{2}u\omega_1\omega_2 + \frac{2}{3}\omega_3\omega_4\omega_1c_s^2 + \frac{1}{6}\omega_3u\omega_4\omega_1 + \frac{4}{3}u^2\omega_4\omega_1\omega_2 - \frac{1}{3}\omega_3^2 - \frac{8}{3}u^2\omega_4\omega_2 - \frac{1}{3}\omega_3^2u^2\omega_2 - \frac{1}{6}\omega_3u\omega_4\omega_1\omega_2 + \omega_4v^2\omega_2^2 - \frac{13}{6}\omega_3\omega_2 - \frac{1}{6}\omega_3u\omega_1\omega_2^2 - \frac{1}{6}\omega_3u^2\omega_4 - \frac{1}{3}\omega_3^2\omega_2c_s^2,$$

$$\alpha_{x+\delta_1,y}^{[\mu_5],t-3\delta_t} = 3 - \frac{5}{2}\omega_3 - \frac{1}{2}\omega_3^2\omega_2 - \frac{1}{2}\omega_1\omega_2^2 + 2\omega_4\omega_1 + 3\omega_3\omega_4 - \frac{7}{2}\omega_3\omega_4\omega_2 - \frac{5}{2}\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4^2 + \frac{1}{2}\omega_4\omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_2^2 + \frac{1}{2}\omega_3\omega_1 - 4\omega_4 + \omega_4^2 + 2\omega_1\omega_2 - \frac{3}{2}\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1\omega_2 - \omega_4^2\omega_2 + 5\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_2^2 - 4\omega_2 + \omega_2^2 - \frac{1}{2}\omega_3\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 - \frac{1}{2}\omega_3^2\omega_4 + \frac{1}{2}\omega_3^2 + \frac{1}{2}\omega_3\omega_4^2\omega_2 - \omega_4\omega_2^2 + 3\omega_3\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_2 + \frac{1}{2}\omega_4^2\omega_1\omega_2,$$

$$\begin{aligned} \alpha_{x,y+\delta_1}^{[\mu_1,t-\delta_t]} = & -1 + \frac{1}{2}\omega_4^2\omega_1v^2 - \frac{1}{2}\omega_3^2\omega_4\omega_1v^2 + \frac{1}{2}\omega_3^2\omega_4v^2 + \frac{5}{3}\omega_3 - \frac{1}{2}\omega_3\omega_4^2\omega_1c_s^2 + \frac{1}{6}\omega_3\omega_1^2vw_2 + \frac{10}{3}\omega_4c_s^2 - \omega_4\omega_1vw_2 + \\ & \frac{1}{3}\omega_3u^2\omega_2 - \omega_2 - \frac{1}{2}u^2\omega_4^2 + \frac{1}{2}\omega_3\omega_4^2v^2 + \frac{1}{2}\omega_4\omega_1^2v^2 - \frac{1}{3}\omega_3\omega_4vw_2 + \frac{1}{2}\omega_4\omega_1 + \frac{1}{3}u^2\omega_4\omega_1^2 - \frac{1}{6}\omega_3\omega_4 - \frac{1}{2}\omega_3\omega_4\omega_1\omega_2c_s^2 + \\ & \frac{1}{3}\omega_3\omega_2c_s^2 + \frac{1}{3}\omega_3\omega_1^2 - \frac{1}{2}\omega_3\omega_4\omega_1^2c_s^2 + \frac{1}{6}\omega_3^2\omega_1vw_2 + \frac{5}{6}\omega_4^2\omega_1c_s^2 - \frac{1}{3}\omega_4\omega_1^2 - \frac{1}{2}\omega_1^2vw_2 - \frac{3}{2}u^2\omega_4\omega_1 - \frac{1}{2}\omega_3^2\omega_4\omega_1c_s^2 + \\ & \frac{1}{2}\omega_3^2\omega_4c_s^2 - \frac{1}{3}\omega_3^2u^2\omega_1 - 2\omega_3\omega_1 - \frac{1}{6}\omega_3^2vw_2 - \frac{1}{3}\omega_3u^2\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4^2\omega_1v^2 - \frac{1}{6}\omega_4 - \frac{4}{3}\omega_3c_s^2 + \frac{1}{3}\omega_3^2u^2 + \frac{4}{3}u^2\omega_4 + \\ & 2\omega_4v^2 - \frac{1}{2}\omega_3\omega_4\omega_1v^2\omega_2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4^2c_s^2 + \omega_1 + \frac{5}{6}\omega_4\omega_1^2c_s^2 - \frac{1}{3}\omega_3\omega_1\omega_2c_s^2 + \frac{5}{3}\omega_3\omega_1c_s^2 - \frac{1}{2}\omega_3\omega_4\omega_1^2v^2 + \\ & \frac{2}{3}\omega_4vw_2 + \frac{1}{3}\omega_3\omega_4\omega_1vw_2 + \frac{5}{6}\omega_3vw_2 - \frac{1}{2}\omega_4^2v^2 + \frac{5}{3}\omega_3u^2\omega_1 - \frac{25}{6}\omega_4\omega_1c_s^2 + \frac{3}{2}\omega_1vw_2 - \frac{5}{6}\omega_3\omega_4c_s^2 - \frac{1}{3}\omega_3\omega_1^2c_s^2 + \\ & \frac{1}{6}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_2c_s^2 + 3\omega_3\omega_4\omega_1v^2 + \frac{5}{6}\omega_4\omega_1\omega_2c_s^2 - \frac{1}{2}\omega_4v^2\omega_2 + \frac{1}{3}u^2\omega_4^2\omega_1 + \frac{1}{3}\omega_3^2\omega_1 - \frac{1}{3}\omega_3^2\omega_1c_s^2 + \frac{1}{2}\omega_2 - \\ & \frac{4}{3}\omega_3u^2 + \frac{1}{3}\omega_3^2c_s^2 + \frac{1}{2}\omega_3\omega_1\omega_2 - \frac{5}{6}\omega_4^2c_s^2 - \frac{5}{2}\omega_4\omega_1v^2 + \frac{1}{2}\omega_3\omega_4v^2\omega_2 - \frac{3}{2}\omega_3\omega_4v^2 + \frac{1}{2}\omega_4\omega_1v^2\omega_2 - \frac{5}{6}\omega_4\omega_2c_s^2 + \\ & 3\omega_3\omega_4\omega_1c_s^2 - \omega_3\omega_1vw_2 + \frac{1}{3}u^2\omega_4\omega_1\omega_2 - \frac{1}{3}\omega_3^2 - \frac{1}{3}u^2\omega_4\omega_2 + \frac{1}{3}\omega_4\omega_1^2vw_2 - \frac{1}{2}\omega_3\omega_2 - \frac{1}{3}\omega_3u^2\omega_1^2, \end{aligned}$$

$$\alpha_{x,y+\delta_1}^{[\mu_5],t-3\delta_t} = 3 - \frac{10}{3}\omega_3 - \frac{1}{6}\omega_3^2\omega_2 + \frac{1}{6}\omega_3^2\omega_1\omega_2 + \omega_1^2 + \frac{1}{6}\omega_3\omega_2^2\omega_2 + 4\omega_4\omega_1 + \frac{10}{3}\omega_3\omega_4 - \frac{5}{6}\omega_3\omega_4\omega_2 - \frac{3}{2}\omega_4\omega_1\omega_2 - \frac{2}{3}\omega_3\omega_1^2 - \frac{1}{2}\omega_3\omega_4^2 - \frac{5}{6}\omega_4\omega_1^2 + 4\omega_3\omega_1 + \frac{1}{2}\omega_3^2\omega_4\omega_1 - \frac{19}{6}\omega_4 + \frac{1}{2}\omega_4^2 + 2\omega_1\omega_2 - 4\omega_1 + \frac{5}{6}\omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4^2\omega_1 - \frac{1}{2}\omega_1^2\omega_2 + \frac{5}{6}\omega_4\omega_2 - \frac{23}{6}\omega_3\omega_4\omega_1 - \frac{2}{3}\omega_3^2\omega_1 - \frac{3}{2}\omega_2 - \frac{3}{2}\omega_3\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 - \frac{1}{2}\omega_3^2\omega_4 + \frac{1}{3}\omega_4\omega_1^2\omega_2 + \frac{2}{3}\omega_3^2 + \frac{1}{2}\omega_3\omega_4\omega_1^2 + \frac{4}{3}\omega_3\omega_2,$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_1],t-4\delta_t} = & 2 + w_4 w_1^2 v^2 w_2 + w_3^2 w_4 w_2 c_s^2 - \frac{5}{3} w_4^2 w_2 c_s^2 - w_4^2 w_1 v^2 + w_3^2 w_4 w_1 v^2 + \frac{5}{3} w_4^2 w_1 w_2 c_s^2 + w_3 w_4^2 v^2 w_2 - \\ & \frac{2}{3} w^2 w_4^2 w_2 - w_3^2 w_4 w_1 w_2 c_s^2 - w_3^2 w_4 v^2 - \frac{10}{3} w_3 - \frac{2}{3} w_3^2 w_2 + \frac{2}{3} w_3^2 w_1 w_2 + \frac{2}{3} u^2 w_4^2 w_1 w_2 + w_3 w_4^2 w_1 c_s^2 - w_3 w_4 w_1 v^2 w_2^2 - \\ & w_1 w_2^2 + \frac{2}{3} w_3 w_1^2 w_2 - \frac{20}{3} w_4 c_s^2 - \frac{10}{3} w_3 u^2 w_2 - \frac{5}{3} w_4 w_2 c_s^2 + \frac{2}{3} u^2 w_4^2 - w_3 w_4^2 v^2 - w_4 w_1^2 v^2 - w_4 w_1 - \frac{2}{3} u^2 w_4 w_1^2 + \\ & \frac{1}{3} w_3 w_4 + 7 w_3 w_4 w_1 w_2 c_s^2 - \frac{10}{3} w_3 w_2 c_s^2 - \frac{1}{3} w_3 w_4 w_2 + w_4 w_1 w_2 + \frac{2}{3} u^2 w_4 w_1^2 w_2 - \frac{2}{3} w_3 u^2 w_1 w_2^2 - \frac{2}{3} w_3 w_1^2 + \\ & w_3 w_4 w_1^2 c_s^2 - \frac{5}{3} w_4^2 w_1 c_s^2 + \frac{2}{3} w_4 w_1^2 + \frac{10}{3} u^2 w_4 w_1 + w_3^2 w_4 w_1 c_s^2 - w_3^2 w_4 c_s^2 + \frac{2}{3} w_3^2 u^2 w_1 + 4 w_3 w_1 + 4 w_3 u^2 w_1 w_2 + \\ & \frac{5}{3} w_4 w_1^2 w_2 c_s^2 + w_3^2 w_4 v^2 w_2 + w_3 w_4^2 w_1 v^2 - w_4^2 v^2 w_2 - w_3^2 w_4 w_1 v^2 w_2 + w_4^2 w_1 v^2 w_2 + w_3 w_4^2 w_2 c_s^2 + \frac{1}{3} w_4 + \frac{8}{3} w_3 c_s^2 + \\ & \frac{2}{3} w_3 u^2 w_2^2 - \frac{2}{3} w_3^2 u^2 - \frac{8}{3} u^2 w_4 - 4 w_4 v^2 + 7 w_3 w_4 w_1 v^2 w_2 + 3 w_1 w_2 - w_3 w_4^2 c_s^2 - 2 w_1 - \frac{5}{3} w_4 w_1^2 c_s^2 + 4 w_3 w_1 w_2 c_s^2 + \\ & \frac{1}{3} w_3 w_4 w_1 w_2 - \frac{10}{3} w_3 w_1 c_s^2 + w_3 w_4 w_1^2 v^2 + \frac{5}{3} w_4 w_1 w_2^2 c_s^2 + w_3 w_4 w_2^2 c_s^2 + w_4^2 v^2 - \frac{10}{3} w_3 u^2 w_1 - \frac{2}{3} w_3 w_1 w_2^2 c_s^2 + \\ & \frac{25}{3} w_4 w_1 c_s^2 + 5 w_3 w_4 c_s^2 + \frac{2}{3} w_3 w_1^2 c_s^2 - \frac{2}{3} u^2 w_4 w_2^2 - \frac{1}{3} w_4 w_2 - \frac{1}{3} w_3 w_4 w_1 - 6 w_3 w_4 w_2 c_s^2 - 6 w_3 w_4 w_1 v^2 - w_3 w_2^2 - \\ & 10 w_4 w_1 w_2 c_s^2 + 5 w_4 v^2 w_2 - \frac{2}{3} w_3 w_1^2 w_2 c_s^2 - \frac{2}{3} u^2 w_4^2 w_1 - \frac{2}{3} w_3^2 w_1 - \frac{2}{3} w_3 u^2 w_1^2 w_2 - w_3 w_4 w_1^2 v^2 w_2 - \\ & w_3 w_4^2 w_1 w_2 c_s^2 + \frac{2}{3} u^2 w_4 w_1 w_2^2 + w_3 w_1 w_2^2 + \frac{2}{3} w_3^2 w_1 c_s^2 - 3 w_2 + w_3 w_4 v^2 w_2^2 + \frac{8}{3} w_3 u^2 + w_4 w_1 v^2 w_2^2 + w_2^2 - \\ & \frac{2}{3} w_3^2 c_s^2 - 5 w_3 w_1 w_2 + \frac{5}{3} w_4^2 c_s^2 + 5 w_4 w_1 v^2 - 6 w_3 w_4 v^2 w_2 + 5 w_3 w_4 v^2 - 6 w_4 w_1 v^2 w_2 + \frac{25}{3} w_4 w_2 c_s^2 + \frac{2}{3} w_3 w_2^2 c_s^2 - \\ & w_3 w_4 w_1 w_2^2 c_s^2 - \frac{2}{3} w_3^2 w_1^2 w_1 w_2 - 6 w_3 w_4 w_1 c_s^2 - \frac{2}{3} w_4 w_1^2 w_2 - 4 u^2 w_4 w_1 w_2 + \frac{2}{3} w_3^2 + \frac{10}{3} u^2 w_4 w_2 + \frac{2}{3} w_3^2 u^2 w_2 - \\ & w_4 v^2 w_2^2 + \frac{13}{3} w_3 w_2 - \frac{2}{3} w_3^2 w_1 w_2 c_s^2 - w_3 w_4 w_1^2 w_2 c_s^2 + \frac{2}{3} w_3^2 w_2 c_s^2 + \frac{2}{3} w_3 u^2 w_1^2 - w_3 w_4 w_1 v^2 w_2, \end{aligned}$$

$$\alpha_{x,y}^{[\mu_5],t-\delta_t} = -4 + 5\omega_3 + \omega_3^2\omega_2 - \omega_3^2\omega_1\omega_2 + \omega_1\omega_2^2 + \omega_3\omega_4\omega_1\omega_2^2 - \omega_1^2 - \omega_3\omega_1^2\omega_2 - 6\omega_4\omega_1 - 6\omega_3\omega_4 + 7\omega_3\omega_4\omega_2 + 7\omega_4\omega_1\omega_2 + \omega_3\omega_1^2 + \omega_3\omega_4^2 + \omega_4\omega_1^2 - \omega_4\omega_1\omega_2^2 - \omega_3\omega_4\omega_2^2 - 6\omega_3\omega_1 - \omega_3^2\omega_4\omega_1 + 5\omega_4 - \omega_4^2 - 6\omega_1\omega_2 + 5\omega_1 - 8\omega_3\omega_4\omega_1\omega_2 + \omega_4^2\omega_2 - \omega_3\omega_4^2\omega_1 + \omega_3\omega_4\omega_1^2\omega_2 + \omega_1^2\omega_2 - 6\omega_4\omega_2 + 7\omega_3\omega_4\omega_1 + \omega_3\omega_2^2 + \omega_3\omega_4^2\omega_1\omega_2 + \omega_3^2\omega_1 - \omega_3\omega_1\omega_2^2 + 5\omega_2 - \omega_2^2 + 7\omega_3\omega_1\omega_2 + \omega_4^2\omega_1 + \omega_3^2\omega_4 - \omega_4\omega_1^2\omega_2 - \omega_3^2 - \omega_3\omega_4^2\omega_2 + \omega_4\omega_2^2 - \omega_3\omega_4\omega_1^2 - 6\omega_3\omega_2 - \omega_3^2\omega_4\omega_2 - \omega_4^2\omega_1\omega_2 + \omega_3^2\omega_4\omega_1\omega_2,$$

## 6 MRT 4: with ortogonalization and relaxation of $m_{00}$ , $m_{10}$ , $m_{01}$ , $m_{20} + m_{02}$ , $m_{20} - m_{02}$

### 6.1 Definitions

Matrix  $\mathbf{A} = \mathbf{M}^{-1}\mathbf{SM}$ :

$$\begin{aligned}
\mathbf{A}_{1,1} &= \frac{4}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{1,2} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{1,3} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{1,4} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{1,5} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{2,1} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{2,2} &= \frac{1}{4}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{20}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{2,3} &= -\frac{1}{4}\omega_4 + \frac{1}{20}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{2,4} &= \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{20}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{2,5} &= -\frac{1}{4}\omega_4 + \frac{1}{20}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{3,1} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{3,2} &= -\frac{1}{4}\omega_4 + \frac{1}{20}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{3,3} &= \frac{1}{4}\omega_4 + \frac{1}{20}\omega_3 + \frac{1}{5}\omega_0 + \frac{1}{2}\omega_2, \\
\mathbf{A}_{3,4} &= -\frac{1}{4}\omega_4 + \frac{1}{20}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{3,5} &= \frac{1}{4}\omega_4 + \frac{1}{20}\omega_3 + \frac{1}{5}\omega_0 - \frac{1}{2}\omega_2, \\
\mathbf{A}_{4,1} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{4,2} &= \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{20}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{4,3} &= -\frac{1}{4}\omega_4 + \frac{1}{20}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{4,4} &= \frac{1}{4}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{20}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{4,5} &= -\frac{1}{4}\omega_4 + \frac{1}{20}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{5,1} &= -\frac{1}{5}\omega_3 + \frac{1}{5}\omega_0, \\
\mathbf{A}_{5,2} &= -\frac{1}{4}\omega_4 + \frac{1}{20}\omega_3 + \frac{1}{5}\omega_0,
\end{aligned}$$

$$\begin{aligned}\mathbf{A}_{5,3} &= \frac{1}{4}\omega_4 + \frac{1}{20}\omega_3 + \frac{1}{5}\omega_0 - \frac{1}{2}\omega_2, \\ \mathbf{A}_{5,4} &= -\frac{1}{4}\omega_4 + \frac{1}{20}\omega_3 + \frac{1}{5}\omega_0, \\ \mathbf{A}_{5,5} &= \frac{1}{4}\omega_4 + \frac{1}{20}\omega_3 + \frac{1}{5}\omega_0 + \frac{1}{2}\omega_2.\end{aligned}$$

where

$$\mathbf{S} = \text{diag}(\omega_0, \omega_1, \omega_2, \omega_3, \omega_4)$$

and

$$\mathbf{M} = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 0 & -1 & 0 \\ 0 & 0 & 1 & 0 & -1 \\ -2^2 & 1 & 1 & 1 & 1 \\ 0 & 1 & -1 & 1 & -1 \end{pmatrix}$$

Matrix  $\mathbf{B}$ :

$$\mathbf{B} = \begin{pmatrix} 0 & -1 + \omega_3 & -1 + \omega_3 & -1 + \omega_3 & -1 + \omega_3 \\ -1 + \frac{1}{4}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3 & 0 & -1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 & -1 + \omega_1 & -1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 \\ -1 + \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3 + \frac{1}{2}\omega_2 & -1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2 & 0 & -1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2 & -1 + \omega_2 \\ -1 + \frac{1}{4}\omega_4 + \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3 & -1 + \omega_1 & -1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 & 0 & -1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1 \\ -1 + \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3 + \frac{1}{2}\omega_2 & -1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2 & -1 + \omega_2 & -1 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2 & 0 \end{pmatrix}.$$

## 6.2 EFDE for $\mu_1$

$$\mu_{1,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l, y+j\delta_l}^{[\mu_1], t-\ell\delta_t} \mu_{x+i\delta_l, y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x,y-\delta_l}^{[\mu_1],t} = 1 + \frac{1}{2}\omega_3 c_s^2 - \frac{1}{4}\omega_3 - \frac{1}{4}\omega_4 u^2 - \frac{1}{4}\omega_4 + \frac{1}{4}v^2\omega_3 + \frac{1}{4}\omega_3 u^2 + \frac{1}{2}v\omega_2 - \frac{1}{2}\omega_2 + \frac{1}{4}v^2\omega_4.$$

$$\alpha_{x-\delta_l,y}^{[\mu_1],t} = 1 + \frac{1}{2}\omega_3 c_s^2 - \frac{1}{4}\omega_3 + \frac{1}{2}\omega_1 u + \frac{1}{4}\omega_4 u^2 - \frac{1}{4}\omega_4 + \frac{1}{4}v^2\omega_3 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3 u^2 - \frac{1}{4}v^2\omega_4.$$

$$\alpha_{x,y}^{[\mu_1],t} = 1 - 2\omega_3 c_s^2 - v^2\omega_3 - \omega_3 u^2.$$

$$\alpha_{x+\delta_l,y}^{[\mu_1],t} = 1 + \frac{1}{2}\omega_3 c_s^2 - \frac{1}{4}\omega_3 - \frac{1}{2}\omega_1 u + \frac{1}{4}\omega_4 u^2 - \frac{1}{4}\omega_4 + \frac{1}{4}v^2\omega_3 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3 u^2 - \frac{1}{4}v^2\omega_4.$$

$$\alpha_{x,y+\delta_l}^{[\mu_1],t} = 1 + \frac{1}{2}\omega_3 c_s^2 - \frac{1}{4}\omega_3 - \frac{1}{4}\omega_4 u^2 - \frac{1}{4}\omega_4 + \frac{1}{4}v^2\omega_3 + \frac{1}{4}\omega_3 u^2 - \frac{1}{2}v\omega_2 - \frac{1}{2}\omega_2 + \frac{1}{4}v^2\omega_4.$$

$$\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} = -1 + \frac{1}{8}v^2\omega_3\omega_1 - \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_1 u\omega_2 + \frac{1}{8}\omega_4 u^2\omega_2 - \omega_3 c_s^2 - \frac{1}{8}v^2\omega_4\omega_2 + \frac{1}{2}\omega_3 + \frac{1}{4}\omega_3\omega_4 u^2 + \frac{1}{4}v^2\omega_3\omega_4 + \frac{1}{8}\omega_3\omega_1 u^2 - \frac{1}{8}\omega_3\omega_1 - \frac{1}{2}\omega_1 u - \frac{1}{8}\omega_4\omega_2 - \frac{1}{4}\omega_3\omega_4 + \frac{1}{4}\omega_3 c_s^2\omega_1 + \frac{1}{2}\omega_4 + \frac{1}{4}\omega_3 c_s^2\omega_2 + \frac{1}{4}v\omega_1\omega_2 - \frac{1}{2}v^2\omega_3 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_1 u + \frac{1}{2}\omega_3\omega_4 c_s^2 - \frac{1}{8}\omega_3\omega_2 - \frac{1}{2}\omega_3 u^2 + \frac{1}{8}\omega_3 u^2\omega_2 - \frac{1}{2}v\omega_2 + \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{8}\omega_4\omega_1 u^2 + \frac{1}{2}\omega_2 + \frac{1}{8}v^2\omega_3\omega_2 + \frac{1}{4}v\omega_4\omega_2,$$

$$\alpha_{x,y-\delta_l}^{[\mu_1],t-\delta_t} = -1 + \frac{3}{2}\omega_3 c_s^2 + \frac{1}{2}v\omega_3\omega_2 + \frac{1}{4}\omega_3 - \frac{1}{2}\omega_3\omega_4 u^2 + \frac{1}{4}\omega_4 u^2 + \frac{1}{4}\omega_4 - \omega_3 c_s^2\omega_2 + \frac{3}{4}v^2\omega_3 - \frac{1}{2}\omega_3\omega_4 c_s^2 + \frac{3}{4}\omega_3 u^2 - \frac{1}{2}\omega_3 u^2\omega_2 - \frac{1}{2}v\omega_2 + \frac{1}{2}\omega_2 - \frac{1}{4}v^2\omega_4 - \frac{1}{2}v^2\omega_3\omega_2,$$



$$\alpha_{x+\delta_1,y}^{[\mu_1],t-2\delta_t} = 1 - \frac{1}{4}v^2\omega_3\omega_1 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{2}\omega_1\omega_2 + \frac{1}{2}\omega_1u\omega_2 + \frac{1}{4}\omega_4u^2\omega_2 + \frac{3}{2}\omega_3c_s^2 - \frac{1}{4}v^2\omega_4\omega_2 - \frac{3}{4}\omega_3 - \frac{1}{2}\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_4u^2 - \frac{1}{2}v^2\omega_3\omega_4 - \frac{1}{4}\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u^2 - \frac{1}{4}\omega_4\omega_1u^2\omega_2 + \frac{1}{4}\omega_3\omega_1 - \frac{1}{2}\omega_1u + \frac{3}{4}\omega_4\omega_2 - \frac{1}{4}\omega_4u^2 + \frac{1}{2}\omega_3\omega_4 - \frac{1}{2}\omega_3c_s^2\omega_1 + \frac{1}{4}v^2\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 - \frac{3}{4}\omega_4 - \frac{3}{4}\omega_3c_s^2\omega_2 + \frac{3}{4}v^2\omega_3 + \frac{1}{2}\omega_3\omega_4u^2\omega_2 - \frac{1}{2}\omega_1 + \frac{1}{2}v^2\omega_3\omega_4\omega_2 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{2}\omega_4\omega_1u - \omega_3\omega_4c_s^2 + \omega_3\omega_4c_s^2\omega_2 + \frac{3}{4}\omega_3\omega_2 - \frac{1}{2}\omega_4\omega_1u\omega_2 + \frac{3}{4}\omega_3u^2 - \frac{3}{4}\omega_3u^2\omega_2 - \frac{1}{4}v^2\omega_4\omega_1 - \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1u^2 - \omega_2 + \frac{1}{4}v^2\omega_4 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{3}{4}v^2\omega_3\omega_2,$$

$$\alpha_{x-\delta_1, y+\delta_1}^{[\mu_1], t-2\delta_t} = 1 - \frac{1}{4}vw_3w_4w_2 + \frac{3}{8}v^2w_3w_1 - \frac{1}{2}\omega_3c_s^2w_1w_2 + \frac{1}{4}\omega_1w_2 + \frac{1}{4}\omega_3w_4w_1u - \frac{1}{4}\omega_1uw_2 - \frac{1}{8}w_4u^2w_2 - \omega_3c_s^2 + \frac{1}{8}v^2w_4w_2 + \frac{1}{2}vw_3w_2 - \frac{1}{2}\omega_3 + \frac{1}{4}\omega_3w_4u^2 - \frac{1}{2}w_3w_1u + \frac{1}{4}v^2w_3w_4 + \frac{3}{8}w_3w_1u^2 - \frac{1}{4}\omega_3w_4c_s^2w_1 + \frac{1}{8}\omega_3w_1 + \frac{1}{2}\omega_1u + \frac{1}{8}\omega_4w_2 - \frac{1}{4}\omega_3w_4w_1u^2 + \frac{1}{4}\omega_3w_4 + \frac{3}{4}\omega_3c_s^2w_1 - \frac{1}{4}vw_3w_1w_2 - \frac{1}{4}w_3w_1u^2w_2 - \frac{1}{2}\omega_4 + \frac{3}{4}\omega_3c_s^2w_2 + \frac{1}{4}vw_1w_2 - \frac{1}{2}v^2w_3 + \frac{1}{4}\omega_3w_1uw_2 - \frac{1}{2}\omega_1 - \frac{1}{4}v^2w_3w_4w_2 + \frac{1}{8}w_4w_1 - \frac{1}{4}\omega_4w_1u + \frac{1}{2}\omega_3w_4c_s^2 - \frac{1}{4}\omega_3w_4c_s^2w_2 + \frac{1}{8}w_3w_2 - \frac{1}{2}w_3u^2 + \frac{3}{8}w_3u^2w_2 - \frac{1}{2}vw_2 - \frac{1}{8}v^2w_4w_1 + \frac{1}{8}w_4w_1u^2 - \frac{1}{2}\omega_2 - \frac{1}{4}v^2w_3w_1w_2 + \frac{3}{8}v^2w_3w_2 + \frac{1}{4}vw_4w_2,$$

$$\begin{aligned} \alpha_{x,y+\delta_1}^{[\mu_1,t-2\delta_t]} = & 1 - \frac{3}{4}v^2\omega_3\omega_1 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{2}\omega_1\omega_2 - \frac{1}{4}\omega_4u^2\omega_2 + \frac{3}{2}\omega_3c_s^2 + \frac{1}{4}v^2\omega_4\omega_2 - \frac{3}{4}\omega_3 - \frac{1}{2}\omega_3\omega_4u^2 - \\ & \frac{1}{2}v^2\omega_3\omega_4 - \frac{1}{4}\omega_3\omega_1\omega_2 - \frac{3}{4}\omega_3\omega_1u^2 + \frac{1}{4}\omega_4\omega_1u^2\omega_2 + \omega_3\omega_4c_s^2\omega_1 + \frac{3}{4}\omega_3\omega_1 + \frac{1}{4}\omega_4\omega_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1 + \frac{1}{4}\omega_4u^2 + \\ & \frac{1}{2}\omega_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3\omega_4 - \frac{3}{2}\omega_3c_s^2\omega_1 - \frac{1}{4}v^2\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 - \frac{3}{4}\omega_4 - \frac{1}{2}\omega_3c_s^2\omega_2 + \frac{1}{2}v\omega_1\omega_2 + \frac{3}{4}v^2\omega_3 - \\ & \omega_1 + \frac{3}{4}\omega_4\omega_1 - \omega_3\omega_4c_s^2 + \frac{1}{4}\omega_3\omega_2 + \frac{3}{4}\omega_3u^2 - \frac{1}{4}\omega_3u^2\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1 - \frac{1}{2}v\omega_2 + \frac{1}{4}v^2\omega_4\omega_1 - \frac{1}{4}\omega_4\omega_1\omega_2 - \\ & \frac{1}{4}\omega_4\omega_1u^2 - \frac{1}{2}\omega_2 - \frac{1}{4}v^2\omega_4 - \frac{1}{2}v\omega_4\omega_1\omega_2 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{4}v^2\omega_3\omega_2 + \frac{1}{2}v\omega_4\omega_2, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_i, y+\delta_i}^{[\mu_1], t-2\delta_t} = & 1 - \frac{1}{4}vw_3w_4w_2 + \frac{3}{8}v^2w_3w_1 - \frac{1}{2}\omega_3c_s^2w_1w_2 + \frac{1}{4}\omega_1w_2 - \frac{1}{4}\omega_3w_4w_1u + \frac{1}{4}\omega_1uw_2 - \frac{1}{8}\omega_4u^2w_2 - \omega_3c_s^2 + \\ & \frac{1}{8}v^2w_4w_2 + \frac{1}{2}vw_3w_2 - \frac{1}{2}\omega_3 + \frac{1}{4}\omega_3w_4u^2 + \frac{1}{2}\omega_3w_1u + \frac{1}{4}v^2w_3w_4 + \frac{3}{8}\omega_3w_1u^2 - \frac{1}{4}\omega_3w_4c_s^2w_1 + \frac{1}{8}\omega_3w_1 - \frac{1}{2}\omega_1u + \\ & \frac{1}{8}\omega_4w_2 - \frac{1}{4}\omega_3w_4w_1u^2 + \frac{1}{4}\omega_3w_4 + \frac{3}{4}\omega_3c_s^2w_1 - \frac{1}{4}vw_3w_1w_2 - \frac{1}{4}\omega_3w_1u^2w_2 - \frac{1}{2}\omega_4 + \frac{3}{4}\omega_3c_s^2w_2 + \frac{1}{4}vw_1w_2 - \\ & \frac{1}{2}v^2w_3 - \frac{1}{4}\omega_3w_1uw_2 - \frac{1}{2}\omega_1 - \frac{1}{4}v^2w_3w_4w_2 + \frac{1}{8}\omega_4w_1 + \frac{1}{4}\omega_4w_1u + \frac{1}{2}\omega_3w_4c_s^2 - \frac{1}{4}\omega_3w_4c_s^2w_2 + \frac{1}{8}\omega_3w_2 - \\ & \frac{1}{2}\omega_3u^2 + \frac{3}{8}\omega_3u^2w_2 - \frac{1}{2}vw_2 - \frac{1}{8}v^2w_4w_1 + \frac{1}{8}\omega_4w_1u^2 - \frac{1}{2}\omega_2 - \frac{1}{4}v^2w_3w_1w_2 + \frac{3}{8}v^2w_3w_2 + \frac{1}{4}vw_4w_2, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y-\delta_1}^{[\mu_1],t-3\delta_t} = & -1 - \frac{1}{2}vw_3w_4w_2 - \frac{1}{4}v^2w_3w_1 + \frac{1}{2}w_3c_s^2w_1w_2 - \frac{1}{2}w_1w_2 + \frac{1}{2}vw_3w_4w_1w_2 + \frac{1}{4}w_4u^2w_2 - \frac{1}{2}v^2w_3w_4w_1w_2 + \\ & \frac{1}{2}w_3c_s^2 - \frac{1}{4}v^2w_4w_2 + \frac{1}{2}vw_3w_2 + \frac{3}{4}w_3 - \frac{1}{2}v^2w_3w_4 + \frac{1}{4}w_3w_1w_2 - \frac{1}{4}w_3w_1u^2 - \frac{1}{2}w_3w_4c_s^2w_1w_2 - \frac{1}{4}w_4w_1u^2w_2 + \\ & \frac{1}{2}w_3w_4c_s^2w_1 - \frac{3}{4}w_3w_1 - \frac{1}{4}w_4w_2 + \frac{1}{2}v^2w_3w_4w_1 - \frac{1}{4}w_4u^2 - \frac{1}{2}w_3w_4 - \frac{1}{2}w_3c_s^2w_1 - \frac{1}{2}vw_3w_1w_2 + \frac{1}{4}v^2w_4w_1w_2 + \\ & \frac{1}{4}w_3w_1u^2w_2 + \frac{3}{4}w_4 - \frac{1}{2}w_3c_s^2w_2 + \frac{1}{2}vw_1w_2 + \frac{1}{4}v^2w_3 + w_1 + \frac{1}{2}v^2w_3w_4w_2 - \frac{3}{4}w_4w_1 - \frac{1}{2}w_3w_4c_s^2 + \\ & \frac{1}{2}w_3w_4c_s^2w_2 - \frac{1}{4}w_3w_2 + \frac{1}{4}w_3u^2 - \frac{1}{4}w_3u^2w_2 + \frac{1}{2}w_3w_4w_1 - \frac{1}{2}vw_2 - \frac{1}{4}v^2w_4w_1 + \frac{1}{4}w_4w_1w_2 + \frac{1}{4}w_4w_1u^2 + \frac{1}{2}w_2 + \\ & \frac{1}{4}v^2w_4 - \frac{1}{2}vw_4w_1w_2 + \frac{1}{4}v^2w_3w_1w_2 - \frac{1}{4}v^2w_3w_2 + \frac{1}{2}vw_4w_2, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_1,y}^{[\mu_1],t-3\delta_t} = & -1 - \frac{1}{4}v^2\omega_3\omega_1 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1u + \frac{1}{2}\omega_1u\omega_2 - \frac{1}{4}\omega_4u^2\omega_2 + \frac{1}{2}\omega_3c_s^2 + \frac{1}{4}v^2\omega_4\omega_2 + \\ & \frac{3}{4}\omega_3 + \frac{1}{2}\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1u^2\omega_2 - \frac{1}{2}\omega_3\omega_4u^2 + \frac{1}{2}\omega_3\omega_1u + \frac{1}{4}\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1\omega_2 + \\ & \frac{1}{4}\omega_4\omega_1u^2\omega_2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_3\omega_1 - \frac{1}{2}\omega_1u - \frac{3}{4}\omega_4\omega_2 + \frac{1}{4}\omega_4u^2 + \frac{1}{2}\omega_3\omega_4\omega_1u^2 - \frac{1}{2}\omega_3\omega_4 - \frac{1}{2}\omega_3c_s^2\omega_1 - \\ & \frac{1}{4}v^2\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 + \frac{3}{4}\omega_4 - \frac{1}{2}\omega_3c_s^2\omega_2 + \frac{1}{4}v^2\omega_3 + \frac{1}{2}\omega_3\omega_4u^2\omega_2 - \frac{1}{2}\omega_3\omega_1u\omega_2 + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_4\omega_1 + \\ & \frac{1}{2}\omega_4\omega_1u - \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 - \frac{3}{4}\omega_3\omega_2 - \frac{1}{2}\omega_4\omega_1u\omega_2 + \frac{1}{4}\omega_3u^2 - \frac{1}{4}\omega_3u^2\omega_2 + \frac{1}{4}v^2\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_1\omega_2 - \\ & \frac{1}{4}\omega_4\omega_1u^2 + \frac{1}{2}\omega_3\omega_4\omega_1u\omega_2 + \omega_2 - \frac{1}{4}v^2\omega_4 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{4}v^2\omega_3\omega_2, \end{aligned}$$

$$\alpha_{x,y}^{[\mu_1,t-\delta_t]} = -1 + v^2 \omega_3 \omega_1 - 2 \omega_3 c_s^2 \omega_1 \omega_2 - \omega_1 \omega_2 + v^2 \omega_3 \omega_4 \omega_1 \omega_2 - 2 \omega_3 c_s^2 + \omega_3 + \omega_3 \omega_4 \omega_2 + \omega_3 \omega_4 \omega_1 u^2 \omega_2 + \omega_3 \omega_4 u^2 + v^2 \omega_3 \omega_4 + \omega_3 \omega_1 \omega_2 + \omega_3 \omega_1 u^2 + 2 \omega_3 \omega_4 c_s^2 \omega_1 \omega_2 - 2 \omega_3 \omega_4 c_s^2 \omega_1 - \omega_3 \omega_1 - \omega_4 \omega_2 - v^2 \omega_3 \omega_4 \omega_1 - \omega_3 \omega_4 \omega_1 u^2 - \omega_3 \omega_4 - \omega_3 \omega_4 \omega_1 \omega_2 + 2 \omega_3 c_s^2 \omega_1 - \omega_3 \omega_1 u^2 \omega_2 + \omega_4 + 2 \omega_3 c_s^2 \omega_2 - v^2 \omega_3 - \omega_3 \omega_4 u^2 \omega_2 + \omega_1 - v^2 \omega_3 \omega_4 \omega_2 - \omega_4 \omega_1 + 2 \omega_3 \omega_4 c_s^2 - 2 \omega_3 \omega_4 c_s^2 \omega_2 - \omega_3 \omega_2 - \omega_3 u^2 + \omega_3 u^2 \omega_2 + \omega_3 \omega_4 \omega_1 + \omega_4 \omega_1 \omega_2 + \omega_2 - v^2 \omega_3 \omega_1 \omega_2 + v^2 \omega_3 \omega_2,$$

$$\alpha_{x+\delta t, y}^{[\mu_1, t-3\delta t]} = -1 - \frac{1}{4}v^2\omega_3\omega_1 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4\omega_1u - \frac{1}{2}\omega_1u\omega_2 - \frac{1}{4}\omega_4u^2\omega_2 + \frac{1}{2}\omega_3c_s^2 + \frac{1}{4}v^2\omega_4\omega_2 + \frac{3}{4}\omega_3 + \frac{1}{2}\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1u^2\omega_2 - \frac{1}{2}\omega_3\omega_4u^2 - \frac{1}{2}\omega_3\omega_1u + \frac{1}{4}\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1u^2\omega_2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_3\omega_1 + \frac{1}{2}\omega_1u - \frac{3}{4}\omega_4\omega_2 + \frac{1}{4}\omega_4u^2 + \frac{1}{2}\omega_3\omega_4\omega_1u^2 - \frac{1}{2}\omega_3\omega_4 - \frac{1}{2}\omega_3c_s^2\omega_1 - \frac{1}{4}v^2\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 + \frac{3}{4}\omega_4 - \frac{1}{2}\omega_3c_s^2\omega_2 + \frac{1}{4}v^2\omega_3 + \frac{1}{2}\omega_3\omega_4u^2\omega_2 + \frac{1}{2}\omega_3\omega_1u\omega_2 + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_1u - \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 - \frac{3}{4}\omega_3\omega_2 + \frac{1}{2}\omega_4\omega_1u\omega_2 + \frac{1}{4}\omega_3u^2 - \frac{1}{4}\omega_3u^2\omega_2 + \frac{1}{4}v^2\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_4\omega_1u^2 - \frac{1}{2}\omega_3\omega_4\omega_1u\omega_2 + \omega_2 - \frac{1}{4}v^2\omega_4 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{4}v^2\omega_3\omega_2,$$

$$\alpha_{x,y+\delta_l}^{[\mu_1],t-3\delta_t} = -1 + \frac{1}{2}v\omega_3\omega_4\omega_2 - \frac{1}{4}v^2\omega_3\omega_1 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}\omega_1\omega_2 - \frac{1}{2}v\omega_3\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_4u^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1\omega_2 +$$

$$\begin{aligned}
& \frac{1}{2}\omega_3 c_s^2 - \frac{1}{4}v^2\omega_4\omega_2 - \frac{1}{2}v\omega_3\omega_2 + \frac{3}{4}\omega_3 - \frac{1}{2}v^2\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_4c_s^2\omega_1\omega_2 - \frac{1}{4}\omega_4\omega_1u^2\omega_2 + \\
& \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 - \frac{3}{4}\omega_3\omega_1 - \frac{1}{4}\omega_4\omega_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_4u^2 - \frac{1}{2}\omega_3\omega_4 - \frac{1}{2}\omega_3c_s^2\omega_1 + \frac{1}{2}v\omega_3\omega_1\omega_2 + \frac{1}{4}v^2\omega_4\omega_1\omega_2 + \\
& \frac{1}{4}\omega_3\omega_1u^2\omega_2 + \frac{3}{4}\omega_4 - \frac{1}{2}\omega_3c_s^2\omega_2 - \frac{1}{2}v\omega_1\omega_2 + \frac{1}{4}v^2\omega_3 + \omega_1 + \frac{1}{2}v^2\omega_3\omega_4\omega_2 - \frac{3}{4}\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4c_s^2 + \\
& \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 - \frac{1}{4}\omega_3\omega_2 + \frac{1}{4}\omega_3u^2 - \frac{1}{4}\omega_3u^2\omega_2 + \frac{1}{2}\omega_3\omega_4\omega_1 + \frac{1}{2}v\omega_2 - \frac{1}{4}v^2\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1u^2 + \frac{1}{2}\omega_2 + \\
& \frac{1}{4}v^2\omega_4 + \frac{1}{2}v\omega_4\omega_1\omega_2 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{4}v^2\omega_3\omega_2 - \frac{1}{2}v\omega_4\omega_2,
\end{aligned}$$

$$\alpha_{x,y}^{[\mu_1],t-\delta_t} = 1 + \omega_1\omega_2 - \omega_3 - \omega_3\omega_4\omega_2 - \omega_3\omega_1\omega_2 + \omega_3\omega_1 + \omega_4\omega_2 + \omega_3\omega_4 + \omega_3\omega_4\omega_1\omega_2 - \omega_4 - \omega_1 + \omega_4\omega_1 + \omega_3\omega_2 - \omega_3\omega_4\omega_1 - \omega_4\omega_1\omega_2 - \omega_2,$$

### 6.3 EFDE for $\mu_2$

$$\mu_{2,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_2],t-\ell\delta_t} \mu_{2,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x-\delta_l,y}^{[\mu_1],t} = 1 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{4}\omega_3 + \frac{1}{2}\omega_1u + \frac{1}{4}\omega_4u^2 - \frac{1}{4}\omega_4 + \frac{1}{4}v^2\omega_3 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3u^2 - \frac{1}{4}v^2\omega_4.$$

$$\alpha_{x+\delta_l,y}^{[\mu_1],t} = -1 - \frac{1}{2}\omega_3c_s^2 + \frac{1}{4}\omega_3 + \frac{1}{2}\omega_1u - \frac{1}{4}\omega_4u^2 + \frac{1}{4}\omega_4 - \frac{1}{4}v^2\omega_3 + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_3u^2 + \frac{1}{4}v^2\omega_4.$$

$$\begin{aligned}
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{8}v^2\omega_3\omega_1 - \frac{1}{4}\omega_1\omega_2 - \frac{1}{2}\omega_3c_s^2 + \frac{1}{4}\omega_3 + \frac{1}{8}\omega_3\omega_4u^2 + \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{8}\omega_3\omega_1u^2 - \frac{1}{8}\omega_3\omega_1 - \frac{1}{4}\omega_4\omega_2 + \\
& \frac{1}{4}\omega_4u^2 - \frac{1}{8}\omega_3\omega_4 + \frac{1}{4}\omega_3c_s^2\omega_1 - \frac{1}{8}\omega_4^2u^2 + \frac{3}{4}\omega_4 + \frac{1}{4}v\omega_1\omega_2 - \frac{1}{4}v^2\omega_3 + \frac{1}{8}v^2\omega_4^2 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4c_s^2 - \\
& \frac{1}{4}\omega_3u^2 - \frac{1}{8}\omega_4^2 - \frac{1}{2}v\omega_2 + \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{8}\omega_4\omega_1u^2 + \frac{1}{2}\omega_2 - \frac{1}{4}v^2\omega_4 + \frac{1}{4}v\omega_4\omega_2,
\end{aligned}$$

$$\alpha_{x-\delta_l,y-\delta_l}^{[\mu_2],t-\delta_t} = 1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x,y-\delta_l}^{[\mu_2],t-\delta_t} = 1 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_2 - \frac{1}{2}\omega_2,$$

$$\begin{aligned}
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= 1 - \frac{1}{8}v^2\omega_3\omega_1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{4}\omega_3 - \frac{1}{8}\omega_3\omega_4u^2 - \frac{1}{8}v^2\omega_3\omega_4 - \frac{1}{8}\omega_3\omega_1u^2 + \frac{1}{8}\omega_3\omega_1 + \frac{1}{4}\omega_4\omega_2 - \\
& \frac{1}{4}\omega_4u^2 + \frac{1}{8}\omega_3\omega_4 - \frac{1}{4}\omega_3c_s^2\omega_1 + \frac{1}{8}\omega_4^2u^2 - \frac{3}{4}\omega_4 - \frac{1}{4}v\omega_1\omega_2 + \frac{1}{4}v^2\omega_3 - \frac{1}{8}\omega_4^2 - \frac{1}{2}\omega_1 + \frac{1}{8}\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4c_s^2 + \\
& \frac{1}{4}\omega_3u^2 + \frac{1}{8}\omega_4^2 + \frac{1}{2}v\omega_2 - \frac{1}{8}v^2\omega_4\omega_1 + \frac{1}{8}\omega_4\omega_1u^2 - \frac{1}{2}\omega_2 + \frac{1}{4}v^2\omega_4 - \frac{1}{4}v\omega_4\omega_2,
\end{aligned}$$

$$\alpha_{x+\delta_l,y-\delta_l}^{[\mu_2],t-\delta_t} = 1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{2}\omega_2,$$

$$\begin{aligned}
\alpha_{x-\delta_l,y}^{[\mu_1],t-\delta_t} &= -1 - \frac{1}{2}v^2\omega_3\omega_1 + 2\omega_3c_s^2 + \frac{1}{4}\omega_3 - \frac{1}{4}\omega_3\omega_4u^2 - \frac{1}{4}v^2\omega_3\omega_4 - \frac{1}{4}\omega_3^2u^2 - \frac{1}{2}\omega_3\omega_1u^2 - \omega_3c_s^2\omega_1 + \frac{1}{4}\omega_4 + \\
& v^2\omega_3 + \frac{1}{2}\omega_1 - \frac{1}{2}\omega_3\omega_4c_s^2 + \omega_3u^2 - \frac{1}{2}\omega_3^2c_s^2 - \frac{1}{4}v^2\omega_3^2,
\end{aligned}$$

$$\alpha_{x-\delta_l,y}^{[\mu_2],t-\delta_t} = 1 - \frac{5}{4}\omega_3 + \frac{1}{2}\omega_3\omega_1 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3^2,$$

$$\alpha_{x,y}^{[\mu_1],t-\delta_t} = \omega_1u - \omega_1^2u,$$

$$\alpha_{x,y}^{[\mu_2],t-\delta_t} = 2 + \omega_2^2 - 2\omega_1 - 2\omega_2 + \omega_1^2,$$

$$\begin{aligned}
\alpha_{x+\delta_l,y}^{[\mu_1],t-\delta_t} &= 1 + \frac{1}{2}v^2\omega_3\omega_1 - 2\omega_3c_s^2 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_3\omega_4u^2 + \frac{1}{4}v^2\omega_3\omega_4 + \frac{1}{4}\omega_3^2u^2 + \frac{1}{2}\omega_3\omega_1u^2 + \omega_3c_s^2\omega_1 - \frac{1}{4}\omega_4 - v^2\omega_3 - \\
& \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3\omega_4c_s^2 - \omega_3u^2 + \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{4}v^2\omega_3^2,
\end{aligned}$$

$$\alpha_{x+\delta_l,y}^{[\mu_2],t-\delta_t} = 1 - \frac{5}{4}\omega_3 + \frac{1}{2}\omega_3\omega_1 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3^2,$$

$$\begin{aligned}
\alpha_{x-\delta_l, y+\delta_l}^{[\mu_1], t-\delta_t} &= -1 + \frac{1}{8}v^2\omega_3\omega_1 - \frac{1}{4}\omega_1\omega_2 - \frac{1}{2}\omega_3c_s^2 + \frac{1}{4}\omega_3 + \frac{1}{8}\omega_3\omega_4u^2 + \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{8}\omega_3\omega_1u^2 - \frac{1}{8}\omega_3\omega_1 - \frac{1}{4}\omega_4\omega_2 + \\
&\quad \frac{1}{4}\omega_4u^2 - \frac{1}{8}\omega_3\omega_4 + \frac{1}{4}\omega_3c_s^2\omega_1 - \frac{1}{8}\omega_4^2u^2 + \frac{3}{4}\omega_4 - \frac{1}{4}v\omega_1\omega_2 - \frac{1}{4}v^2\omega_3 + \frac{1}{8}v^2\omega_4^2 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4c_s^2 - \\
&\quad \frac{1}{4}\omega_3u^2 - \frac{1}{8}\omega_4^2 + \frac{1}{2}vw_2 + \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{8}\omega_4\omega_1u^2 + \frac{1}{2}\omega_2 - \frac{1}{4}v^2\omega_4 - \frac{1}{4}vw_4\omega_2, \\
\alpha_{x-\delta_l, y+\delta_l}^{[\mu_2], t-\delta_t} &= 1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{2}\omega_2, \\
\alpha_{x, y+\delta_l}^{[\mu_2], t-\delta_t} &= 1 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_2 - \frac{1}{2}\omega_2, \\
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_1], t-\delta_t} &= 1 - \frac{1}{8}v^2\omega_3\omega_1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{4}\omega_3 - \frac{1}{8}\omega_3\omega_4u^2 - \frac{1}{8}v^2\omega_3\omega_4 - \frac{1}{8}\omega_3\omega_1u^2 + \frac{1}{8}\omega_3\omega_1 + \frac{1}{4}\omega_4\omega_2 - \\
&\quad \frac{1}{4}\omega_4u^2 + \frac{1}{8}\omega_3\omega_4 - \frac{1}{4}\omega_3c_s^2\omega_1 + \frac{1}{8}\omega_4^2u^2 - \frac{3}{4}\omega_4 + \frac{1}{4}v\omega_1\omega_2 + \frac{1}{4}v^2\omega_3 - \frac{1}{8}v^2\omega_4^2 - \frac{1}{2}\omega_1 + \frac{1}{8}\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4c_s^2 + \\
&\quad \frac{1}{4}\omega_3u^2 + \frac{1}{8}\omega_4^2 - \frac{1}{2}vw_2 - \frac{1}{8}v^2\omega_4\omega_1 + \frac{1}{8}\omega_4\omega_1u^2 - \frac{1}{2}\omega_2 + \frac{1}{4}v^2\omega_4 + \frac{1}{4}vw_4\omega_2, \\
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_2], t-\delta_t} &= 1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{2}\omega_2, \\
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_1], t-2\delta_t} &= 1 + \frac{1}{8}vw_3\omega_4\omega_2 + \frac{3}{8}v^2\omega_3\omega_1 - \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{8}\omega_3\omega_4\omega_1u - \frac{1}{8}v^2\omega_3^2\omega_2 + \frac{1}{4}\omega_1u\omega_2 + \frac{1}{8}\omega_4u^2\omega_2 - 2\omega_3c_s^2 - \\
&\quad \frac{1}{8}v^2\omega_4\omega_2 - \frac{5}{8}vw_3\omega_2 - \frac{1}{4}\omega_3 + \frac{11}{8}\omega_3\omega_4u^2 + \frac{5}{8}\omega_3\omega_1u + \frac{1}{8}v^2\omega_3\omega_4 - \frac{1}{4}\omega_3\omega_4^2c_s^2 - \frac{1}{4}\omega_3^2c_s^2\omega_2 + \frac{1}{4}\omega_3^2u^2 + \frac{3}{8}\omega_3\omega_1u^2 - \\
&\quad \frac{1}{4}\omega_3\omega_4c_s^2\omega_1 + \frac{1}{8}\omega_3\omega_1 - \frac{1}{2}\omega_1u + \frac{1}{4}\omega_4\omega_2 - \frac{1}{2}\omega_4u^2 - \frac{1}{4}\omega_3^2\omega_4c_s^2 - \frac{1}{4}\omega_3\omega_4\omega_1u^2 + \frac{1}{8}\omega_3\omega_4 + \frac{3}{4}\omega_3c_s^2\omega_1 + \frac{1}{4}vw_3\omega_1\omega_2 - \\
&\quad \frac{1}{8}\omega_3^2u^2\omega_2 - \frac{1}{4}\omega_3\omega_1u^2\omega_2 + \frac{1}{8}\omega_4^2u^2 - \frac{3}{4}\omega_4 + \frac{5}{8}\omega_3c_s^2\omega_2 - \frac{1}{4}vw_1\omega_2 - v^2\omega_3 - \frac{3}{8}\omega_3\omega_4u^2\omega_2 - \frac{1}{4}\omega_3\omega_1u\omega_2 - \frac{1}{8}v^2\omega_4^2 - \frac{1}{2}\omega_1 - \\
&\quad \frac{1}{8}v^2\omega_3\omega_4\omega_2 + \frac{1}{8}\omega_4\omega_1 + \frac{1}{8}\omega_4\omega_1u + \frac{3}{2}\omega_3\omega_4c_s^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 - \omega_3u^2 + \frac{5}{8}\omega_3u^2\omega_2 + \frac{1}{8}\omega_4^2 + \frac{1}{2}vw_2 - \frac{1}{8}v^2\omega_4\omega_1 + \frac{1}{2}\omega_3^2c_s^2 + \\
&\quad \frac{9}{8}vw_3^2\omega_2 + \frac{1}{8}\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_4^2u^2 - \frac{1}{2}\omega_2 + \frac{1}{2}v^2\omega_4 - \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{8}\omega_3^2\omega_1u - \frac{1}{4}\omega_3^2\omega_4u^2 + \frac{5}{8}v^2\omega_3\omega_2 - \frac{1}{8}vw_4\omega_2 + \frac{1}{4}v^2\omega_3^2, \\
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_2], t-2\delta_t} &= -2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_4^2 + \frac{5}{2}\omega_3 + \frac{3}{8}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2 + \frac{1}{8}\omega_3^2\omega_2 - \frac{9}{8}\omega_3\omega_1 - \frac{3}{8}\omega_4\omega_2 - \frac{7}{4}\omega_3\omega_4 + \frac{3}{2}\omega_4 + \\
&\quad \frac{1}{4}\omega_3^2\omega_4 + \omega_1 - \frac{3}{8}\omega_4\omega_1 - \frac{1}{2}\omega_3^2 - \frac{9}{8}\omega_3\omega_2 + \frac{1}{8}\omega_3^2\omega_1 + \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_4^2 + \omega_2, \\
\alpha_{x, y-\delta_l}^{[\mu_1], t-2\delta_t} &= \omega_1u\omega_2 - \frac{1}{2}\omega_4\omega_1^2u - 2\omega_1u - \frac{1}{2}\omega_4^2\omega_1u + \omega_1^2u + 2\omega_4\omega_1u - \frac{1}{2}\omega_4\omega_1u\omega_2 - \frac{1}{2}\omega_1^2u\omega_2, \\
\alpha_{x, y-\delta_l}^{[\mu_2], t-2\delta_t} &= -2 - \frac{3}{2}\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_2 + \frac{1}{2}\omega_4^2\omega_1 + 2\omega_4 + 3\omega_1 - \frac{5}{2}\omega_4\omega_1 - \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_4\omega_1\omega_2 + \omega_2 + \frac{1}{2}\omega_4\omega_1^2 + \frac{1}{2}\omega_1^2\omega_2 - \omega_1^2, \\
\alpha_{x+\delta_l, y-\delta_l}^{[\mu_1], t-2\delta_t} &= \\
&-1 - \frac{1}{8}vw_3\omega_4\omega_2 - \frac{3}{8}v^2\omega_3\omega_1 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{4}\omega_1\omega_2 - \frac{1}{8}\omega_3\omega_4\omega_1u + \frac{1}{8}v^2\omega_3^2\omega_2 + \frac{1}{4}\omega_1u\omega_2 - \frac{1}{8}\omega_4u^2\omega_2 + 2\omega_3c_s^2 + \\
&\quad \frac{1}{8}v^2\omega_4\omega_2 + \frac{5}{8}vw_3\omega_2 + \frac{1}{4}\omega_3 - \frac{11}{8}\omega_3\omega_4u^2 + \frac{5}{8}\omega_3\omega_1u - \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_4^2c_s^2 + \frac{1}{4}\omega_3^2c_s^2\omega_2 - \frac{1}{4}\omega_3^2u^2 - \frac{3}{8}\omega_3\omega_1u^2 + \\
&\quad \frac{1}{4}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{8}\omega_3\omega_1 - \frac{1}{2}\omega_1u - \frac{1}{4}\omega_4\omega_2 + \frac{1}{2}\omega_4u^2 + \frac{1}{4}\omega_3^2\omega_4c_s^2 + \frac{1}{4}\omega_3\omega_4\omega_1u^2 - \frac{1}{8}\omega_3\omega_4 - \frac{3}{4}\omega_3c_s^2\omega_1 - \frac{1}{4}vw_3\omega_1\omega_2 + \\
&\quad \frac{1}{8}\omega_3^2u^2\omega_2 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 - \frac{1}{8}\omega_4^2u^2 + \frac{3}{4}\omega_4 - \frac{5}{4}\omega_3c_s^2\omega_2 + \frac{1}{4}vw_1\omega_2 + v^2\omega_3 + \frac{3}{8}\omega_3\omega_4u^2\omega_2 - \frac{1}{4}\omega_3\omega_1u\omega_2 + \frac{1}{8}v^2\omega_4^2 + \frac{1}{2}\omega_1 + \\
&\quad \frac{1}{8}v^2\omega_3\omega_4\omega_2 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{8}\omega_4\omega_1u - \frac{3}{2}\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \omega_3u^2 - \frac{5}{8}\omega_3u^2\omega_2 - \frac{1}{8}\omega_4^2 - \frac{1}{2}vw_2 + \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{2}\omega_3^2c_s^2 - \\
&\quad \frac{9}{8}vw_3^2\omega_2 - \frac{1}{8}\omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_4^2u^2 + \frac{1}{2}\omega_2 - \frac{1}{2}v^2\omega_4 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{8}\omega_3^2\omega_1u + \frac{1}{4}\omega_3^2\omega_4u^2 - \frac{5}{8}v^2\omega_3\omega_2 + \frac{1}{8}vw_4\omega_2 - \frac{1}{4}v^2\omega_3^2, \\
\alpha_{x+\delta_l, y-\delta_l}^{[\mu_2], t-2\delta_t} &= -2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_4^2 + \frac{5}{2}\omega_3 + \frac{3}{8}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2 + \frac{1}{8}\omega_3^2\omega_2 - \frac{9}{8}\omega_3\omega_1 - \frac{3}{8}\omega_4\omega_2 - \frac{7}{4}\omega_3\omega_4 + \frac{3}{2}\omega_4 + \\
&\quad \frac{1}{4}\omega_3^2\omega_4 + \omega_1 - \frac{3}{8}\omega_4\omega_1 - \frac{1}{2}\omega_3^2 - \frac{9}{8}\omega_3\omega_2 + \frac{1}{8}\omega_3^2\omega_1 + \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_4^2 + \omega_2, \\
\alpha_{x-\delta_l, y}^{[\mu_1], t-2\delta_t} &= 1 - \frac{1}{4}v^2\omega_3\omega_1 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{2}\omega_1\omega_2 - \frac{1}{4}\omega_4\omega_2^2 + \omega_1u\omega_2 + \omega_4u^2\omega_2 + \frac{1}{2}\omega_3c_s^2 - v^2\omega_4\omega_2 - \frac{1}{4}\omega_3 - \frac{1}{4}\omega_3\omega_4\omega_2 - \\
&\quad \frac{1}{4}\omega_3\omega_4u^2 - \frac{1}{4}v^2\omega_3\omega_4 + \frac{1}{4}v^2\omega_4\omega_2^2 - \frac{1}{4}\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u^2 - \frac{1}{4}\omega_4\omega_1u^2\omega_2 - \frac{1}{2}\omega_1u\omega_2^2 + \frac{1}{4}\omega_3\omega_1 - \frac{1}{4}\omega_4u^2\omega_2^2 - \frac{1}{2}\omega_1u + \\
&\quad \frac{3}{4}\omega_4\omega_2 - \frac{3}{4}\omega_4u^2 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{2}\omega_3c_s^2\omega_1 + \frac{1}{4}v^2\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 + \frac{1}{4}\omega_4^2u^2 - \frac{1}{4}\omega_4^2\omega_2 - \frac{5}{4}\omega_4 - \frac{1}{4}v^2\omega_3\omega_2^2 + \\
&\quad \frac{1}{4}v^2\omega_3 + \frac{1}{4}\omega_3\omega_4u^2\omega_2 - \frac{1}{4}v^2\omega_4^2 - \frac{1}{2}\omega_1 + \frac{1}{4}v^2\omega_3\omega_4\omega_2 + \frac{1}{4}\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \frac{1}{4}\omega_3u^2 - \frac{1}{4}\omega_3u^2\omega_2^2 + \\
&\quad \frac{1}{4}\omega_4^2 - \frac{1}{4}v^2\omega_4\omega_1 + \frac{1}{4}v^2\omega_4\omega_2 - \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_2^2 - \frac{1}{4}\omega_4^2u^2\omega_2 - \omega_2 + \frac{3}{4}v^2\omega_4 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{2}\omega_3c_s^2\omega_2^2, \\
\alpha_{x-\delta_l, y}^{[\mu_2], t-2\delta_t} &= -2 - \omega_2^2 - \frac{3}{2}\omega_1\omega_2 + \frac{1}{2}\omega_4\omega_2^2 + \frac{1}{2}\omega_1\omega_2^2 - \frac{5}{2}\omega_4\omega_2 + \frac{1}{2}\omega_4^2\omega_2 + 2\omega_4 + \omega_1 - \frac{1}{2}\omega_4\omega_1 - \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_4\omega_1\omega_2 + 3\omega_2, \\
\alpha_{x, y}^{[\mu_1], t-2\delta_t} &= -\frac{1}{2}\omega_3\omega_4\omega_1u + \frac{5}{2}\omega_3\omega_1u - 2\omega_1u + \omega_1^2u + \frac{1}{2}\omega_4\omega_1u - \omega_3\omega_1^2u - \frac{1}{2}\omega_3^2\omega_1u, \\
\alpha_{x, y}^{[\mu_2], t-2\delta_t} &= -4 - \omega_2^2 + \omega_3\omega_1^2 + 5\omega_3 + \frac{1}{2}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3^2\omega_2 - \frac{7}{2}\omega_3\omega_1 - \frac{1}{2}\omega_4\omega_2 - \omega_3\omega_4 + \omega_4 + 3\omega_1 - \frac{1}{2}\omega_4\omega_1 - \omega_3^2 - \\
&\quad \frac{7}{2}\omega_3\omega_2 + \frac{1}{2}\omega_3^2\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1 + \omega_3\omega_2^2 + 3\omega_2 - \omega_1^2, \\
\alpha_{x+\delta_l, y}^{[\mu_1], t-2\delta_t} &= -1 + \frac{1}{4}v^2\omega_3\omega_1 - \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2^2 + \omega_1u\omega_2 - \omega_4u^2\omega_2 - \frac{1}{2}\omega_3c_s^2 + v^2\omega_4\omega_2 + \frac{1}{4}\omega_3 + \frac{1}{4}\omega_3\omega_4\omega_2 + 
\end{aligned}$$

$$\begin{aligned}
& \frac{1}{4}\omega_3\omega_4u^2 + \frac{1}{4}v^2\omega_3\omega_4 - \frac{1}{4}v^2\omega_4\omega_2^2 + \frac{1}{4}\omega_3\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1u^2 + \frac{1}{4}\omega_4\omega_1u^2\omega_2 - \frac{1}{2}\omega_1u\omega_2^2 - \frac{1}{4}\omega_3\omega_1 + \frac{1}{4}\omega_4u^2\omega_2^2 - \frac{1}{2}\omega_1u - \\
& \frac{3}{2}\omega_4\omega_2 + \frac{3}{4}\omega_4u^2 - \frac{1}{4}\omega_3\omega_4 + \frac{1}{2}\omega_3c_s^2\omega_1 - \frac{1}{4}v^2\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u^2\omega_2 - \frac{1}{4}\omega_4^2u^2 + \frac{5}{4}\omega_4\omega_2 + \frac{1}{4}v^2\omega_3\omega_2^2 - \\
& \frac{1}{4}v^2\omega_3 - \frac{1}{2}\omega_3\omega_4u^2\omega_2 + \frac{1}{4}v^2\omega_4^2 + \frac{1}{2}\omega_1 - \frac{1}{4}v^2\omega_3\omega_4\omega_2 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{2}\omega_3\omega_4c_s^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 - \frac{1}{4}\omega_3u^2 + \frac{1}{4}\omega_3u^2\omega_2^2 - \\
& \frac{1}{4}\omega_4^2 + \frac{1}{4}v^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_4^2\omega_2 + \frac{1}{4}\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_2^2 + \frac{1}{4}\omega_4^2u^2\omega_2 + \omega_2 - \frac{3}{4}v^2\omega_4 - \frac{1}{4}v^2\omega_3\omega_1\omega_2 + \frac{1}{2}\omega_3c_s^2\omega_2^2, \\
\alpha_{x+\delta_l,y}^{[\mu_2],t-2\delta_t} &= -2 - \omega_2^2 - \frac{3}{2}\omega_1\omega_2 + \frac{1}{2}\omega_4\omega_2^2 + \frac{1}{2}\omega_1\omega_2^2 - \frac{5}{2}\omega_4\omega_2 + \frac{1}{2}\omega_4^2\omega_2 + 2\omega_4 + \omega_1 - \frac{1}{2}\omega_4\omega_1 - \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_4\omega_1\omega_2 + 3\omega_2, \\
\alpha_{x-\delta_l,y+\delta_l}^{[\mu_1],t-2\delta_t} &= 1 - \frac{1}{8}v\omega_3\omega_4\omega_2 + \frac{3}{8}v^2\omega_3\omega_1 - \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{8}\omega_3\omega_4\omega_1u - \frac{1}{8}v^2\omega_3^2\omega_2 + \frac{1}{4}\omega_1u\omega_2 - \frac{1}{8}\omega_4u^2\omega_2 - 2\omega_3c_s^2 - \\
& \frac{1}{8}v^2\omega_4\omega_2 + \frac{5}{8}v\omega_3\omega_2 - \frac{1}{4}\omega_3 + \frac{11}{8}\omega_3\omega_4u^2 + \frac{5}{8}\omega_3\omega_1u + \frac{1}{8}v^2\omega_3\omega_4 - \frac{1}{4}\omega_3\omega_2^2c_s^2 - \frac{1}{4}\omega_3^2c_s^2\omega_2 + \frac{1}{4}\omega_3^2u^2 + \frac{3}{8}\omega_3\omega_1u^2 - \\
& \frac{1}{4}\omega_3\omega_4c_s^2\omega_1 + \frac{1}{8}\omega_3\omega_1 - \frac{1}{2}\omega_1u + \frac{1}{4}\omega_4\omega_2 - \frac{1}{2}\omega_4u^2 - \frac{1}{4}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_3\omega_4\omega_1u^2 + \frac{1}{8}\omega_3\omega_4 + \frac{3}{4}\omega_3c_s^2\omega_1 - \frac{1}{4}v\omega_3\omega_1\omega_2 - \\
& \frac{1}{8}\omega_3^2u^2\omega_2 - \frac{1}{4}\omega_3\omega_1u^2\omega_2 + \frac{1}{8}\omega_4^2u^2 - \frac{3}{4}\omega_4 + \frac{5}{4}\omega_3c_s^2\omega_2 + \frac{1}{4}v\omega_1\omega_2 - v^2\omega_3 - \frac{3}{8}\omega_3\omega_4u^2\omega_2 - \frac{1}{4}\omega_3\omega_1\omega_2 - \frac{1}{8}v^2\omega_4^2 - \frac{1}{2}\omega_1 - \\
& \frac{1}{8}v^2\omega_3\omega_4\omega_2 + \frac{1}{8}\omega_4\omega_1 + \frac{1}{8}\omega_4\omega_1u + \frac{3}{4}\omega_3\omega_4c_s^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 - \omega_3u^2 + \frac{5}{8}\omega_3u^2\omega_2 + \frac{1}{8}\omega_4^2u^2 - \frac{1}{2}v\omega_2 - \frac{1}{8}v^2\omega_4\omega_1 + \frac{1}{2}\omega_3^2c_s^2 - \\
& \frac{1}{8}v\omega_3^2\omega_2 + \frac{1}{8}\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_4u^2 - \frac{1}{2}\omega_2 + \frac{1}{2}v^2\omega_3\omega_1\omega_2 - \frac{1}{8}\omega_3^2\omega_1u - \frac{1}{4}\omega_3\omega_4u^2 + \frac{5}{8}v^2\omega_3\omega_2 + \frac{1}{8}v\omega_4\omega_2 + \frac{1}{4}v^2\omega_3^2, \\
\alpha_{x-\delta_l,y+\delta_l}^{[\mu_2],t-2\delta_t} &= -2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_4^2 + \frac{5}{2}\omega_3 + \frac{3}{8}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2 + \frac{1}{8}\omega_3^2\omega_2 - \frac{9}{8}\omega_3\omega_1 - \frac{3}{8}\omega_4\omega_2 - \frac{7}{4}\omega_3\omega_4 + \frac{3}{2}\omega_4 + \\
& \frac{1}{4}\omega_3^2\omega_4 + \omega_1 - \frac{3}{8}\omega_4\omega_1 - \frac{1}{2}\omega_3^2 - \frac{9}{8}\omega_3\omega_2 + \frac{1}{8}\omega_3^2\omega_1 + \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_4^2 + \omega_2, \\
\alpha_{x,y+\delta_l}^{[\mu_1],t-2\delta_t} &= \omega_1\omega_2 - \frac{1}{2}\omega_4\omega_1^2u - 2\omega_1u - \frac{1}{2}\omega_4^2\omega_1u + \omega_1^2u + 2\omega_4\omega_1u - \frac{1}{2}\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_1^2u\omega_2, \\
\alpha_{x,y+\delta_l}^{[\mu_2],t-2\delta_t} &= -2 - \frac{3}{2}\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_2 + \frac{1}{2}\omega_4^2\omega_1 + 2\omega_4 + 3\omega_1 - \frac{5}{2}\omega_4\omega_1 - \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_4\omega_1\omega_2 + \omega_2 + \frac{1}{2}\omega_4\omega_1^2 + \frac{1}{2}\omega_1^2\omega_2 - \omega_1^2, \\
\alpha_{x+\delta_l,y+\delta_l}^{[\mu_1],t-2\delta_t} &= -1 + \frac{1}{8}v\omega_3\omega_4\omega_2 - \frac{3}{8}v^2\omega_3\omega_1 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{4}\omega_1\omega_2 - \frac{1}{8}\omega_3\omega_4\omega_1u + \frac{1}{8}v^2\omega_3^2\omega_2 + \frac{1}{4}\omega_1u\omega_2 - \frac{1}{8}\omega_4u^2\omega_2 + 2\omega_3c_s^2 + \\
& \frac{1}{8}v^2\omega_4\omega_2 - \frac{5}{8}v\omega_3\omega_2 + \frac{1}{4}\omega_3 - \frac{11}{8}\omega_3\omega_4u^2 + \frac{5}{8}\omega_3\omega_1u - \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_2^2c_s^2 + \frac{1}{4}\omega_3^2c_s^2\omega_2 - \frac{1}{4}\omega_3^2u^2 - \frac{3}{8}\omega_3\omega_1u^2 + \\
& \frac{1}{4}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{8}\omega_3\omega_1 - \frac{1}{2}\omega_1u - \frac{1}{4}\omega_4\omega_2 + \frac{1}{2}\omega_4u^2 + \frac{1}{4}\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_3\omega_4\omega_1u^2 - \frac{1}{8}\omega_3\omega_4 - \frac{3}{4}\omega_3c_s^2\omega_1 + \frac{1}{4}v\omega_3\omega_1\omega_2 + \\
& \frac{1}{8}\omega_3^2u^2\omega_2 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 - \frac{1}{8}\omega_4^2u^2 + \frac{3}{4}\omega_4 - \frac{5}{4}\omega_3c_s^2\omega_2 - \frac{1}{4}v\omega_1\omega_2 + v^2\omega_3 + \frac{3}{8}\omega_3\omega_4u^2\omega_2 - \frac{1}{4}\omega_3\omega_1\omega_2 + \frac{1}{8}v^2\omega_4^2 + \frac{1}{2}\omega_1 + \\
& \frac{1}{8}v^2\omega_3\omega_4\omega_2 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{8}\omega_4\omega_1u - \frac{3}{4}\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \omega_3u^2 - \frac{5}{8}\omega_3u^2\omega_2 - \frac{1}{8}\omega_4^2 + \frac{1}{2}v\omega_2 + \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{2}\omega_3^2c_s^2 + \\
& \frac{1}{8}v\omega_3^2\omega_2 - \frac{1}{8}\omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_4u^2 + \frac{1}{2}\omega_2 - \frac{1}{2}v^2\omega_4 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{8}\omega_3^2\omega_1u + \frac{1}{4}\omega_3\omega_4u^2 - \frac{5}{8}v^2\omega_3\omega_2 - \frac{1}{8}v\omega_4\omega_2 - \frac{1}{4}v^2\omega_3^2, \\
\alpha_{x+\delta_l,y+\delta_l}^{[\mu_2],t-2\delta_t} &= -2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_4^2 + \frac{5}{2}\omega_3 + \frac{3}{8}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2 + \frac{1}{8}\omega_3^2\omega_2 - \frac{9}{8}\omega_3\omega_1 - \frac{3}{8}\omega_4\omega_2 - \frac{7}{4}\omega_3\omega_4 + \frac{3}{2}\omega_4 + \\
& \frac{1}{4}\omega_3^2\omega_4 + \omega_1 - \frac{3}{8}\omega_4\omega_1 - \frac{1}{2}\omega_3^2 - \frac{9}{8}\omega_3\omega_2 + \frac{1}{8}\omega_3^2\omega_1 + \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_4^2 + \omega_2, \\
\alpha_{x,y-\delta_l}^{[\mu_1],t-3\delta_t} &= -\frac{1}{4}\omega_3^2\omega_1\omega_2 + \frac{13}{4}\omega_3\omega_4\omega_1u - \frac{3}{2}\omega_1\omega_2 - \frac{15}{4}\omega_3\omega_1u + \frac{1}{2}\omega_4\omega_1^2u - \frac{1}{2}\omega_3\omega_1^2u\omega_2 + 3\omega_1u + \frac{1}{2}\omega_4^2\omega_1u - \frac{1}{2}\omega_3^2\omega_4\omega_1u - \\
& w_1^2u + \frac{7}{4}\omega_3\omega_1\omega_2 - \frac{11}{4}\omega_4\omega_1u + \frac{3}{4}\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4^2\omega_1u + \omega_3\omega_1^2u - \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_1^2u\omega_2 + \frac{3}{4}\omega_3^2\omega_1u - \frac{1}{2}\omega_3\omega_4\omega_1^2u, \\
\alpha_{x,y-\delta_l}^{[\mu_2],t-3\delta_t} &= 3 + \frac{1}{2}\omega_3^2\omega_4\omega_1 + 2\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4^2 + \frac{1}{2}\omega_3\omega_4^2\omega_1 - \omega_3\omega_1^2 - \frac{15}{4}\omega_3 - \frac{3}{4}\omega_3\omega_4\omega_2 - \frac{9}{4}\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3^2\omega_2 + \\
& \frac{19}{4}\omega_3\omega_1 + \frac{3}{4}\omega_4\omega_2 + \frac{13}{4}\omega_3\omega_4 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 + \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{11}{4}\omega_4 - \frac{1}{2}\omega_3^2\omega_4 - 4\omega_1 + \frac{13}{4}\omega_4\omega_1 + \frac{3}{4}\omega_3^2 + \\
& \frac{7}{4}\omega_3\omega_2 + \frac{1}{2}\omega_3\omega_1^2\omega_2 - \frac{3}{4}\omega_3^2\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1^2 - \frac{15}{4}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2 - \frac{3}{4}\omega_4\omega_1\omega_2 - \frac{3}{2}\omega_2 - \frac{1}{2}\omega_4\omega_1^2 - \frac{1}{2}\omega_1^2\omega_2 + \omega_1^2, \\
\alpha_{x-\delta_l,y}^{[\mu_1],t-3\delta_t} &= -1 - \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{1}{4}v^2\omega_3\omega_1 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}\omega_3^2\omega_4u^2\omega_2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2^2 + \frac{1}{4}\omega_3\omega_4\omega_1u + \\
& \frac{1}{4}v^2\omega_3^2\omega_2 - \frac{3}{2}\omega_1\omega_2 - \frac{5}{4}\omega_4u^2\omega_2 - \frac{1}{2}\omega_3^2\omega_4c_s^2\omega_2 + 2\omega_3c_s^2 + \frac{5}{4}v^2\omega_4\omega_2 + \frac{1}{4}\omega_3 + \frac{1}{4}\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1u^2\omega_2 - \\
& \frac{5}{2}\omega_3\omega_4u^2 - \frac{5}{4}\omega_3\omega_1u + \frac{1}{2}\omega_3\omega_4c_s^2 - \frac{1}{4}v^2\omega_4\omega_2 + \frac{1}{2}\omega_3^2c_s^2\omega_2 - \frac{1}{4}\omega_3^2u^2 + \frac{1}{4}\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_4c_s^2\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1u^2\omega_2 - \\
& \frac{1}{4}\omega_4\omega_1u^2\omega_2 + \frac{1}{2}\omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_3\omega_1 - \frac{1}{2}\omega_3\omega_4u^2\omega_2 + \frac{1}{4}\omega_4u^2\omega_2^2 + \omega_1u - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 - \frac{3}{2}\omega_4\omega_2 + \\
& \omega_4u^2 + \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_3\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_4 - \frac{1}{2}\omega_3c_s^2\omega_1 - \frac{1}{4}v^2\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3^2u^2\omega_2 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 - \frac{1}{4}\omega_4^2u^2 + \\
& \frac{1}{4}\omega_4^2\omega_2 + \frac{5}{4}\omega_4 + \frac{1}{4}v^2\omega_3\omega_2^2 - \frac{5}{2}\omega_3c_s^2\omega_2 + v^2\omega_3 + 3\omega_3\omega_4u^2\omega_2 + \frac{7}{4}\omega_3\omega_1\omega_2 + \frac{1}{4}v^2\omega_2^2 + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_4\omega_1 - \\
& \frac{1}{4}\omega_4\omega_1u - \frac{5}{2}\omega_3\omega_4c_s^2 + 3\omega_3\omega_4c_s^2\omega_2 + \frac{1}{4}\omega_4\omega_1\omega_2 + \omega_3u^2 - \frac{5}{4}\omega_3u^2\omega_2 + \frac{1}{4}\omega_3u^2\omega_2^2 - \frac{1}{4}\omega_4^2 + \frac{1}{4}v^2\omega_4\omega_1 - \\
& \frac{1}{2}\omega_3^2c_s^2 - \frac{1}{4}v^2\omega_4\omega_2 + \frac{1}{4}\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_2^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 - \frac{1}{4}\omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4u^2 + \frac{1}{4}\omega_4^2u^2\omega_2 + \\
& \omega_2 - \frac{1}{2}\omega_3\omega_4u^2\omega_2^2 - v^2\omega_4 - \frac{1}{2}\omega_3\omega_1\omega_2^2 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 + \frac{1}{4}\omega_3^2\omega_1u + \frac{1}{2}\omega_3\omega_4u^2 + \frac{1}{2}\omega_3c_s^2\omega_2^2 - \frac{5}{4}v^2\omega_3\omega_2 - \frac{1}{4}v^2\omega_3^2,
\end{aligned}$$

$$\begin{aligned}
& \frac{3}{4}\omega_4\omega_1 + \frac{3}{4}\omega_3^2 + \frac{19}{4}\omega_3\omega_2 - \frac{1}{4}\omega_3^2\omega_1 - \frac{3}{4}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2 - \frac{3}{4}\omega_4\omega_1\omega_2 - \omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_4^2\omega_2 - 4\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_2, \\
\alpha_{x,y}^{[\mu_1],t-3\delta_t} &= -4\omega_1u\omega_2 - \omega_4^2\omega_1u\omega_2 + \omega_4\omega_1^2u + \omega_1u\omega_2^2 + 3\omega_1u - \omega_4\omega_1^2u\omega_2 + \omega_4^2\omega_1u - \omega_1^2u - 4\omega_4\omega_1u + 5\omega_4\omega_1u\omega_2 - \omega_4\omega_1u\omega_2^2 + \omega_1^2u\omega_2, \\
\alpha_{x,y}^{[\mu_2],t-3\delta_t} &= 3 + \omega_2^2 + 5\omega_1\omega_2 - \omega_4\omega_2^2 + \omega_4^2\omega_1\omega_2 + \omega_4\omega_1^2\omega_2 - \omega_1\omega_2^2 + 5\omega_4\omega_2 - \omega_4^2\omega_1 - \omega_4^2\omega_2 - 4\omega_4 - 4\omega_1 + 5\omega_4\omega_1 + \omega_4\omega_1\omega_2^2 + \omega_4^2 - 6\omega_4\omega_1\omega_2 - 4\omega_2 - \omega_4\omega_1^2 - \omega_1^2\omega_2 + \omega_1^2, \\
\alpha_{x+\delta_l,y}^{[\mu_1],t-3\delta_t} &= 1 - \frac{1}{4}\omega_3^2\omega_1u\omega_2 + \frac{1}{4}v^2\omega_3\omega_1 - \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{2}\omega_3^2\omega_4u^2\omega_2 + \frac{1}{2}\omega_1\omega_2 - \frac{1}{4}\omega_4\omega_2^2 + \frac{1}{4}\omega_3\omega_4\omega_1u - \frac{1}{4}v^2\omega_3^2\omega_2 - \frac{3}{2}\omega_1u\omega_2 + \frac{5}{4}\omega_4u^2\omega_2 + \frac{1}{2}\omega_3^2\omega_4c_s^2\omega_2 - 2\omega_3c_s^2 - \frac{5}{4}v^2\omega_4\omega_2 - \frac{1}{4}\omega_3 - \frac{1}{4}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_4\omega_1u^2\omega_2 + \frac{5}{2}\omega_3\omega_4u^2 - \frac{5}{4}\omega_3\omega_1u - \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{1}{4}v^2\omega_4\omega_2 - \frac{1}{2}\omega_3c_s^2\omega_2 + \frac{1}{4}\omega_3^2u^2 - \frac{1}{4}\omega_3\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1u^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1\omega_2 - \frac{1}{4}\omega_4\omega_1u^2\omega_2 + \frac{1}{2}\omega_1u\omega_2^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_3\omega_1 + \frac{1}{2}\omega_3\omega_4u^2\omega_2 - \frac{1}{4}\omega_4u^2\omega_2^2 + \omega_1u + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \frac{3}{2}\omega_4\omega_2 - \omega_4u^2 - \frac{1}{2}\omega_3^2\omega_4c_s^2 - \frac{1}{2}\omega_3\omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_4 + \frac{1}{2}\omega_3c_s^2\omega_1 + \frac{1}{4}v^2\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_3^2u^2\omega_2 - \frac{1}{4}\omega_3\omega_1u^2\omega_2 + \frac{1}{4}\omega_4^2u^2 - \frac{1}{2}\omega_3^2\omega_2 - \frac{5}{4}\omega_4 - \frac{1}{4}v^2\omega_3\omega_2^2 + \frac{5}{2}\omega_3c_s^2\omega_2 - v^2\omega_3 - 3\omega_3\omega_4u^2\omega_2 + \frac{7}{4}\omega_3\omega_1u\omega_2 - \frac{1}{4}v^2\omega_4^2 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_4\omega_1u + \frac{5}{2}\omega_3\omega_4c_s^2 - 3\omega_3\omega_4c_s^2\omega_2 + \frac{1}{4}\omega_4\omega_1u\omega_2 - \omega_3u^2 + \frac{5}{4}\omega_3u^2\omega_2 - \frac{1}{4}\omega_3u^2\omega_2^2 + \frac{1}{4}\omega_4^2 - \frac{1}{4}v^2\omega_4\omega_1 + \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{4}v^2\omega_4^2\omega_2 - \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2^2 - \frac{1}{4}\omega_3\omega_4\omega_1u\omega_2 - \frac{1}{2}\omega_3\omega_4u^2\omega_2^2 - \frac{1}{4}\omega_4^2u^2\omega_2 - \omega_2 + \frac{1}{2}\omega_3\omega_4u^2\omega_2^2 + v^2\omega_4 - \frac{1}{2}\omega_3\omega_1u\omega_2^2 - \frac{1}{4}v^2\omega_3\omega_1\omega_2 + \frac{1}{4}\omega_3^2\omega_1u - \frac{1}{2}\omega_3\omega_4u^2 - \frac{1}{2}\omega_3c_s^2\omega_2^2 + \frac{5}{4}v^2\omega_3\omega_2 + \frac{1}{4}v^2\omega_3^2, \\
\alpha_{x+\delta_l,y}^{[\mu_2],t-3\delta_t} &= 3 + \omega_2^2 + 2\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_2^2 - \frac{1}{2}\omega_3\omega_4^2 - \frac{15}{4}\omega_3 - \frac{15}{4}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_2^2 - \frac{9}{4}\omega_3\omega_1\omega_2 - \frac{3}{4}\omega_3^2\omega_2 + \frac{7}{4}\omega_3\omega_1 - \frac{1}{2}\omega_1\omega_2^2 + \frac{13}{4}\omega_4\omega_2 + \frac{13}{4}\omega_3\omega_4 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_2 - \frac{11}{4}\omega_4 - \frac{1}{2}\omega_3\omega_4 - \frac{3}{2}\omega_1 + \frac{3}{4}\omega_4\omega_1 + \frac{3}{4}\omega_3^2 + \frac{19}{4}\omega_3\omega_2 - \frac{1}{4}\omega_3^2\omega_1 - \frac{3}{4}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2 - \frac{3}{4}\omega_4\omega_1\omega_2 - \omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_2^2 - 4\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_2, \\
\alpha_{x,y+\delta_l}^{[\mu_1],t-3\delta_t} &= -\frac{1}{4}\omega_3^2\omega_1u\omega_2 + \frac{13}{4}\omega_3\omega_4\omega_1u - \frac{3}{2}\omega_1u\omega_2 - \frac{15}{4}\omega_3\omega_1u + \frac{1}{2}\omega_4\omega_1u - \frac{1}{2}\omega_3\omega_1u\omega_2 + 3\omega_1u + \frac{1}{2}\omega_4^2\omega_1u - \frac{1}{2}\omega_3^2\omega_4\omega_1u - \omega_1^2u + \frac{7}{4}\omega_3\omega_1u\omega_2 - \frac{11}{4}\omega_4\omega_1u + \frac{3}{4}\omega_4\omega_1u\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1u\omega_2 + \frac{1}{2}\omega_1^2u\omega_2 + \frac{3}{4}\omega_3^2\omega_1u - \frac{1}{2}\omega_3\omega_4\omega_1u\omega_2^2, \\
\alpha_{x,y+\delta_l}^{[\mu_2],t-3\delta_t} &= 3 + \frac{1}{2}\omega_3^2\omega_4\omega_1 + 2\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4^2 + \frac{1}{2}\omega_3\omega_4^2\omega_1 - \omega_3\omega_1^2 - \frac{15}{4}\omega_3 - \frac{3}{4}\omega_3\omega_4\omega_2 - \frac{9}{4}\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3^2\omega_2 + \frac{19}{4}\omega_3\omega_1 + \frac{3}{4}\omega_4\omega_2 + \frac{13}{4}\omega_3\omega_4 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 + \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{11}{4}\omega_4 - \frac{1}{2}\omega_3\omega_4 - 4\omega_1 + \frac{13}{4}\omega_4\omega_1 + \frac{3}{4}\omega_3^2 + \frac{7}{4}\omega_3\omega_2 + \frac{1}{2}\omega_3\omega_1^2\omega_2 - \frac{3}{4}\omega_3^2\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1\omega_2^2 - \frac{15}{4}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2 - \frac{3}{4}\omega_4\omega_1\omega_2 - \frac{3}{2}\omega_2 - \frac{1}{2}\omega_4\omega_1^2 - \frac{1}{2}\omega_1^2\omega_2 + \omega_1^2, \\
\alpha_{x,y}^{[\mu_1],t-4\delta_t} &= \omega_3^2\omega_1u\omega_2 - \omega_3\omega_4\omega_1u\omega_2 - 6\omega_3\omega_4\omega_1u + 5\omega_1u\omega_2 + \omega_4^2\omega_1u\omega_2 + 5\omega_3\omega_1u - \omega_4\omega_1^2u - \omega_3\omega_4^2\omega_1u\omega_2 - \omega_1u\omega_2^2 + \omega_3\omega_1^2u\omega_2 - 4\omega_1u + \omega_4\omega_1^2u\omega_2 - \omega_4^2\omega_1u + \omega_3^2\omega_4\omega_1u + \omega_1^2u - 6\omega_3\omega_1u\omega_2 + 5\omega_4\omega_1u - 6\omega_4\omega_1u\omega_2 - \omega_3\omega_4\omega_1u\omega_2^2 + \omega_3\omega_4^2\omega_1u + \omega_4\omega_1u\omega_2^2 - \omega_3\omega_1u + 7\omega_3\omega_4\omega_1u\omega_2 + \omega_3\omega_1u\omega_2^2 - \omega_1^2u\omega_2 - \omega_3\omega_4\omega_1u\omega_2 - \omega_3^2\omega_1u + \omega_3\omega_4\omega_1u\omega_2^2, \\
\alpha_{x,y}^{[\mu_2],t-4\delta_t} &= -4 - \omega_2^2 - \omega_3^2\omega_4\omega_1 - 6\omega_1\omega_2 + \omega_4\omega_2^2 - \omega_4^2\omega_1\omega_2 + \omega_3\omega_4\omega_1\omega_2^2 + \omega_3\omega_4^2 - \omega_3\omega_4^2\omega_1 + \omega_3\omega_1^2 - \omega_4\omega_1^2\omega_2 + 5\omega_3 + 7\omega_3\omega_4\omega_2 - \omega_3\omega_1\omega_2^2 - \omega_3\omega_4\omega_2^2 + 7\omega_3\omega_1\omega_2 + \omega_3^2\omega_2 - 6\omega_3\omega_1 + \omega_1\omega_2^2 - 6\omega_4\omega_2 - 6\omega_3\omega_4 - 8\omega_3\omega_4\omega_1\omega_2 + \omega_4^2\omega_1 - \omega_3^2\omega_1\omega_2 + \omega_4^2\omega_2 + 5\omega_4 + \omega_3\omega_4\omega_1\omega_2^2 + \omega_3^2\omega_4 + 5\omega_1 - 6\omega_4\omega_1 - \omega_3^2 + \omega_3\omega_4^2\omega_1\omega_2 - \omega_4\omega_1\omega_2^2 - 6\omega_3\omega_2 - \omega_3\omega_1^2\omega_2 + \omega_3^2\omega_1 - \omega_3\omega_4\omega_1^2 + 7\omega_3\omega_4\omega_1 - \omega_4^2 + 7\omega_4\omega_1\omega_2 + \omega_3\omega_2^2 - \omega_3\omega_4^2\omega_2 + 5\omega_2 + \omega_4\omega_1^2 - \omega_3^2\omega_4\omega_2 + \omega_1^2\omega_2 + \omega_3^2\omega_4\omega_1\omega_2 - \omega_1^2,
\end{aligned}$$

#### 6.4 EFDE for $\mu_3$

$$\mu_{3,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_3],t-\ell\delta_t} \mu_{3,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x,y-\delta_l}^{[\mu_1],t} = 1 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{4}\omega_3 - \frac{1}{4}\omega_4u^2 - \frac{1}{4}\omega_4 + \frac{1}{4}v^2\omega_3 + \frac{1}{4}\omega_3u^2 + \frac{1}{2}v\omega_2 - \frac{1}{2}\omega_2 + \frac{1}{4}v^2\omega_4.$$

$$a_{x,y+\delta_l}^{[\mu_1],t} = -1 - \frac{1}{2}\omega_3 c_s^2 + \frac{1}{4}\omega_3 + \frac{1}{4}\omega_4 u^2 + \frac{1}{4}\omega_4 - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_3 u^2 + \frac{1}{2}v\omega_2 + \frac{1}{2}\omega_2 - \frac{1}{4}v^2\omega_4.$$

$$\alpha_{x-\delta_1, y-\delta_1}^{[\mu_1], t-\delta_t} = -1 - \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_1u\omega_2 + \frac{1}{8}\omega_4u^2\omega_2 - \frac{1}{2}\omega_3c_s^2 - \frac{1}{8}v^2\omega_4\omega_2 + \frac{1}{4}\omega_3 + \frac{1}{8}\omega_3\omega_4u^2 + \frac{1}{8}v^2\omega_3\omega_4 - \frac{1}{2}\omega_1u - \frac{1}{8}\omega_4\omega_2 - \frac{1}{4}\omega_4u^2 - \frac{1}{8}\omega_3\omega_4 + \frac{1}{8}\omega_4^2u^2 + \frac{3}{4}\omega_4 + \frac{1}{4}\omega_3c_s^2\omega_2 - \frac{1}{8}v^2\omega_3 - \frac{1}{8}v^2\omega_4^2 + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_1u + \frac{1}{4}\omega_3\omega_4c_s^2 - \frac{1}{8}\omega_3\omega_2 - \frac{1}{4}\omega_3u^2 + \frac{1}{8}\omega_3u^2\omega_2 - \frac{1}{8}\omega_4^2 + \frac{1}{2}\omega_2 + \frac{1}{4}v^2\omega_4 + \frac{1}{8}v^2\omega_3\omega_2,$$

$$\alpha_{x-\delta_t, y-\delta_t}^{[\mu_3], t-\delta_t} = 1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x,y-\delta_l}^{[\mu_1],t-\delta_t} = -1 + 2\omega_3 c_s^2 + \frac{1}{4}\omega_3 - \frac{1}{4}\omega_3\omega_4 u^2 - \frac{1}{4}v^2\omega_3\omega_4 - \frac{1}{4}\omega_3^2 u^2 + \frac{1}{4}\omega_4 - \omega_3 c_s^2 \omega_2 + v^2\omega_3 - \frac{1}{2}\omega_3\omega_4 c_s^2 + \omega_3 u^2 - \frac{1}{2}\omega_3 u^2 \omega_2 - \frac{1}{2}\omega_3^2 c_s^2 + \frac{1}{2}\omega_2 - \frac{1}{2}v^2\omega_3\omega_2 - \frac{1}{4}v^2\omega_3^2,$$

$$\alpha_{x,y-\delta_l}^{[\mu_3],t-\delta_t} = 1 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x+\delta_i, y-\delta_i}^{[\mu_1], t-\delta_t} = -1 - \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_1u\omega_2 + \frac{1}{8}\omega_4u^2\omega_2 - \frac{1}{2}\omega_3c_s^2 - \frac{1}{8}v^2\omega_4\omega_2 + \frac{1}{4}\omega_3 + \frac{1}{8}\omega_3\omega_4u^2 + \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{2}\omega_1u - \frac{1}{8}\omega_4\omega_2 - \frac{1}{4}\omega_4u^2 - \frac{1}{8}\omega_3\omega_4 + \frac{1}{8}\omega_4^2u^2 + \frac{3}{4}\omega_4 + \frac{1}{4}\omega_3c_s^2\omega_2 - \frac{1}{4}v^2\omega_3 - \frac{1}{8}v^2\omega_4^2 + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_4\omega_1u + \frac{1}{4}\omega_3\omega_4c_s^2 - \frac{1}{8}\omega_3\omega_2 - \frac{1}{4}\omega_3u^2 + \frac{1}{8}\omega_3u^2\omega_2 - \frac{1}{8}\omega_4^2 + \frac{1}{2}\omega_2 + \frac{1}{4}v^2\omega_4 + \frac{1}{8}v^2\omega_3\omega_2,$$

$$\alpha_{x+\delta_t, y-\delta_t}^{[\mu_3], t-\delta_t} = 1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x-\delta_t,y}^{[\mu_3],t-\delta_t} = 1 - \frac{5}{4}\omega_3 + \frac{1}{2}\omega_3\omega_1 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3^2,$$

$$\alpha_{x,y}^{[\mu_1],t-\delta_t} = -v\omega_2^2 + v\omega_2,$$

$$\alpha_{x,y}^{[\mu_3],t-\delta_t} = 2 + \omega_2^2 - 2\omega_1 - 2\omega_2 + \omega_1^2,$$

$$\alpha_{x+\delta t, y}^{[\mu_3], t-\delta t} = 1 - \frac{5}{4}\omega_3 + \frac{1}{2}\omega_3\omega_1 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3^2,$$

$$\alpha_{x-\delta t, y+\delta t}^{[\mu_1], t-\delta t} = 1 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_1 u\omega_2 - \frac{1}{8}\omega_4 u^2\omega_2 + \frac{1}{2}\omega_3 c_s^2 + \frac{1}{8}v^2\omega_4\omega_2 - \frac{1}{4}\omega_3 - \frac{1}{8}\omega_3\omega_4 u^2 - \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{2}\omega_1 u + \frac{1}{8}\omega_4\omega_2 + \frac{1}{4}\omega_4 u^2 + \frac{1}{8}\omega_3\omega_4 - \frac{1}{8}\omega_4^2 u^2 - \frac{3}{4}\omega_4 - \frac{1}{4}\omega_3 c_s^2\omega_2 + \frac{1}{4}v^2\omega_3 + \frac{1}{8}v^2\omega_4^2 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_4\omega_1 u - \frac{1}{4}\omega_3\omega_4 c_s^2 + \frac{1}{8}\omega_3\omega_2 + \frac{1}{4}\omega_3 u^2 - \frac{1}{8}\omega_3 u^2\omega_2 + \frac{1}{8}\omega_4^2 - \frac{1}{2}\omega_2 - \frac{1}{4}v^2\omega_4 - \frac{1}{8}v^2\omega_3\omega_2,$$

$$\alpha_{x-\delta_t, y+\delta_t}^{[\mu_3], t-\delta_t} = 1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x,y+\delta_t}^{[\mu_1],t-\delta_t} = 1 - 2\omega_3 c_s^2 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_3\omega_4 u^2 + \frac{1}{4}v^2\omega_3\omega_4 + \frac{1}{4}\omega_3^2 u^2 - \frac{1}{4}\omega_4 + \omega_3 c_s^2 \omega_2 - v^2\omega_3 + \frac{1}{2}\omega_3\omega_4 c_s^2 - \omega_3 u^2 + \frac{1}{2}\omega_3 u^2 \omega_2 + \frac{1}{2}\omega_3^2 c_s^2 - \frac{1}{2}\omega_2 + \frac{1}{2}v^2\omega_3\omega_2 + \frac{1}{4}v^2\omega_3^2,$$

$$\alpha_{x,y+\delta_1}^{[\mu_3],t-\delta_1} = 1 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x+\delta_t, y+\delta_l}^{[\mu_1], t-\delta_t} = 1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_1 u\omega_2 - \frac{1}{8}\omega_4 u^2\omega_2 + \frac{1}{2}\omega_3 c_s^2 + \frac{1}{8}v^2\omega_4\omega_2 - \frac{1}{4}\omega_3 - \frac{1}{8}\omega_3\omega_4 u^2 - \frac{1}{8}v^2\omega_3\omega_4 - \frac{1}{2}\omega_1 u + \frac{1}{8}\omega_4\omega_2 + \frac{1}{4}\omega_4 u^2 + \frac{1}{8}\omega_3\omega_4 - \frac{1}{8}\omega_4^2 u^2 - \frac{3}{4}\omega_4 - \frac{1}{4}\omega_3 c_s^2\omega_2 + \frac{1}{4}v^2\omega_3 + \frac{1}{8}v^2\omega_4^2 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_1 u - \frac{1}{4}\omega_3\omega_4 c_s^2 + \frac{1}{8}\omega_3\omega_2 + \frac{1}{4}\omega_3 u^2 - \frac{1}{8}\omega_3 u^2\omega_2 + \frac{1}{8}\omega_4^2 - \frac{1}{2}\omega_2 - \frac{1}{4}v^2\omega_4 - \frac{1}{8}v^2\omega_3\omega_2,$$

$$\alpha_{x+\delta_1,y+\delta_1}^{[\mu_3],t-\delta_t} = 1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x-\delta_1, y-\delta_1}^{[\mu_1], t-2\delta t} = 1 - \frac{1}{8}vw_3w_4w_2 + \frac{5}{8}v^2w_3w_1 - \frac{1}{2}w_3c_s^2w_1w_2 + \frac{1}{4}w_1w_2 + \frac{1}{8}w_3w_4w_1u - \frac{1}{4}w_1w_2 - \frac{1}{8}w_4u^2w_2 - 2w_3c_s^2 + \frac{1}{8}v^2w_4w_2 + \frac{5}{8}vw_3w_2 - \frac{1}{4}w_3 + \frac{1}{8}w_3w_4u^2 - \frac{5}{8}w_3w_1u + \frac{11}{8}v^2w_3w_4 - \frac{1}{4}w_3w_4^2c_s^2 + \frac{1}{4}w_3^2u^2 + \frac{5}{8}w_3w_1u^2 - \frac{1}{4}v^2w_3w_4^2 - \frac{1}{2}w_3w_4c_s^2w_1 + \frac{1}{2}w_1u + \frac{1}{8}w_4w_2 - \frac{3}{8}v^2w_3w_4w_1 + \frac{1}{2}w_4u^2 - \frac{1}{4}w_3^2w_4c_s^2 - \frac{1}{8}w_3w_4w_1u^2 + \frac{1}{8}w_3w_4 + \frac{1}{4}w_3c_s^2w_1 - \frac{1}{4}vw_3w_1w_2 - \frac{1}{4}w_3w_1u^2w_2 - \frac{1}{8}w_4^2u^2 - \frac{1}{8}w_3^2w_1u^2 - \frac{3}{4}w_4 + \frac{3}{4}w_3c_s^2w_2 + \frac{1}{4}vw_1w_2 - v^2w_3 + \frac{1}{4}w_3w_1uw_2 + \frac{1}{8}v^2w_4^2 - \frac{1}{2}w_1 - \frac{1}{4}v^2w_3w_4w_2 + \frac{1}{4}w_4w_1 - \frac{1}{8}w_4w_1u + \frac{3}{8}w_3w_4c_s^2w_2 - \frac{1}{4}w_3w_4c_s^2w_2 + \frac{1}{8}w_3w_2 - w_3u^2 + \frac{3}{8}w_3u^2w_2 - \frac{1}{4}w_3c_s^2w_1 + \frac{1}{8}w_4^2 - \frac{1}{2}v_2w_2 + \frac{1}{8}v^2w_4w_1 + \frac{1}{2}w_3^2c_s^2 - \frac{1}{8}vw_3^2w_2 - \frac{1}{8}w_4w_1u^2 - \frac{1}{4}v^2w_3w_4 - \frac{1}{8}v^2w_3^2w_1 - \frac{1}{2}w_2 - \frac{1}{2}v^2w_4 - \frac{1}{4}v^2w_3w_1w_2 + \frac{1}{8}w_3^2w_1u + \frac{3}{8}v^2w_3w_2 + \frac{1}{8}vw_4w_2 + \frac{1}{4}v^2w_3^2,$$

$$\alpha_{x-\delta_1, y-\delta_1}^{[\mu_3], t-2\delta_t} = -2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_4^2 + \frac{5}{2}\omega_3 + \frac{3}{8}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2 + \frac{1}{8}\omega_3^2\omega_2 - \frac{9}{8}\omega_3\omega_1 - \frac{3}{8}\omega_4\omega_2 - \frac{7}{4}\omega_3\omega_4 + \frac{3}{2}\omega_4 + \frac{1}{4}\omega_3^2\omega_4 + \omega_1 - \frac{3}{8}\omega_4\omega_1 - \frac{1}{2}\omega_3^2 - \frac{9}{8}\omega_3\omega_2 + \frac{1}{8}\omega_3^2\omega_1 + \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_4^2 + \omega_2,$$



$$\begin{aligned}
& \frac{5}{8}v\omega_3\omega_2 + \frac{1}{4}\omega_3 - \frac{1}{8}\omega_3\omega_4u^2 - \frac{5}{8}\omega_3\omega_1u - \frac{11}{8}v^2\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_4^2c_s^2 - \frac{1}{4}\omega_3^2u^2 - \frac{5}{8}\omega_3\omega_1u^2 + \frac{1}{4}v^2\omega_3\omega_4^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 + \\
& \frac{1}{2}\omega_1u - \frac{1}{8}\omega_4\omega_2 + \frac{3}{8}v^2\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_4u^2 + \frac{1}{4}\omega_3^2\omega_4c_s^2 + \frac{1}{8}\omega_3\omega_4\omega_1u^2 - \frac{1}{8}\omega_3\omega_4 - \frac{5}{4}\omega_3c_s^2\omega_1 - \frac{1}{4}v\omega_3\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 + \\
& \frac{1}{8}\omega_4^2u^2 + \frac{1}{8}\omega_3^2\omega_1u^2 + \frac{3}{4}\omega_4 - \frac{3}{4}\omega_3c_s^2\omega_2 + \frac{1}{4}v\omega_1\omega_2 + v^2\omega_3 + \frac{1}{4}\omega_3\omega_1\omega_2 - \frac{1}{8}v^2\omega_4^2 + \frac{1}{2}\omega_1 + \frac{1}{4}v^2\omega_3\omega_4\omega_2 - \frac{1}{4}\omega_4\omega_1 - \\
& \frac{1}{8}\omega_4\omega_1u - \frac{3}{8}\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_3\omega_4c_s^2\omega_2 - \frac{1}{8}\omega_3\omega_2 + \omega_3u^2 - \frac{3}{8}\omega_3u^2\omega_2 + \frac{1}{4}\omega_3c_s^2\omega_1 - \frac{1}{8}\omega_4^2 - \frac{1}{2}v\omega_2 - \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{2}\omega_3^2c_s^2 - \\
& \frac{1}{8}v\omega_3^2\omega_2 + \frac{1}{8}\omega_4\omega_1u^2 + \frac{1}{4}v^2\omega_3^2\omega_4 + \frac{1}{8}\omega_2 + \frac{1}{2}v^2\omega_4 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 + \frac{1}{8}\omega_3^2\omega_1u - \frac{3}{8}v^2\omega_3\omega_2 + \frac{1}{8}v\omega_4\omega_2 - \frac{1}{4}v^2\omega_3^2,
\end{aligned}$$

$$\alpha_{x+\delta_t, y+\delta_t}^{[\mu_3], t-2\delta_t} = -2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_4^2 + \frac{5}{2}\omega_3 + \frac{3}{8}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2 + \frac{1}{8}\omega_3^2\omega_2 - \frac{9}{8}\omega_3\omega_1 - \frac{3}{8}\omega_4\omega_2 - \frac{7}{4}\omega_3\omega_4 + \frac{3}{2}\omega_4 + \\
\frac{1}{4}\omega_3^2\omega_4 + \omega_1 - \frac{3}{8}\omega_4\omega_1 - \frac{1}{2}\omega_3^2 - \frac{9}{8}\omega_3\omega_2 + \frac{1}{8}\omega_3^2\omega_1 + \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_4^2 + \omega_2,$$

$$\alpha_{x-\delta_t, y-\delta_t}^{[\mu_1], t-3\delta_t} = -1 + \frac{1}{4}v\omega_3\omega_4\omega_2 - \frac{5}{4}v^2\omega_3\omega_1 + \frac{1}{2}\omega_3c_s^2\omega_1^2 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}\omega_1\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1^2 - \frac{1}{4}\omega_4^2\omega_1u^2 - \\
\frac{1}{4}v\omega_3\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1^2 + \frac{1}{4}v^2\omega_4^2\omega_1 + \frac{1}{4}\omega_4u^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_4\omega_1^2u^2 + 2\omega_3c_s^2 - \\
\frac{1}{4}v^2\omega_4\omega_2 - \frac{5}{4}v\omega_3\omega_2 + \frac{1}{4}\omega_3 - \frac{5}{2}v^2\omega_3\omega_4 + \frac{1}{2}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_3^2u^2 + \frac{1}{4}\omega_3\omega_1\omega_2 - \frac{5}{4}\omega_3\omega_1u^2 + \frac{1}{2}v^2\omega_3\omega_4^2 - \\
\frac{1}{2}\omega_3\omega_4c_s^2\omega_1\omega_2 - \frac{1}{4}\omega_4\omega_1u^2\omega_2 + 3\omega_3\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_4\omega_2 + 3v^2\omega_3\omega_4\omega_1 - \omega_4u^2 + \frac{1}{2}\omega_3^2\omega_4c_s^2 + \frac{1}{2}v\omega_1^2\omega_2 - \frac{1}{4}\omega_3\omega_4 - \\
\frac{5}{8}\omega_3c_s^2\omega_1 + \frac{1}{4}v^2\omega_3\omega_1^2 + \frac{7}{4}v\omega_3\omega_1\omega_2 + \frac{1}{4}v^2\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_4^2\omega_1 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 + \frac{1}{4}\omega_4^2u^2 - \frac{1}{2}v^2\omega_3\omega_4^2\omega_1 + \frac{1}{4}\omega_3^2\omega_1u^2 + \\
\frac{9}{8}\omega_4 - \frac{1}{2}\omega_3c_s^2\omega_2 - \frac{3}{2}v\omega_1\omega_2 + v^2\omega_3 - \frac{1}{2}v\omega_3\omega_1^2\omega_2 - \frac{1}{4}v^2\omega_4^2 + \omega_1 + \frac{1}{2}v^2\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 - \frac{3}{2}\omega_4\omega_1 - \\
\frac{5}{4}\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \frac{1}{4}\omega_3\omega_1^2u^2 - \frac{1}{2}\omega_3\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_4\omega_1 + \omega_3u^2 - \frac{1}{4}\omega_3u^2\omega_2 + \frac{1}{4}v^2\omega_4\omega_1^2 - \frac{1}{4}v\omega_3^2\omega_1\omega_2 + \\
\frac{1}{2}\omega_3^2c_s^2\omega_1 + \frac{1}{4}\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_4^2 + v\omega_2 - \frac{5}{4}v^2\omega_4\omega_1 - \frac{1}{2}\omega_3^2\omega_4c_s^2\omega_1 - \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{4}v\omega_3^2\omega_2 + \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{5}{4}\omega_4\omega_1u^2 + \\
\frac{1}{2}v^2\omega_3^2\omega_4 + \frac{1}{4}v^2\omega_3^2\omega_1 + \frac{1}{2}\omega_2 + \frac{1}{4}\omega_4\omega_1^2 + v^2\omega_4 + \frac{1}{4}v^2\omega_4\omega_1\omega_2 - \frac{1}{4}v^2\omega_3\omega_2 - \frac{1}{4}v\omega_4\omega_2 - \frac{1}{4}v^2\omega_3^2,$$

$$\alpha_{x,y-\delta_t}^{[\mu_3], t-3\delta_t} = 3 + \frac{1}{2}\omega_3^2\omega_4\omega_1 + 2\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4^2 + \frac{1}{2}\omega_3\omega_4^2\omega_1 - \omega_3\omega_1^2 - \frac{15}{4}\omega_3 - \frac{3}{4}\omega_3\omega_4\omega_2 - \frac{9}{4}\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3^2\omega_2 + \\
\frac{19}{4}\omega_3\omega_1 + \frac{3}{4}\omega_4\omega_2 + \frac{13}{4}\omega_3\omega_4 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 + \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{11}{4}\omega_4 - \frac{1}{2}\omega_3^2\omega_4 - 4\omega_1 + \frac{13}{4}\omega_4\omega_1 + \frac{3}{4}\omega_3^2 + \\
\frac{4}{4}\omega_3\omega_2 + \frac{1}{2}\omega_3\omega_1^2\omega_2 - \frac{3}{4}\omega_3^2\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1^2 - \frac{15}{4}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2 - \frac{3}{4}\omega_4\omega_1\omega_2 - \frac{3}{2}\omega_2 - \frac{1}{2}\omega_4\omega_1^2 - \frac{1}{2}\omega_1^2\omega_2 + \omega_1^2,$$

$$\alpha_{x-\delta_t, y}^{[\mu_1], t-3\delta_t} = \\
\frac{13}{4}v\omega_3\omega_4\omega_2 - \frac{1}{2}v\omega_3\omega_1\omega_2^2 - \frac{3}{4}v\omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}v\omega_4^2\omega_2 - \frac{15}{4}v\omega_3\omega_2 + v\omega_3\omega_2^2 - \frac{1}{2}v\omega_3\omega_4\omega_2^2 + \frac{7}{4}v\omega_3\omega_1\omega_2 + \frac{1}{2}v\omega_4\omega_2^2 - \\
\frac{3}{2}v\omega_1\omega_2 - \frac{1}{4}v\omega_3^2\omega_1\omega_2 - v\omega_2^2 + 3v\omega_2 - \frac{1}{2}v\omega_3^2\omega_4\omega_2 + \frac{3}{4}v\omega_3^2\omega_2 - \frac{1}{2}v\omega_3\omega_4\omega_2^2 + \frac{3}{4}v\omega_4\omega_1\omega_2 - \frac{11}{4}v\omega_4\omega_2 + \frac{1}{2}v\omega_1\omega_2^2,$$

$$\alpha_{x-\delta_t, y}^{[\mu_3], t-3\delta_t} = 3 + \omega_2^2 + 2\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_2^2 - \frac{1}{2}\omega_3\omega_4^2 - \frac{15}{4}\omega_3 - \frac{15}{4}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_2^2 - \frac{9}{4}\omega_3\omega_1\omega_2 - \\
\frac{3}{4}\omega_3^2\omega_2 + \frac{7}{4}\omega_3\omega_1 - \frac{1}{2}\omega_1\omega_2^2 + \frac{13}{4}\omega_4\omega_2 + \frac{13}{4}\omega_3\omega_4 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_2 - \frac{11}{4}\omega_4 - \frac{1}{2}\omega_3^2\omega_4 - \frac{3}{2}\omega_1 + \\
\frac{3}{4}\omega_4\omega_1 + \frac{3}{4}\omega_3^2 + \frac{19}{4}\omega_3\omega_2 - \frac{1}{4}\omega_3^2\omega_1 - \frac{3}{4}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2 - \frac{3}{4}\omega_4\omega_1\omega_2 - \omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_2^2 - 4\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_2,$$

$$\alpha_{x,y+\delta_t}^{[\mu_1], t-3\delta_t} = -v\omega_4\omega_1^2\omega_2 + v\omega_4^2\omega_2 - v\omega_4\omega_1\omega_2 + v\omega_1^2\omega_2 + v\omega_4\omega_2^2 - 4v\omega_1\omega_2 - v\omega_4\omega_1\omega_2^2 - v\omega_2^2 + 3v\omega_2 + 5v\omega_4\omega_1\omega_2 - \\
4v\omega_4\omega_2 + v\omega_1\omega_2^2,$$

$$\alpha_{x,y}^{[\mu_3], t-3\delta_t} = 3 + \omega_2^2 + 5\omega_1\omega_2 - \omega_4\omega_2^2 + \omega_4^2\omega_1\omega_2 + \omega_4\omega_1^2\omega_2 - \omega_1\omega_2^2 + 5\omega_4\omega_2 - \omega_4^2\omega_1 - \omega_4^2\omega_2 - 4\omega_4 - 4\omega_1 + 5\omega_4\omega_1 + \\
\omega_4\omega_1\omega_2^2 + \omega_4^2 - 6\omega_4\omega_1\omega_2 - 4\omega_2 - \omega_4\omega_1^2 - \omega_1^2\omega_2 + \omega_1^2,$$

$$\alpha_{x+\delta_t, y}^{[\mu_1], t-3\delta_t} = \\
\frac{13}{4}v\omega_3\omega_4\omega_2 - \frac{1}{2}v\omega_3\omega_1\omega_2^2 - \frac{3}{4}v\omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}v\omega_4^2\omega_2 - \frac{15}{4}v\omega_3\omega_2 + v\omega_3\omega_2^2 - \frac{1}{2}v\omega_3\omega_4\omega_2^2 + \frac{7}{4}v\omega_3\omega_1\omega_2 + \frac{1}{2}v\omega_4\omega_2^2 - \\
\frac{3}{2}v\omega_1\omega_2 - \frac{1}{4}v\omega_3^2\omega_1\omega_2 - v\omega_2^2 + 3v\omega_2 - \frac{1}{2}v\omega_3^2\omega_4\omega_2 + \frac{3}{4}v\omega_3^2\omega_2 - \frac{1}{2}v\omega_3\omega_4\omega_2^2 + \frac{3}{4}v\omega_4\omega_1\omega_2 - \frac{11}{4}v\omega_4\omega_2 + \frac{1}{2}v\omega_1\omega_2^2,$$

$$\alpha_{x+\delta_t, y}^{[\mu_3], t-3\delta_t} = 3 + \omega_2^2 + 2\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_2^2 - \frac{1}{2}\omega_3\omega_4^2 - \frac{15}{4}\omega_3 - \frac{15}{4}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_2^2 - \frac{9}{4}\omega_3\omega_1\omega_2 - \\
\frac{3}{4}\omega_3^2\omega_2 + \frac{7}{4}\omega_3\omega_1 - \frac{1}{2}\omega_1\omega_2^2 + \frac{13}{4}\omega_4\omega_2 + \frac{13}{4}\omega_3\omega_4 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_2 - \frac{11}{4}\omega_4 - \frac{1}{2}\omega_3^2\omega_4 - \frac{3}{2}\omega_1 + \\
\frac{3}{4}\omega_4\omega_1 + \frac{3}{4}\omega_3^2 + \frac{19}{4}\omega_3\omega_2 - \frac{1}{4}\omega_3^2\omega_1 - \frac{3}{4}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2 - \frac{3}{4}\omega_4\omega_1\omega_2 - \omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_2^2 - 4\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_2,$$

$$\alpha_{x,y+\delta_t}^{[\mu_1], t-3\delta_t} = 1 + \frac{1}{4}v\omega_3\omega_4\omega_2 + \frac{5}{4}v^2\omega_3\omega_1 - \frac{1}{2}\omega_3c_s^2\omega_1^2 - \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{2}\omega_1\omega_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1^2 + \frac{1}{4}\omega_4^2\omega_1u^2 - \\
\frac{1}{4}v\omega_3\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1^2 - \frac{1}{4}v^2\omega_4^2\omega_1 - \frac{1}{4}\omega_4u^2\omega_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1^2u^2 - 2\omega_3c_s^2 + \\
\frac{1}{4}v^2\omega_4\omega_2 - \frac{5}{4}v\omega_3\omega_2 - \frac{1}{4}\omega_3 + \frac{5}{2}v^2\omega_3\omega_4 - \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_3^2u^2 - \frac{1}{4}\omega_3\omega_1\omega_2 + \frac{5}{4}\omega_3\omega_1u^2 - \frac{1}{2}v^2\omega_3\omega_4^2 + \\
\frac{1}{2}\omega_3\omega_4c_s^2\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1u^2\omega_2 - 3\omega_3\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_4\omega_2 - 3v^2\omega_3\omega_4\omega_1 + \omega_4u^2 - \frac{1}{2}\omega_3^2\omega_4c_s^2 + \frac{1}{2}v\omega_1^2\omega_2 + \frac{1}{4}\omega_3\omega_4 + \\
\frac{9}{4}\omega_3c_s^2\omega_1 - \frac{1}{4}v^2\omega_3\omega_1^2 + \frac{7}{4}v\omega_3\omega_1\omega_2 - \frac{1}{4}v^2\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_4^2\omega_1 - \frac{1}{4}\omega_3\omega_1u^2\omega_2 - \frac{1}{4}\omega_4^2u^2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1^2 - \frac{1}{4}\omega_3^2\omega_1u^2 - \\
\frac{5}{4}\omega_4 + \frac{1}{2}\omega_3c_s^2\omega_2 - \frac{3}{2}v\omega_1\omega_2 - v^2\omega_3 - \frac{1}{2}v\omega_3\omega_1^2\omega_2 + \frac{1}{4}v^2\omega_4^2\omega_1 - \omega_1 - \frac{1}{2}v^2\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 + \frac{3}{2}\omega_4\omega_1 +$$

$$\begin{aligned}
& \frac{5}{2}\omega_3\omega_4c_s^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 - \frac{1}{4}\omega_3\omega_1^2u^2 + \frac{1}{4}\omega_3\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_4\omega_1 - \omega_3u^2 + \frac{1}{4}\omega_3u^2\omega_2 - \frac{1}{4}v^2\omega_4\omega_1^2 - \frac{1}{4}v\omega_3^2\omega_1\omega_2 - \\
& \frac{1}{2}\omega_3^2c_s^2\omega_1 - \frac{1}{4}\omega_3\omega_4\omega_1 + \frac{1}{4}\omega_4^2 + v\omega_2 + \frac{5}{4}v^2\omega_4\omega_1 + \frac{1}{2}\omega_3^2\omega_4c_s^2\omega_1 + \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{4}v\omega_3^2\omega_2 - \frac{1}{4}\omega_4\omega_1\omega_2 - \frac{5}{4}\omega_4\omega_1u^2 - \\
& \frac{1}{2}v^2\omega_3^2\omega_4 - \frac{1}{4}v^2\omega_3^2\omega_1 - \frac{1}{2}\omega_2 - \frac{1}{4}\omega_4\omega_1^2 - v^2\omega_4 + \frac{1}{4}v\omega_4\omega_1\omega_2 - \frac{1}{4}v^2\omega_3\omega_1\omega_2 + \frac{1}{4}v^2\omega_3\omega_2 - \frac{1}{4}v\omega_4\omega_2 + \frac{1}{4}v^2\omega_3^2, \\
\alpha_{x,y+\delta_l}^{[\mu_3],t-3\delta_t} &= 3 + \frac{1}{2}\omega_3\omega_4\omega_1 + 2\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4^2 + \frac{1}{2}\omega_3\omega_4\omega_1 - \omega_3\omega_1^2 - \frac{15}{4}\omega_3 - \frac{3}{4}\omega_3\omega_4\omega_2 - \frac{9}{4}\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3^2\omega_2 + \\
& \frac{19}{4}\omega_3\omega_1 + \frac{3}{4}\omega_4\omega_2 + \frac{13}{4}\omega_3\omega_4 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 + \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{11}{4}\omega_4 - \frac{1}{2}\omega_3^2\omega_4 - 4\omega_1 + \frac{13}{4}\omega_4\omega_1 + \frac{3}{4}\omega_3^2 + \\
& \frac{7}{4}\omega_3\omega_2 + \frac{1}{2}\omega_3\omega_1^2\omega_2 - \frac{3}{4}\omega_3^2\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1^2 - \frac{15}{4}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2 - \frac{3}{4}\omega_4\omega_1\omega_2 - \frac{3}{2}\omega_2 - \frac{1}{2}\omega_4\omega_1^2 - \frac{1}{2}\omega_1^2\omega_2 + \omega_1^2, \\
\alpha_{x,y}^{[\mu_1],t-4\delta_t} &= -6v\omega_3\omega_4\omega_2 + v\omega_3\omega_1\omega_2^2 + v\omega_4\omega_1^2\omega_2 + 7v\omega_3\omega_4\omega_1\omega_2 - v\omega_4^2\omega_2 + v\omega_4^2\omega_1\omega_2 + 5v\omega_3\omega_2 - v\omega_3\omega_2^2 - v\omega_1^2\omega_2 - \\
& v\omega_3\omega_4\omega_1\omega_2^2 + v\omega_3\omega_4\omega_2^2 - 6v\omega_3\omega_1\omega_2 - v\omega_3^2\omega_4\omega_1\omega_2 - v\omega_4\omega_2^2 + 5v\omega_1\omega_2 + v\omega_3\omega_1^2\omega_2 + v\omega_4\omega_1\omega_2^2 + v\omega_3^2\omega_1\omega_2 + \\
& v\omega_2^2 - 4v\omega_2 + v\omega_3^2\omega_4\omega_2 - v\omega_3\omega_4\omega_1\omega_2 - v\omega_3^2\omega_2 + v\omega_3\omega_4\omega_2^2 - 6v\omega_4\omega_1\omega_2 + 5v\omega_4\omega_2 - v\omega_3\omega_4\omega_1\omega_2^2 - v\omega_1\omega_2^2, \\
\alpha_{x,y}^{[\mu_3],t-4\delta_t} &= -4 - \omega_2^2 - \omega_3^2\omega_4\omega_1 - 6\omega_1\omega_2 + \omega_4\omega_2^2 - \omega_4^2\omega_1\omega_2 + \omega_3\omega_4\omega_1\omega_2^2 + \omega_3\omega_4^2 - \omega_3\omega_4^2\omega_1 + \omega_3\omega_4^2 - \omega_4\omega_1^2\omega_2 + 5\omega_3 + \\
& 7\omega_3\omega_4\omega_2 - \omega_3\omega_1\omega_2^2 - \omega_3\omega_4\omega_2^2 + 7\omega_3\omega_1\omega_2 + \omega_3^2\omega_2 - 6\omega_3\omega_1 + \omega_1\omega_2^2 - 6\omega_4\omega_2 - 6\omega_3\omega_4 - 8\omega_3\omega_4\omega_1\omega_2 + \omega_4^2\omega_1 - \\
& \omega_3^2\omega_1\omega_2 + \omega_4^2\omega_2 + 5\omega_4 + \omega_3\omega_4\omega_1^2\omega_2 + \omega_3^2\omega_4 + 5\omega_1 - 6\omega_4\omega_1 - \omega_3^2 + \omega_3\omega_4^2\omega_1\omega_2 - \omega_4\omega_1\omega_2^2 - 6\omega_3\omega_2 - \omega_3\omega_1^2\omega_2 + \\
& \omega_3^2\omega_1 - \omega_3\omega_4\omega_1^2 + 7\omega_3\omega_4\omega_1 - \omega_4^2 + 7\omega_4\omega_1\omega_2 + \omega_3\omega_2^2 - \omega_3\omega_4^2\omega_2 + 5\omega_2 + \omega_4\omega_1^2 - \omega_3^2\omega_4\omega_2 + \omega_1^2\omega_2 + \omega_3^2\omega_4\omega_1\omega_2 - \omega_1^2,
\end{aligned}$$

## 6.5 EFDE for $\mu_4$

$$\mu_{4,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l, y+j\delta_l}^{[\mu_1], t-\ell\delta_t} \mu_{x+i\delta_l, y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l, y+j\delta_l}^{[\mu_4], t-\ell\delta_t} \mu_{4,x+i\delta_l, y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\begin{aligned}
\alpha_{x-\delta_l, y}^{[\mu_1], t} &= 1 + \frac{1}{2}\omega_3\omega_1^2 - \frac{1}{4}\omega_3 + \frac{1}{2}\omega_1u + \frac{1}{4}\omega_4u^2 - \frac{1}{4}\omega_4 + \frac{1}{4}v^2\omega_3 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3u^2 - \frac{1}{4}v^2\omega_4. \\
\alpha_{x+\delta_l, y}^{[\mu_1], t} &= 1 + \frac{1}{2}\omega_3\omega_1^2 - \frac{1}{4}\omega_3 - \frac{1}{2}\omega_1u + \frac{1}{4}\omega_4u^2 - \frac{1}{4}\omega_4 + \frac{1}{4}v^2\omega_3 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3u^2 - \frac{1}{4}v^2\omega_4. \\
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_1], t-\delta_t} &= -1 + \frac{1}{8}v^2\omega_3\omega_1 - \frac{1}{4}\omega_1\omega_2 - \frac{1}{2}\omega_3c_s^2 + \frac{1}{4}\omega_3 + \frac{1}{8}\omega_3\omega_4u^2 + \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{8}\omega_3\omega_1u^2 - \frac{1}{8}\omega_3\omega_1 - \frac{1}{4}\omega_4\omega_2 + \\
& \frac{1}{4}\omega_4u^2 - \frac{1}{8}\omega_3\omega_4 + \frac{1}{4}\omega_3c_s^2\omega_1 - \frac{1}{8}\omega_4^2u^2 + \frac{3}{4}\omega_4 + \frac{1}{4}v\omega_1\omega_2 - \frac{1}{4}v^2\omega_3 + \frac{1}{8}v^2\omega_4^2 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4c_s^2 - \\
& \frac{1}{4}\omega_3u^2 - \frac{1}{8}\omega_4^2 - \frac{1}{2}v\omega_2 + \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{8}\omega_4\omega_1u^2 + \frac{1}{2}\omega_2 - \frac{1}{4}v^2\omega_4 + \frac{1}{4}v\omega_4\omega_2, \\
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_4], t-\delta_t} &= 1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{2}\omega_2, \\
\alpha_{x, y-\delta_l}^{[\mu_4], t-\delta_t} &= 1 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_2 - \frac{1}{2}\omega_2, \\
\alpha_{x+\delta_l, y-\delta_l}^{[\mu_1], t-\delta_t} &= -1 + \frac{1}{8}v^2\omega_3\omega_1 - \frac{1}{4}\omega_1\omega_2 - \frac{1}{2}\omega_3c_s^2 + \frac{1}{4}\omega_3 + \frac{1}{8}\omega_3\omega_4u^2 + \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{8}\omega_3\omega_1u^2 - \frac{1}{8}\omega_3\omega_1 - \frac{1}{4}\omega_4\omega_2 + \\
& \frac{1}{4}\omega_4u^2 - \frac{1}{8}\omega_3\omega_4 + \frac{1}{4}\omega_3c_s^2\omega_1 - \frac{1}{8}\omega_4^2u^2 + \frac{3}{4}\omega_4 + \frac{1}{4}v\omega_1\omega_2 - \frac{1}{4}v^2\omega_3 + \frac{1}{8}v^2\omega_4^2 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4c_s^2 - \\
& \frac{1}{4}\omega_3u^2 - \frac{1}{8}\omega_4^2 - \frac{1}{2}v\omega_2 + \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{8}\omega_4\omega_1u^2 + \frac{1}{2}\omega_2 - \frac{1}{4}v^2\omega_4 + \frac{1}{4}v\omega_4\omega_2, \\
\alpha_{x+\delta_l, y-\delta_l}^{[\mu_4], t-\delta_t} &= 1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{2}\omega_2, \\
\alpha_{x-\delta_l, y}^{[\mu_1], t-\delta_t} &= -1 - \frac{1}{2}v^2\omega_3\omega_1 + 2\omega_3c_s^2 + \frac{1}{4}\omega_3 - \frac{1}{4}\omega_3\omega_4u^2 - \frac{1}{4}v^2\omega_3\omega_4 - \frac{1}{4}\omega_3^2u^2 - \frac{1}{2}\omega_3\omega_1u^2 - \omega_3c_s^2\omega_1 + \frac{1}{4}\omega_4 + \\
& v^2\omega_3 + \frac{1}{2}\omega_1 - \frac{1}{2}\omega_3\omega_4c_s^2 + \omega_3u^2 - \frac{1}{2}\omega_3^2c_s^2 - \frac{1}{4}v^2\omega_3^2, \\
\alpha_{x-\delta_l, y}^{[\mu_4], t-\delta_t} &= 1 - \frac{5}{4}\omega_3 + \frac{1}{2}\omega_3\omega_1 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3^2,
\end{aligned}$$

$$\alpha_{x,y}^{[\mu_1],t-\delta_t} = -2 + \frac{1}{2}v^2\omega_3\omega_1 - \omega_3c_s^2 + \frac{1}{2}\omega_3 + \frac{1}{2}\omega_3\omega_1u^2 - \frac{1}{2}\omega_3\omega_1 - \frac{1}{2}\omega_4u^2 + \omega_3c_s^2\omega_1 + \frac{1}{2}\omega_4 - \frac{1}{2}v^2\omega_3 + 3\omega_1 - \frac{1}{2}\omega_4\omega_1 - \frac{1}{2}\omega_3u^2 - \frac{1}{2}v^2\omega_4\omega_1 + \frac{1}{2}\omega_4\omega_1u^2 + \frac{1}{2}v^2\omega_4 - \omega_1^2,$$

$$\alpha_{x,y}^{[\mu_4],t-\delta_t} = 2 + \omega_2^2 - 2\omega_1 - 2\omega_2 + \omega_1^2,$$

$$\alpha_{x+\delta_1 y}^{[\mu_1], t-\delta_t} = -1 - \frac{1}{2} v^2 \omega_3 \omega_1 + 2 \omega_3 c_s^2 + \frac{1}{4} \omega_3 - \frac{1}{4} \omega_3 \omega_4 u^2 - \frac{1}{4} v^2 \omega_3 \omega_4 - \frac{1}{4} \omega_3^2 u^2 - \frac{1}{2} \omega_3 \omega_1 u^2 - \omega_3 c_s^2 \omega_1 + \frac{1}{4} \omega_4 + v^2 \omega_3 + \frac{1}{2} \omega_1 - \frac{1}{2} \omega_3 \omega_4 c_s^2 + \omega_3 u^2 - \frac{1}{2} \omega_3^2 c_s^2 - \frac{1}{4} v^2 \omega_3^2,$$

$$\alpha_{x+\delta_1 y}^{[\mu_4], t-\delta_t} = 1 - \frac{5}{4}\omega_3 + \frac{1}{2}\omega_3\omega_1 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3^2$$

$$\begin{aligned} \alpha_{x-\delta_1, y+\delta_1}^{[\mu_1], t-\delta_t} = & -1 + \frac{1}{8}v^2w_3\omega_1 - \frac{1}{4}\omega_1\omega_2 - \frac{1}{2}w_3c_s^2 + \frac{1}{4}\omega_3 + \frac{1}{8}w_3\omega_4u^2 + \frac{1}{8}v^2w_3\omega_4 + \frac{1}{8}w_3\omega_1u^2 - \frac{1}{8}w_3\omega_1 - \frac{1}{4}\omega_4\omega_2 + \\ & \frac{1}{4}w_4u^2 - \frac{1}{8}w_3\omega_4 + \frac{1}{4}w_3c_s^2\omega_1 - \frac{1}{8}w_4^2u^2 + \frac{3}{4}\omega_4 - \frac{1}{4}v\omega_1\omega_2 - \frac{1}{4}v^2w_3 + \frac{1}{8}v^2w_4^2 + \frac{1}{2}\omega_1 - \frac{1}{8}w_4\omega_1 + \frac{1}{4}w_3\omega_4c_s^2 - \\ & \frac{1}{4}w_3u^2 - \frac{1}{8}w_4^2 + \frac{1}{2}v\omega_2 + \frac{1}{8}v^2w_4\omega_1 - \frac{1}{8}w_4\omega_1u^2 + \frac{1}{2}\omega_2 - \frac{1}{4}v^2w_4 - \frac{1}{4}v\omega_4\omega_2, \end{aligned}$$

$$\alpha_{x-\delta_t, y+\delta_t}^{[\mu_4], t-\delta_t} = 1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x,y+\delta_l}^{[\mu_4],t-\delta_t} = 1 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x+\delta t, y+\delta t}^{[\mu_1], t-\delta t} = -1 + \frac{1}{8}v^2\omega_3\omega_1 - \frac{1}{4}\omega_1\omega_2 - \frac{1}{2}\omega_3c_s^2 + \frac{1}{4}\omega_3 + \frac{1}{8}\omega_3\omega_4u^2 + \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{8}\omega_3\omega_1u^2 - \frac{1}{8}\omega_3\omega_1 - \frac{1}{4}\omega_4\omega_2 + \frac{1}{4}\omega_4u^2 - \frac{1}{8}\omega_3\omega_4 + \frac{1}{4}\omega_3c_s^2\omega_1 - \frac{1}{8}\omega_4^2u^2 + \frac{3}{4}\omega_4 - \frac{1}{4}v\omega_1\omega_2 - \frac{1}{4}v^2\omega_3 + \frac{1}{8}v^2\omega_4^2 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_3u^2 - \frac{1}{8}\omega_4^2 + \frac{1}{2}v\omega_2 + \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{8}\omega_4\omega_1u^2 + \frac{1}{2}\omega_2 - \frac{1}{4}v^2\omega_4 - \frac{1}{4}v\omega_4\omega_2,$$

$$\alpha_{x+\delta_1,y+\delta_1}^{[\mu_4],t-\delta_t} = 1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x-\delta_1, y-\delta_1}^{[\mu_1], t-2\delta_t} = 1 + \frac{1}{8}v\omega_3\omega_4\omega_2 + \frac{3}{8}v^2\omega_3\omega_1 - \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{8}\omega_3\omega_4\omega_1u - \frac{1}{8}v^2\omega_3^2\omega_2 + \frac{1}{4}\omega_1u\omega_2 + \frac{1}{8}\omega_4u^2\omega_2 - 2\omega_3c_s^2 - \frac{1}{8}v^2\omega_4\omega_2 - \frac{5}{8}v\omega_3\omega_2 - \frac{1}{4}\omega_3 + \frac{11}{8}\omega_3\omega_4u^2 + \frac{5}{8}\omega_3\omega_1u + \frac{1}{8}v^2\omega_3\omega_4 - \frac{1}{4}\omega_3\omega_4^2c_s^2 - \frac{1}{4}\omega_3^2c_s^2\omega_2 + \frac{1}{4}\omega_3^2u^2 + \frac{3}{8}\omega_3\omega_1u^2 - \frac{1}{4}\omega_3\omega_4c_s^2\omega_1 + \frac{1}{8}\omega_3\omega_1 - \frac{1}{2}\omega_1u + \frac{1}{4}\omega_4\omega_2 - \frac{1}{2}\omega_4u^2 - \frac{1}{4}\omega_5^2\omega_4c_s^2 - \frac{1}{4}\omega_3\omega_4\omega_1u^2 + \frac{1}{8}\omega_3\omega_4 + \frac{3}{4}\omega_3c_s^2\omega_1 + \frac{1}{4}v\omega_3\omega_1\omega_2 - \frac{1}{8}\omega_3^2u^2\omega_2 - \frac{1}{4}\omega_3\omega_1u^2\omega_2 + \frac{1}{8}\omega_4u^2 - \frac{3}{4}\omega_4 + \frac{5}{4}\omega_3c_s^2\omega_2 - \frac{1}{4}v\omega_1\omega_2 - v^2\omega_3 - \frac{3}{8}\omega_3\omega_4u^2\omega_2 - \frac{1}{4}\omega_3\omega_1u\omega_2 - \frac{1}{8}v^2\omega_4^2 - \frac{1}{2}\omega_1 - \frac{1}{8}v^2\omega_3\omega_4\omega_2 + \frac{1}{8}\omega_4\omega_1 + \frac{1}{8}\omega_4\omega_1u + \frac{3}{4}\omega_3\omega_4c_s^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 - \omega_3u^2 + \frac{5}{8}\omega_3u^2\omega_2 + \frac{1}{8}\omega_4^2 + \frac{1}{2}v\omega_2 - \frac{1}{8}v^2\omega_4\omega_1 + \frac{1}{2}\omega_3c_s^2 + \frac{9}{8}v\omega_3^2\omega_2 + \frac{1}{8}\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_4^2u^2 - \frac{1}{2}\omega_2 + \frac{1}{2}v^2\omega_4 - \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{8}\omega_3^2\omega_1u - \frac{1}{4}\omega_3^2\omega_4u^2 + \frac{5}{8}v^2\omega_3\omega_2 - \frac{1}{8}v\omega_4\omega_2 + \frac{1}{4}v^2\omega_3^2,$$

$$\alpha_{x-\delta_1, y-\delta_1}^{[\mu_4], t-2\delta_t} = -2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_4^2 + \frac{5}{2}\omega_3 + \frac{3}{8}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2 + \frac{1}{8}\omega_3^2\omega_2 - \frac{9}{8}\omega_3\omega_1 - \frac{3}{8}\omega_4\omega_2 - \frac{7}{4}\omega_3\omega_4 + \frac{3}{2}\omega_4 + \frac{1}{4}\omega_3^2\omega_4 + \omega_1 - \frac{3}{8}\omega_4\omega_1 - \frac{1}{2}\omega_3^2 - \frac{9}{8}\omega_3\omega_2 + \frac{1}{8}\omega_3^2\omega_1 + \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_4^2 + \omega_2,$$

$$\begin{aligned} \alpha_{x,y-\delta_1}^{[\mu_1,t-2\delta_t]} = & 2 - \frac{3}{4}v^2\omega_3\omega_1 + \frac{1}{2}\omega_3c_s^2\omega_1^2 + \frac{3}{4}\omega_1\omega_2 - \frac{1}{4}\omega_4^2\omega_1u^2 - \frac{1}{4}\omega_3\omega_1^2 + \frac{1}{4}v^2\omega_4^2\omega_1 - \frac{1}{4}\omega_4\omega_1^2u^2 + \omega_3c_s^2 - \frac{1}{2}\omega_3 \\ & - \frac{1}{4}v^2\omega_3\omega_4 - \frac{3}{4}\omega_3\omega_1u^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 + \frac{3}{4}\omega_3\omega_1 + \frac{1}{2}\omega_4\omega_2 + \frac{1}{4}v^2\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_4u^2 + \frac{1}{2}v\omega_1\omega_2 + \\ & \frac{1}{4}\omega_3\omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_4 - \frac{3}{2}\omega_3c_s^2\omega_1 + \frac{1}{4}v^2\omega_3\omega_1^2 - \frac{1}{4}\omega_4^2\omega_1 + \frac{1}{4}\omega_4^2u^2 - \frac{3}{2}\omega_4 - \frac{3}{2}v\omega_1\omega_2 + \frac{1}{2}v^2\omega_3 - \frac{1}{4}v^2\omega_4^2 - 3\omega_1 + \\ & \frac{1}{4}\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_3\omega_1^2u^2 + \frac{1}{2}\omega_3u^2 + \frac{1}{4}v^2\omega_4\omega_1^2 - \frac{1}{4}\omega_3\omega_4\omega_1 + \frac{1}{4}\omega_4^2 + v\omega_2 - \frac{3}{4}v^2\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_1\omega_2 + \\ & \frac{3}{4}\omega_4\omega_1u^2 - \omega_2 - \frac{1}{4}\omega_4\omega_1^2 + \frac{1}{2}v^2\omega_4 + \frac{1}{2}v\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_1^2\omega_2 - \frac{1}{2}v\omega_4\omega_2 + \omega_1^2, \end{aligned}$$

$$\alpha_{x,y-\delta_l}^{[\mu_4],t-2\delta_t} = -2 - \frac{3}{2}\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_2 + \frac{1}{2}\omega_4^2\omega_1 + 2\omega_4 + 3\omega_1 - \frac{5}{2}\omega_4\omega_1 - \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_4\omega_1\omega_2 + \omega_2 + \frac{1}{2}\omega_4\omega_1^2 + \frac{1}{2}\omega_1^2\omega_2 - \omega_1^2,$$

$$\alpha_{x+\delta_1, y-\delta_1}^{[\mu_1], t-2\delta_t} = 1 + \frac{1}{8}vw_3w_4w_2 + \frac{3}{8}v^2w_3w_1 - \frac{1}{2}w_3c_s^2w_1w_2 + \frac{1}{4}w_1w_2 + \frac{1}{8}w_3w_4w_1u - \frac{1}{8}v^2w_3^2w_2 - \frac{1}{4}w_1uw_2 + \frac{1}{8}w_4u^2w_2 - 2w_3c_s^2 - \frac{1}{8}v^2w_4w_2 - \frac{5}{8}vw_3w_2 - \frac{1}{4}w_3 + \frac{11}{8}w_3w_4u^2 - \frac{5}{8}w_3w_1u + \frac{1}{8}v^2w_3w_4 - \frac{1}{4}w_3w_4^2c_s^2 - \frac{1}{4}w_3^2c_s^2w_2 + \frac{1}{4}w_3^2u^2 + \frac{3}{8}w_3w_1u^2 - \frac{1}{4}w_3w_4c_s^2w_1 + \frac{1}{8}w_3w_1 + \frac{1}{2}w_1u + \frac{1}{4}w_4w_2 - \frac{1}{2}w_4u^2 - \frac{1}{4}w_3^2w_4c_s^2 - \frac{1}{4}w_3w_4w_1u^2 + \frac{1}{8}w_3w_4 + \frac{3}{4}w_3c_s^2w_1 + \frac{1}{4}vw_3w_1w_2 - \frac{1}{8}w_3^2u^2w_2 - \frac{1}{4}w_3w_1u^2w_2 + \frac{1}{8}w_2^2u^2 - \frac{3}{4}w_4 + \frac{5}{4}w_3c_s^2w_2 - \frac{1}{4}vw_1w_2 - v^2w_3 - \frac{3}{8}w_3w_4u^2w_2 + \frac{1}{4}w_3w_1uw_2 - \frac{1}{8}v^2w_4^2 - \frac{1}{2}w_1 - \frac{1}{8}v^2w_3w_4w_2 + \frac{1}{8}w_4w_1 - \frac{1}{8}w_4w_1u + \frac{3}{2}w_3w_4c_s^2 - \frac{1}{2}w_3w_4c_s^2w_2 - w_3u^2 + \frac{5}{8}w_3u^2w_2 + \frac{1}{8}w_4^2 + \frac{1}{2}vw_2 - \frac{1}{8}v^2w_4w_1 + \frac{1}{2}w_3^2c_s^2 + \frac{1}{8}vw_3^2w_2 + \frac{1}{8}w_4w_1u^2 - \frac{1}{4}w_3w_4^2u^2 - \frac{1}{2}w_2 + \frac{1}{2}v^2w_4 - \frac{1}{4}v^2w_3w_1w_2 + \frac{1}{8}w_3^2w_1u - \frac{1}{4}w_3^2w_4u^2 + \frac{5}{8}v^2w_3w_2 - \frac{1}{8}vw_4w_2 + \frac{1}{4}v^2w_3^2,$$

$$\begin{aligned} \alpha_{x+\delta_1, y-\delta_1}^{[\mu_4], t-2\delta_t} = & -2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_4^2 + \frac{5}{2}\omega_3 + \frac{3}{8}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2 + \frac{1}{8}\omega_3^2\omega_2 - \frac{9}{8}\omega_3\omega_1 - \frac{3}{8}\omega_4\omega_2 - \frac{7}{4}\omega_3\omega_4 + \frac{3}{2}\omega_4 + \\ & \frac{1}{4}\omega_3^2\omega_4 + \omega_1 - \frac{3}{8}\omega_4\omega_1 - \frac{1}{2}\omega_3^2 - \frac{9}{8}\omega_3\omega_2 + \frac{1}{8}\omega_3^2\omega_1 + \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_4^2 + \omega_2, \end{aligned}$$

$$\alpha_{x-\delta_l,y}^{[\mu_1],t-2\delta_t} = 1 - \frac{1}{4}v^2\omega_3\omega_1 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{2}\omega_1\omega_2 - \frac{1}{4}\omega_4\omega_2^2 + \omega_1u\omega_2 + \omega_4u^2\omega_2 + \frac{1}{2}\omega_3c_s^2 - v^2\omega_4\omega_2 - \frac{1}{4}\omega_3 - \frac{1}{4}\omega_3\omega_4\omega_2 -$$

$$\begin{aligned}
& \frac{1}{4} w_3 w_4 u^2 - \frac{1}{4} v^2 w_3 w_4 + \frac{1}{4} v^2 w_4 w_2^2 - \frac{1}{4} w_3 w_1 w_2 - \frac{1}{4} w_4 w_1 u^2 w_2 - \frac{1}{2} w_1 u w_2^2 + \frac{1}{4} w_3 w_1 - \frac{1}{4} w_4 u^2 w_2^2 - \frac{1}{2} w_1 u + \\
& \frac{3}{2} w_4 w_2 - \frac{3}{4} w_4 u^2 + \frac{1}{4} w_3 w_4 - \frac{1}{2} w_3 c_s^2 w_1 + \frac{1}{4} v^2 w_4 w_1 w_2 + \frac{1}{4} w_3 w_1 u^2 w_2 + \frac{1}{4} w_4^2 u^2 - \frac{5}{4} w_4 - \frac{1}{4} v^2 w_3 w_2^2 + \\
& \frac{1}{4} v^2 w_3 + \frac{1}{4} w_3 w_4 u^2 w_2 - \frac{1}{4} v^2 w_4^2 - \frac{1}{2} w_1 + \frac{1}{4} v^2 w_3 w_4 w_2 + \frac{1}{4} w_4 w_1 - \frac{1}{2} w_3 w_4 c_s^2 + \frac{1}{2} w_3 w_4 c_s^2 w_2 + \frac{1}{4} w_3 u^2 - \frac{1}{4} w_3 u^2 w_2^2 + \\
& \frac{1}{4} w_4^2 - \frac{1}{4} v^2 w_4 w_1 + \frac{1}{4} v^2 w_4^2 w_2 - \frac{1}{4} w_4 w_1 w_2 + \frac{1}{4} w_4 w_1 u^2 + \frac{1}{4} w_3 w_2^2 - \frac{1}{4} w_4^2 u^2 w_2 - w_2 + \frac{3}{4} v^2 w_4 + \frac{1}{4} v^2 w_3 w_1 w_2 - \frac{1}{2} w_3 c_s^2 w_2^2,
\end{aligned}$$

$$\alpha_{x-\delta_1, y}^{[\mu_4], t-2\delta_t} = -2 - w_2^2 - \frac{3}{2} w_1 w_2 + \frac{1}{2} w_4 w_2^2 + \frac{1}{2} w_1 w_2^2 - \frac{5}{2} w_4 w_2 + \frac{1}{2} w_4^2 w_2 + 2 w_4 + w_1 - \frac{1}{2} w_4 w_1 - \frac{1}{2} w_4^2 + \frac{1}{2} w_4 w_1 w_2 + 3 w_2,$$

$$\alpha_{x, y}^{[\mu_1], t-2\delta_t} = 2 + 3 v^2 w_3 w_1 - 2 w_3 c_s^2 w_1^2 - 4 w_3 c_s^2 - \frac{1}{2} w_3 + \frac{1}{2} w_3 w_4 u^2 + \frac{1}{2} v^2 w_3 w_4 + \frac{1}{2} w_3^2 u^2 + 3 w_3 w_1 u^2 - w_3 w_4 c_s^2 w_1 + \frac{1}{2} w_3 w_1 - \frac{1}{2} v^2 w_3 w_4 w_1 - \frac{1}{2} w_3 w_4 w_1 u^2 + 6 w_3 c_s^2 w_1 - v^2 w_3 w_1^2 - \frac{1}{2} w_3^2 w_1 u^2 - \frac{1}{2} w_4 - 2 v^2 w_3 - 3 w_1 + \frac{1}{2} w_4 w_1 + w_3 w_4 c_s^2 - w_3 w_1^2 u^2 - 2 w_3 u^2 - w_3^2 c_s^2 w_1 + w_3^2 c_s^2 - \frac{1}{2} v^2 w_3^2 w_1 + w_1^2 + \frac{1}{2} v^2 w_3^2,$$

$$\alpha_{x, y}^{[\mu_4], t-2\delta_t} = -4 - w_2^2 + w_3 w_1^2 + 5 w_3 + \frac{1}{2} w_3 w_4 w_2 + \frac{1}{2} w_3^2 w_2 - \frac{7}{2} w_3 w_1 - \frac{1}{2} w_4 w_2 - w_3 w_4 + w_4 + 3 w_1 - \frac{1}{2} w_4 w_1 - w_3^2 - \frac{7}{2} w_3 w_2 + \frac{1}{2} w_3^2 w_1 + \frac{1}{2} w_3 w_4 w_1 + w_3 w_2^2 + 3 w_2 - w_1^2,$$

$$\alpha_{x+\delta_1, y}^{[\mu_1], t-2\delta_t} = 1 - \frac{1}{4} v^2 w_3 w_1 + \frac{1}{2} w_3 c_s^2 w_1 w_2 + \frac{1}{2} w_1 w_2 - \frac{1}{4} w_4 w_2^2 - w_1 u w_2 + w_4 u^2 w_2 + \frac{1}{2} w_3 c_s^2 - v^2 w_4 w_2 - \frac{1}{4} w_3 - \frac{1}{4} w_3 w_4 w_2 - \frac{1}{4} w_3 w_4 u^2 - \frac{1}{4} v^2 w_3 w_4 + \frac{1}{4} v^2 w_4 w_2^2 - \frac{1}{4} w_3 w_1 w_2 - \frac{1}{4} w_4 w_1 u^2 w_2 + \frac{1}{2} w_1 u w_2^2 + \frac{1}{4} w_3 w_1 - \frac{1}{4} w_4 u^2 w_2^2 + \frac{1}{2} w_1 u + \frac{3}{2} w_4 w_2 - \frac{3}{4} w_4 u^2 + \frac{1}{4} w_3 w_4 - \frac{1}{2} w_3 c_s^2 w_1 + \frac{1}{4} v^2 w_4 w_1 w_2 + \frac{1}{4} w_3 w_1 u^2 w_2 + \frac{1}{4} w_4^2 u^2 - \frac{5}{4} w_4 - \frac{1}{4} v^2 w_3 w_2^2 + \frac{1}{4} v^2 w_3 w_4 u^2 w_2 - \frac{1}{4} v^2 w_4^2 - \frac{1}{2} w_1 + \frac{1}{4} v^2 w_3 w_4 w_2 + \frac{1}{4} w_4 w_1 - \frac{1}{2} w_3 w_4 c_s^2 + \frac{1}{2} w_3 w_4 c_s^2 w_2 + \frac{1}{4} w_3 u^2 - \frac{1}{4} w_3 u^2 w_2^2 + \frac{1}{4} w_4^2 - \frac{1}{4} v^2 w_4 w_1 + \frac{1}{4} v^2 w_4^2 w_2 - \frac{1}{4} w_4 w_1 w_2 + \frac{1}{4} w_4 w_1 u^2 + \frac{1}{4} w_3 w_2^2 - \frac{1}{4} w_4^2 u^2 w_2 - w_2 + \frac{3}{4} v^2 w_4 + \frac{1}{4} v^2 w_3 w_1 w_2 - \frac{1}{2} w_3 c_s^2 w_2^2,$$

$$\alpha_{x+\delta_1, y}^{[\mu_4], t-2\delta_t} = -2 - w_2^2 - \frac{3}{2} w_1 w_2 + \frac{1}{2} w_4 w_2^2 + \frac{1}{2} w_1 w_2^2 - \frac{5}{2} w_4 w_2 + \frac{1}{2} w_4^2 w_2 + 2 w_4 + w_1 - \frac{1}{2} w_4 w_1 - \frac{1}{2} w_4^2 + \frac{1}{2} w_4 w_1 w_2 + 3 w_2,$$

$$\alpha_{x-\delta_1, y+\delta_1}^{[\mu_1], t-2\delta_t} = 1 - \frac{1}{8} v w_3 w_4 w_2 + \frac{3}{8} v^2 w_3 w_1 - \frac{1}{2} w_3 c_s^2 w_1 w_2 + \frac{1}{4} w_1 w_2 - \frac{1}{8} w_3 w_4 w_1 u - \frac{1}{8} v^2 w_3^2 w_2 + \frac{1}{4} w_1 u w_2 + \frac{1}{8} w_4 u^2 w_2 - 2 w_3 c_s^2 - \frac{1}{8} v^2 w_4 w_2 + \frac{5}{8} v w_3 w_2 - \frac{1}{4} w_3 + \frac{11}{8} w_3 w_4 u^2 + \frac{5}{8} w_3 w_1 u + \frac{1}{8} v^2 w_3 w_4 - \frac{1}{4} w_3 w_4 c_s^2 - \frac{1}{4} w_3^2 c_s^2 w_2 + \frac{1}{4} w_3^2 u^2 + \frac{3}{8} w_3 w_1 - \frac{1}{4} w_3 w_4 c_s^2 w_1 + \frac{1}{8} w_3 w_1 - \frac{1}{2} w_1 u + \frac{1}{4} w_4 w_2 - \frac{1}{2} w_4 u^2 - \frac{1}{4} w_3 w_4 c_s^2 - \frac{1}{4} w_3 w_4 w_1 u^2 + \frac{8}{8} w_3 w_4 + \frac{3}{4} w_3 c_s^2 w_1 - \frac{1}{4} v w_3 w_1 w_2 - \frac{1}{2} w_3^2 u^2 w_2 - \frac{1}{4} w_3 w_1 u w_2 - \frac{1}{8} v^2 w_4^2 - \frac{1}{2} w_1 - \frac{1}{8} v^2 w_3 w_4 w_2 + \frac{1}{8} w_4 w_1 + \frac{1}{8} w_4 w_1 u + \frac{3}{8} w_3 w_4 c_s^2 - \frac{1}{2} w_3 w_4 c_s^2 w_2 - w_3 u^2 + \frac{5}{8} w_3 u^2 w_2 + \frac{1}{8} w_4^2 - \frac{1}{2} v w_2 - \frac{1}{8} v^2 w_4 w_1 + \frac{1}{2} w_3^2 c_s^2 - \frac{1}{8} v w_3^2 w_2 + \frac{1}{8} w_4 w_1 u^2 - \frac{1}{4} w_3 w_4 u^2 - \frac{1}{2} w_2 + \frac{1}{2} v^2 w_4 - \frac{1}{4} v^2 w_3 w_1 w_2 - \frac{1}{8} w_3^2 w_1 u - \frac{1}{4} w_3^2 w_4 u^2 + \frac{5}{8} v^2 w_3 w_2 + \frac{1}{8} v w_4 w_2 + \frac{1}{4} v^2 w_3^2,$$

$$\alpha_{x-\delta_1, y+\delta_1}^{[\mu_4], t-2\delta_t} = -2 - \frac{1}{2} w_1 w_2 + \frac{1}{4} w_3 w_4^2 + \frac{5}{2} w_3 + \frac{3}{8} w_3 w_4 w_2 + \frac{1}{2} w_3 w_1 w_2 + \frac{1}{8} w_2^2 w_2 - \frac{9}{8} w_3 w_1 - \frac{3}{8} w_4 w_2 - \frac{7}{4} w_3 w_4 + \frac{3}{2} w_4 + \frac{1}{4} w_3^2 w_4 + w_1 - \frac{3}{8} w_4 w_1 - \frac{1}{2} w_3^2 - \frac{9}{8} w_3 w_2 + \frac{1}{8} w_3^2 w_1 + \frac{3}{8} w_3 w_4 w_1 - \frac{1}{4} w_4^2 + w_2,$$

$$\alpha_{x, y+\delta_1}^{[\mu_1], t-2\delta_t} = 2 - \frac{3}{4} v^2 w_3 w_1 + \frac{1}{2} w_3 c_s^2 w_1^2 + \frac{3}{2} w_1 w_2 - \frac{1}{4} w_4^2 w_1 u^2 - \frac{1}{4} w_3 w_2^2 + \frac{1}{4} v^2 w_4^2 w_1 - \frac{1}{4} w_4 w_1 u^2 + w_3 c_s^2 - \frac{1}{2} w_3 - \frac{1}{4} w_3 w_4 u^2 - \frac{1}{4} v^2 w_3 w_4 - \frac{3}{4} w_3 w_1 u^2 + \frac{1}{2} w_3 w_4 c_s^2 w_1 + \frac{3}{4} w_3 w_1 + \frac{1}{2} w_4 w_2 + \frac{1}{4} v^2 w_3 w_4 w_1 - \frac{1}{2} w_4 u^2 - \frac{1}{2} v w_1^2 w_2 + \frac{1}{4} w_3 w_4 w_1 u^2 + \frac{1}{4} w_3 w_4 - \frac{3}{4} w_3 c_s^2 w_1 + \frac{1}{2} w_3 w_4 - \frac{1}{2} w_3 c_s^2 w_1 + \frac{1}{4} v^2 w_3 w_2^2 - \frac{1}{4} w_4^2 w_1 + \frac{1}{4} w_4^2 u^2 - \frac{3}{2} w_4 + \frac{3}{2} v w_1 w_2 + \frac{1}{2} v^2 w_3 - \frac{1}{4} v^2 w_4^2 - 3 w_1 + \frac{7}{4} w_4 w_1 - \frac{1}{2} w_3 w_4 c_s^2 + \frac{1}{4} w_3 w_2^2 + \frac{1}{2} w_3 u^2 + \frac{1}{4} v^2 w_4 w_1^2 - \frac{1}{4} w_3 w_4 w_1 + \frac{1}{4} w_4^2 - v w_2 - \frac{3}{4} v^2 w_4 w_1 - \frac{1}{2} w_4 w_1 w_2 + \frac{3}{4} w_4 w_1 u^2 - w_2 - \frac{1}{4} w_4 w_1^2 + \frac{1}{2} v^2 w_4 w_1 w_2 - \frac{1}{2} w_1^2 w_2 + \frac{1}{2} v w_4 w_2 + w_1^2,$$

$$\alpha_{x, y+\delta_1}^{[\mu_4], t-2\delta_t} = -2 - \frac{3}{2} w_1 w_2 - \frac{1}{2} w_4 w_2 + \frac{1}{2} w_4^2 w_1 + 2 w_4 + 3 w_1 - \frac{5}{2} w_4 w_1 - \frac{1}{2} w_4^2 + \frac{1}{2} w_4 w_1 w_2 + w_2 + \frac{1}{2} w_4 w_1^2 + \frac{1}{2} w_1^2 w_2 - w_1^2,$$

$$\alpha_{x+\delta_1, y}^{[\mu_1], t-2\delta_t} = 1 - \frac{1}{8} v w_3 w_4 w_2 + \frac{3}{8} v^2 w_3 w_1 - \frac{1}{2} w_3 c_s^2 w_1 w_2 + \frac{1}{4} w_1 w_2 + \frac{1}{8} w_3 w_4 w_1 u - \frac{1}{8} v^2 w_3^2 w_2 - \frac{1}{4} w_1 u w_2 + \frac{1}{8} w_4 u^2 w_2 - 2 w_3 c_s^2 - \frac{1}{8} v^2 w_4 w_2 + \frac{5}{8} v w_3 w_2 - \frac{1}{4} w_3 + \frac{11}{8} w_3 w_4 u^2 - \frac{5}{8} w_3 w_1 u + \frac{1}{8} v^2 w_3 w_4 - \frac{1}{4} w_3 w_4 c_s^2 - \frac{1}{4} w_3^2 c_s^2 w_2 + \frac{1}{4} w_3^2 u^2 + \frac{3}{8} w_3 w_1 - \frac{1}{4} w_3 w_4 c_s^2 w_1 + \frac{1}{8} w_3 w_1 + \frac{1}{2} w_1 u + \frac{1}{4} w_4 w_2 - \frac{1}{2} w_4 u^2 - \frac{1}{4} w_3 w_4 c_s^2 - \frac{1}{4} w_3 w_4 w_1 u^2 + \frac{8}{8} w_3 w_4 + \frac{3}{4} w_3 c_s^2 w_1 - \frac{1}{4} v w_3 w_1 w_2 - \frac{1}{2} w_3^2 u^2 w_2 - \frac{1}{4} w_3 w_1 u w_2 - \frac{1}{8} v^2 w_4^2 - \frac{1}{2} w_1 - \frac{1}{8} v^2 w_3 w_4 w_2 + \frac{1}{8} w_4 w_1 + \frac{1}{8} w_4 w_1 u + \frac{3}{8} w_3 w_4 c_s^2 - \frac{1}{2} w_3 w_4 c_s^2 w_2 - w_3 u^2 + \frac{5}{8} w_3 u^2 w_2 + \frac{1}{8} w_4^2 - \frac{1}{2} v w_2 - \frac{1}{8} v^2 w_4 w_1 + \frac{1}{2} w_3^2 c_s^2 - \frac{1}{8} v w_3^2 w_2 + \frac{1}{8} w_4 w_1 u^2 - \frac{1}{4} w_3 w_4 u^2 - \frac{1}{2} w_2 + \frac{1}{2} v^2 w_4 - \frac{1}{4} v^2 w_3 w_1 w_2 + \frac{1}{8} w_3^2 w_1 u - \frac{1}{4} w_3^2 w_4 u^2 + \frac{5}{8} v^2 w_3 w_2 + \frac{1}{8} v w_4 w_2 + \frac{1}{4} v^2 w_3^2,$$

$$\alpha_{x+\delta_1, y+\delta_1}^{[\mu_4], t-2\delta_t} = -2 - \frac{1}{2} w_1 w_2 + \frac{1}{4} w_3 w_4^2 + \frac{5}{2} w_3 + \frac{3}{8} w_3 w_4 w_2 + \frac{1}{2} w_3 w_1 w_2 + \frac{1}{8} w_2^2 w_2 - \frac{9}{8} w_3 w_1 - \frac{3}{8} w_4 w_2 - \frac{7}{4} w_3 w_4 + \frac{3}{2} w_4 + \frac{1}{4} w_3^2 w_4 + w_1 - \frac{3}{8} w_4 w_1 - \frac{1}{2} w_3^2 - \frac{9}{8} w_3 w_2 + \frac{1}{8} w_3^2 w_1 + \frac{3}{8} w_3 w_4 w_1 - \frac{1}{4} w_4^2 + w_2,$$

$$\alpha_{x, y}^{[\mu_1], t-3\delta_t} = -2 - \frac{1}{4} v w_3 w_4 w_2 - \frac{11}{4} v^2 w_3 w_1 + \frac{3}{2} w_3 c_s^2 w_1^2 - \frac{1}{2} v^2 w_3 w_2^2 w_2 + \frac{7}{2} w_3 c_s^2 w_1 w_2 - \frac{3}{2} w_1 w_2 + \frac{1}{4} w_3 w_1 u^2 w_2 - \frac{1}{2} v^2 w_3 w_4 w_1 - \frac{1}{2} w_4 u^2 w_2 - \frac{1}{4} w_4 w_1 u^2 + \frac{1}{4} w_3^2 w_4 u^2 + w_1^2 + \frac{1}{4} v^2 w_3 w_4 w_1 w_2 + \frac{1}{2} w_3^2 w_1 u - \frac{1}{4} w_3^2 w_4 u^2 + \frac{5}{8} v^2 w_3 w_2 + \frac{1}{8} v w_4 w_2 + \frac{1}{4} v^2 w_3^2,$$

$$\begin{aligned}
& \frac{1}{4}w_4w_2^2u^2 + 4w_3c_s^2 + \frac{1}{4}v^2w_4w_2 + \frac{5}{4}vw_3w_2 + \frac{1}{2}w_3 - \frac{3}{4}w_3w_4w_1u^2w_2 - \frac{11}{4}\omega_3w_4u^2 - \frac{1}{4}v^2w_3w_4 + \frac{1}{2}\omega_3w_4^2c_s^2 + \\
& \frac{1}{2}\omega_3^2c_s^2w_2 - \frac{1}{2}\omega_3^2u^2 - \frac{11}{4}\omega_3w_1u^2 - w_3w_4c_s^2w_1w_2 + \frac{1}{4}\omega_4w_1u^2w_2 + \frac{7}{2}w_3w_4c_s^2w_1 - \frac{3}{4}w_3w_1 - \frac{1}{2}\omega_4w_2 + \\
& \frac{1}{2}v^2w_3w_4w_1 + w_4u^2 + \frac{1}{2}\omega_3^2w_4c_s^2 - \frac{1}{2}v\omega_1^2w_2 + \frac{13}{4}w_3w_4w_1u^2 - \frac{1}{4}\omega_3w_4 - \frac{11}{2}w_3c_s^2w_1 + \frac{3}{4}v^2w_3w_1^2 - \frac{7}{4}vw_3w_1w_2 - \\
& \frac{1}{4}v^2w_4w_1w_2 + \frac{1}{4}\omega_3^2u^2w_2 + \frac{1}{4}\omega_4^2w_1 + \frac{7}{4}w_3w_1u^2w_2 - \frac{1}{4}\omega_4^2u^2 + \frac{1}{2}\omega_3^2w_1u^2 + \frac{3}{2}w_4 - \frac{5}{5}w_3c_s^2w_2 - \frac{1}{2}w_3w_4w_1^2u^2 + \\
& \frac{3}{2}vw_1w_2 + 2v^2w_3 + \frac{1}{2}vw_3w_1w_2 - \frac{1}{2}\omega_3^2c_s^2w_1w_2 + \frac{3}{4}w_3w_4u^2w_2 + \frac{1}{4}v^2w_4^2 + 3w_1 + \frac{1}{4}v^2w_3w_4w_2 - \frac{1}{2}w_3w_4^2c_s^2w_1 - \\
& \frac{7}{2}\omega_4w_1 - \frac{1}{2}w_3w_4^2w_1u^2 - 3w_3w_4c_s^2 + w_3w_4c_s^2w_2 + \frac{3}{4}w_3w_1^2u^2 + 2w_3u^2 - \frac{1}{2}w_3w_1u^2w_2 - \frac{5}{4}\omega_3u^2w_2 - \frac{1}{4}v^2w_4w_1^2 + \\
& \frac{1}{4}vw_2^2w_1w_2 + w_3^2c_s^2w_1 + \frac{1}{4}w_3w_4w_1 - \frac{1}{4}\omega_4^2 - v\omega_2 + \frac{5}{4}v^2w_4w_1 - \frac{1}{2}\omega_3^2w_4c_s^2w_1 - w_3^2c_s^2 - \frac{1}{4}vw_3^2w_2 + \frac{1}{2}w_4w_1w_2 - \\
& \frac{5}{4}\omega_4w_1u^2 + \frac{1}{2}w_3w_4^2u^2 + \frac{1}{4}v^2w_3^2w_1 - \frac{1}{4}\omega_3^2w_1u^2w_2 + w_2 + \frac{1}{4}\omega_4w_1^2 - v^2w_4 - \frac{1}{4}vw_4w_1w_2 - w_3c_s^2w_1^2w_2 + \\
& \frac{7}{4}v^2w_3w_1w_2 - \frac{1}{2}\omega_3^2w_4w_1u^2 + \frac{1}{2}\omega_1^2w_2 + \frac{1}{2}\omega_3^2w_4u^2 - \frac{5}{4}v^2w_3w_2 + \frac{1}{4}vw_4w_2 - w_1^2 - \frac{1}{2}v^2w_3^2,
\end{aligned}$$

$$\begin{aligned} \alpha_{x,y-\delta t}^{|\mu_4|,t-3\delta t} = & 3 + \frac{1}{2}\omega_3^2\omega_4\omega_1 + 2\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4^2 + \frac{1}{2}\omega_3\omega_4^2\omega_1 - \omega_3\omega_1^2 - \frac{15}{4}\omega_3 - \frac{3}{4}\omega_3\omega_4\omega_2 - \frac{9}{4}\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3^2\omega_2 + \\ & \frac{19}{4}\omega_3\omega_1 + \frac{3}{4}\omega_4\omega_2 + \frac{13}{4}\omega_3\omega_4 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 + \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{11}{4}\omega_4 - \frac{1}{2}\omega_3^2\omega_4 - 4\omega_1 + \frac{13}{4}\omega_4\omega_1 + \frac{3}{4}\omega_3^2 + \\ & \frac{7}{4}\omega_3\omega_2 + \frac{1}{2}\omega_3\omega_1^2\omega_2 - \frac{3}{4}\omega_3^2\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1^2 - \frac{15}{4}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2 - \frac{3}{4}\omega_4\omega_1\omega_2 - \frac{3}{2}\omega_2 - \frac{1}{2}\omega_4\omega_1^2 - \frac{1}{2}\omega_1^2\omega_2 + \omega_1^2, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta t,y}^{[\mu_1],t-\delta t} = & -1 - \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{1}{4}v^2\omega_3\omega_1 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}\omega_3^2\omega_4u^2\omega_2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2^2 + \frac{1}{4}\omega_3\omega_4\omega_1u + \\ & \frac{1}{4}v^2\omega_3^2\omega_2 - \frac{3}{2}\omega_1\omega_2 - \frac{5}{4}\omega_4u^2\omega_2 - \frac{1}{2}\omega_3^2\omega_4c_s^2\omega_2 + 2\omega_3c_s^2 + \frac{5}{4}v^2\omega_4\omega_2 + \frac{1}{4}\omega_3 + \frac{1}{4}\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1u^2\omega_2 - \\ & \frac{5}{2}\omega_3\omega_4u^2 - \frac{2}{4}\omega_3\omega_1u + \frac{1}{2}\omega_3\omega_4c_s^2 - \frac{1}{4}v^2\omega_4\omega_2^2 + \frac{1}{2}\omega_3^2c_s^2\omega_2 - \frac{1}{4}\omega_3^2u^2 + \frac{1}{4}\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1\omega_2 + \\ & \frac{1}{4}\omega_4\omega_1u^2\omega_2 + \frac{1}{2}\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_3\omega_1 - \frac{1}{2}\omega_3\omega_4u^2\omega_2 + \frac{1}{4}\omega_4u^2\omega_2^2 + \omega_1u - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 - \frac{3}{2}\omega_4\omega_2 + \\ & \omega_4u^2 + \frac{1}{2}\omega_3^2\omega_4c_s^2 + \frac{1}{2}\omega_3\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_4 - \frac{1}{2}\omega_3c_s^2\omega_1 - \frac{1}{4}v^2\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3^2u^2\omega_2 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 - \frac{1}{4}\omega_4^2u^2 + \\ & \frac{1}{4}\omega_4^2\omega_2 + \frac{5}{4}\omega_4 + \frac{1}{4}v^2\omega_3\omega_2^2 - \frac{5}{2}\omega_3c_s^2\omega_2 + v^2\omega_3 + 3\omega_3\omega_4u^2\omega_2 + \frac{7}{4}\omega_3\omega_1\omega_2 + \frac{1}{4}v^2\omega_4^2 + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_4\omega_1 - \\ & \frac{1}{4}\omega_4\omega_1u - \frac{5}{2}\omega_3\omega_4c_s^2 + 3\omega_3\omega_4c_s^2\omega_2 + \frac{1}{4}\omega_4\omega_1\omega_2 + \omega_3u^2 - \frac{5}{4}\omega_3u^2\omega_2 + \frac{1}{4}\omega_3u^2\omega_2^2 - \frac{1}{4}\omega_4^2 + \frac{1}{4}v^2\omega_4\omega_1 - \\ & \frac{1}{2}\omega_3^2c_s^2 - \frac{1}{4}v^2\omega_4\omega_2 + \frac{1}{4}\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_2^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2^2 - \frac{1}{4}\omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4u^2 + \frac{1}{4}\omega_4u^2\omega_2 + \\ & \omega_2 - \frac{1}{2}\omega_3\omega_4u^2\omega_2^2 - v^2\omega_4 - \frac{1}{2}\omega_3\omega_1\omega_2 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 + \frac{1}{4}\omega_3^2\omega_1u + \frac{1}{2}\omega_3^2\omega_4u^2 + \frac{1}{2}\omega_3c_s^2\omega_2^2 - \frac{5}{4}v^2\omega_3\omega_2 - \frac{1}{4}v^2\omega_3^2, \end{aligned}$$

$$\alpha_{x-\delta t,y}^{[\mu_4],t-3\delta t} = 3 + \omega_2^2 + 2\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_2^2 - \frac{1}{2}\omega_3\omega_4^2 - \frac{15}{4}\omega_3 - \frac{15}{4}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_2^2 - \frac{9}{4}\omega_3\omega_1\omega_2 - \frac{3}{4}\omega_3^2\omega_2 + \frac{7}{4}\omega_3\omega_1 - \frac{1}{2}\omega_1\omega_2^2 + \frac{13}{4}\omega_4\omega_2 + \frac{13}{4}\omega_3\omega_4 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_2 - \frac{11}{4}\omega_4 - \frac{1}{2}\omega_3^2\omega_4 - \frac{3}{2}\omega_1 + \frac{3}{4}\omega_4\omega_1 + \frac{3}{4}\omega_3^2 + \frac{19}{4}\omega_3\omega_2 - \frac{1}{4}\omega_3^2\omega_1 - \frac{3}{4}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2 - \frac{3}{4}\omega_4\omega_1\omega_2 - \omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_4^2\omega_2 - 4\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_2,$$

$$\begin{aligned} & \alpha_{x,y}^{[\mu_1],t-3\delta_t} = \\ & -2 + \frac{1}{2}v^2\omega_4\omega_1\omega_2^2 + v^2\omega_3\omega_1 - \omega_3c_s^2\omega_1^2 + \frac{1}{2}v^2\omega_3\omega_1^2\omega_2 - \omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_1u^2\omega_2^2 - 3\omega_1\omega_2 + \frac{1}{2}\omega_4\omega_2^2 - \frac{1}{2}\omega_4^2\omega_1\omega_2 + \\ & \frac{1}{2}\omega_4^2\omega_1u^2 + \frac{1}{2}\omega_3\omega_1^2 - \frac{1}{2}v^2\omega_4^2\omega_1 - 2\omega_4u^2\omega_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_4\omega_1^2u^2 - \frac{1}{2}\omega_4\omega_1^2\omega_2 - \omega_3c_s^2 + 2v^2\omega_4\omega_2 + \frac{1}{2}\omega_3 + \\ & \frac{1}{2}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_4\omega_1u^2\omega_2 + \frac{1}{2}\omega_3\omega_4u^2 - \frac{1}{2}\omega_4\omega_1u^2\omega_2^2 + \frac{1}{2}v^2\omega_3\omega_4 + \frac{1}{2}\omega_3\omega_1\omega_2^2 - \frac{1}{2}v^2\omega_4\omega_2^2 + \frac{1}{2}\omega_3\omega_1\omega_2 + \omega_3\omega_1u^2 + \\ & \omega_3\omega_4c_s^2\omega_1\omega_2 + \frac{5}{2}\omega_4\omega_1u^2\omega_2 - \omega_3\omega_4c_s^2\omega_1 - \omega_3\omega_1 + \frac{1}{2}\omega_4u^2\omega_2^2 - 3\omega_4\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1 + \frac{3}{2}\omega_4u^2 - \frac{1}{2}\omega_3\omega_4\omega_1u^2 - \\ & \frac{1}{2}\omega_3\omega_4 - \frac{1}{2}\omega_3\omega_4\omega_1\omega_2 + 2\omega_3c_s^2\omega_1 - \frac{1}{2}v^2\omega_3\omega_1^2 - \frac{5}{2}v^2\omega_4\omega_1\omega_2 - \omega_3c_s^2\omega_1\omega_2^2 + \frac{1}{2}\omega_4^2\omega_1 - \frac{1}{2}\omega_3\omega_1u^2\omega_2 - \frac{1}{2}\omega_4^2u^2 - \\ & \frac{1}{2}\omega_4\omega_2^2u^2\omega_2 + \frac{1}{2}\omega_4^2\omega_2 + \frac{5}{2}\omega_4 + \frac{1}{2}v^2\omega_3\omega_2^2 - \frac{1}{2}v^2\omega_3 + \frac{1}{2}v^2\omega_4\omega_1^2\omega_2 - \frac{1}{2}\omega_3\omega_4u^2\omega_2 + \frac{1}{2}v^2\omega_4^2 + 3\omega_1 - \frac{1}{2}v^2\omega_3\omega_4\omega_2 - \\ & 3\omega_4\omega_1 - \frac{1}{2}v^2\omega_3\omega_1\omega_2^2 + \omega_3\omega_4c_s^2 - \frac{1}{2}\omega_4\omega_1\omega_2^2 - \omega_3\omega_4c_s^2\omega_2 - \frac{1}{2}\omega_3\omega_1^2u^2 - \frac{1}{2}\omega_3\omega_1^2\omega_2 + \frac{1}{2}\omega_3\omega_1^2u^2\omega_2 - \\ & \frac{1}{2}v^2\omega_4\omega_1^2 + \frac{1}{2}v^2\omega_4^2\omega_1\omega_2 + \frac{1}{2}\omega_3u^2\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_4^2 + 2v^2\omega_4\omega_1 - \frac{1}{2}v^2\omega_4^2\omega_2 + \frac{7}{2}\omega_4\omega_1\omega_2 - 2\omega_4\omega_1u^2 - \\ & \frac{1}{2}\omega_4^2\omega_1u^2\omega_2 - \frac{1}{2}\omega_3\omega_2^2 + \frac{1}{2}\omega_4^2u^2\omega_2 + 2\omega_2 + \frac{1}{2}\omega_4\omega_1^2 - \frac{3}{2}v^2\omega_4 + \omega_3c_s^2\omega_1^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_1\omega_2 + \omega_1^2\omega_2 + \omega_3c_s^2\omega_2^2 - \omega_1^2, \end{aligned}$$

$$\alpha_{x,y}^{[\mu_4],t-3\delta_t} = 3 + \omega_2^2 + 5\omega_1\omega_2 - \omega_4\omega_2^2 + \omega_4^2\omega_1\omega_2 + \omega_4\omega_1^2\omega_2 - \omega_1\omega_2^2 + 5\omega_4\omega_2 - \omega_4^2\omega_1 - \omega_4^2\omega_2 - 4\omega_4 - 4\omega_1 + 5\omega_4\omega_1 + \omega_4\omega_1\omega_2^2 + \omega_4^2 - 6\omega_4\omega_1\omega_2 - 4\omega_2 - \omega_4\omega_1^2 - \omega_1^2\omega_2 + \omega_1^2,$$

$$\begin{aligned} \alpha_{x+\delta t, y}^{[\mu_1], t-3\delta t} = & -1 + \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{1}{4}v^2\omega_3\omega_1 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}\omega_3^2\omega_4u^2\omega_2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2^2 - \frac{1}{4}\omega_3\omega_4\omega_1u + \\ & \frac{1}{4}v^2\omega_3^2\omega_2 + \frac{3}{4}\omega_1\omega_2 - \frac{5}{4}\omega_4u^2\omega_2 - \frac{1}{2}\omega_3^2\omega_4c_s^2\omega_2 + 2\omega_3c_s^2 + \frac{5}{4}v^2\omega_4\omega_2 + \frac{1}{4}\omega_3 + \frac{1}{4}\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1u^2 - \\ & \frac{5}{2}\omega_3\omega_4u^2 + \frac{5}{2}\omega_3\omega_1u + \frac{1}{2}\omega_3\omega_4c_s^2 - \frac{1}{4}v^2\omega_4\omega_2^2 + \frac{1}{2}\omega_3^2c_s^2\omega_2 - \frac{1}{4}\omega_3^2u^2 + \frac{1}{4}\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1\omega_2 + \\ & \frac{1}{4}\omega_4\omega_1u^2\omega_2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_3\omega_1 - \frac{1}{2}\omega_3\omega_4u^2\omega_2 + \frac{1}{4}\omega_4u^2\omega_2^2 - \omega_1u - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 - \frac{3}{2}\omega_4\omega_2 + \\ & \omega_4u^2 + \frac{1}{2}\omega_3^2\omega_4c_s^2 + \frac{1}{2}\omega_3\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_4 - \frac{1}{2}\omega_3c_s^2\omega_1 - \frac{1}{4}v^2\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3^2u^2\omega_2 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 - \frac{1}{4}\omega_4u^2 + \\ & \frac{1}{4}\omega_4^2\omega_2 + \frac{5}{4}\omega_4 + \frac{1}{4}v^2\omega_3\omega_2^2 - \frac{5}{2}\omega_3c_s^2\omega_2 + v^2\omega_3 + 3\omega_3\omega_4u^2\omega_2 - \frac{7}{4}\omega_3\omega_1\omega_2 + \frac{1}{4}v^2\omega_4^2 + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_4\omega_1 + \\ & \frac{1}{4}\omega_4\omega_1u - \frac{5}{2}\omega_3\omega_4c_s^2 + 3\omega_3\omega_4c_s^2\omega_2 - \frac{1}{4}\omega_4\omega_1\omega_2 + \omega_3u^2 - \frac{5}{4}\omega_3u^2\omega_2 + \frac{1}{4}\omega_3u^2\omega_2^2 - \frac{1}{4}\omega_4^2 + \frac{4}{5}v^2\omega_4\omega_1 - \\ & \frac{1}{2}\omega_3^2c_s^2 - \frac{1}{4}v^2\omega_4^2\omega_2 + \frac{1}{4}\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_2^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2^2 + \frac{1}{4}\omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4u^2 + \frac{1}{4}\omega_4^2u^2\omega_2 + \end{aligned}$$

$$\begin{aligned}
& \omega_2 - \frac{1}{2}\omega_3\omega_4u^2\omega_2^2 - v^2\omega_4 + \frac{1}{2}\omega_3\omega_1u\omega_2^2 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3^2\omega_1u + \frac{1}{2}\omega_3^2\omega_4u^2 + \frac{1}{2}\omega_3c_s^2\omega_2^2 - \frac{5}{4}v^2\omega_3\omega_2 - \frac{1}{4}v^2\omega_3^2, \\
\alpha_{x+\delta_l,y}^{[\mu_4],t-3\delta_t} &= 3 + \omega_2^2 + 2\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_2^2 - \frac{1}{2}\omega_3\omega_4^2 - \frac{15}{4}\omega_3 - \frac{15}{4}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_2^2 - \frac{9}{4}\omega_3\omega_1\omega_2 - \\
&\quad \frac{3}{4}\omega_3^2\omega_2 + \frac{7}{4}\omega_3\omega_1 - \frac{1}{2}\omega_1\omega_2^2 + \frac{13}{4}\omega_4\omega_2 + \frac{13}{4}\omega_3\omega_4 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_2 - \frac{11}{4}\omega_4 - \frac{1}{2}\omega_3^2\omega_4 - \frac{3}{2}\omega_1 + \\
&\quad \frac{3}{4}\omega_4\omega_1 + \frac{3}{4}\omega_3^2 + \frac{19}{4}\omega_3\omega_2 - \frac{1}{4}\omega_3^2\omega_1 - \frac{3}{4}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2 - \frac{3}{4}\omega_4\omega_1\omega_2 - \omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_4^2\omega_2 - 4\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_2, \\
\alpha_{x,y+\delta_l}^{[\mu_1],t-3\delta_t} &= -2 + \frac{1}{4}v\omega_3\omega_4\omega_2 - \frac{11}{4}v^2\omega_3\omega_1 + \frac{3}{2}\omega_3c_s^2\omega_1^2 - \frac{1}{2}v^2\omega_3\omega_1^2\omega_2 + \frac{7}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{3}{2}\omega_1\omega_2 + \frac{1}{4}\omega_4^2\omega_1u^2 - \\
&\quad \frac{1}{4}v\omega_3\omega_4\omega_1\omega_2 + \frac{1}{4}v^2\omega_3^2\omega_2 - \frac{1}{4}v^2\omega_3^2\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1^2 - \frac{1}{4}v^2\omega_4^2\omega_1 - \frac{1}{4}\omega_4u^2\omega_2 - \frac{1}{4}v^2\omega_3\omega_4\omega_1\omega_2 + \\
&\quad \frac{1}{4}\omega_4\omega_1^2u^2 + 4\omega_3c_s^2 + \frac{1}{4}v^2\omega_4\omega_2 - \frac{5}{4}v\omega_3\omega_2 + \frac{1}{2}\omega_3 - \frac{3}{4}\omega_3\omega_4\omega_1\omega_2^2 - \frac{11}{4}\omega_3\omega_4u^2 - \frac{1}{4}v^2\omega_3\omega_4 + \frac{1}{2}\omega_3\omega_4^2c_s^2 + \\
&\quad \frac{1}{2}\omega_3c_s^2\omega_2 - \frac{1}{2}\omega_3^2\omega_2^2 - \frac{11}{4}\omega_3\omega_1u^2 - \omega_3\omega_4c_s^2\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1u^2\omega_2 + \frac{7}{2}\omega_3\omega_4c_s^2\omega_1 - \frac{3}{4}\omega_3\omega_1 - \frac{1}{2}\omega_4\omega_2 + \\
&\quad \frac{1}{4}v^2\omega_3\omega_4\omega_1 + \omega_4u^2 + \frac{1}{2}\omega_3^2\omega_4c_s^2 + \frac{1}{2}v\omega_1^2\omega_2 + \frac{13}{4}\omega_3\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_4 - \frac{11}{2}\omega_3c_s^2\omega_1 + \frac{3}{4}v^2\omega_3\omega_2^2 + \frac{7}{4}v\omega_3\omega_1\omega_2 - \\
&\quad \frac{1}{4}v^2\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3^2\omega_2^2 + \frac{1}{4}\omega_4^2\omega_1 + \frac{7}{4}\omega_3\omega_1u^2\omega_2 - \frac{1}{4}\omega_4^2u^2 + \frac{1}{2}\omega_3^2\omega_1u^2 + \frac{3}{2}\omega_4 - \frac{5}{4}\omega_3c_s^2\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1^2u^2 - \\
&\quad \frac{3}{2}\omega_1\omega_2 + 2v^2\omega_3 - \frac{1}{2}v\omega_3\omega_1\omega_2 - \frac{1}{2}\omega_3^2c_s^2\omega_1\omega_2 + \frac{3}{4}\omega_3\omega_4u^2\omega_2 + \frac{1}{4}v^2\omega_4^2 + 3\omega_1 + \frac{1}{4}v^2\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_4^2c_s^2\omega_1 - \\
&\quad \frac{7}{4}\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4\omega_1u^2 - 3\omega_3\omega_4c_s^2 + \omega_3\omega_4c_s^2\omega_2 + \frac{3}{4}\omega_3\omega_1^2u^2 + 2\omega_3u^2 - \frac{1}{2}\omega_3\omega_1^2u^2\omega_2 - \frac{5}{4}\omega_3u^2\omega_2 - \frac{1}{4}v^2\omega_4\omega_1^2 - \\
&\quad \frac{3}{4}v\omega_3\omega_1\omega_2 + \omega_3^2c_s^2\omega_1 + \frac{1}{4}\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_4^2 + v\omega_2 + \frac{5}{4}v^2\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 - \omega_3^2c_s^2 + \frac{1}{4}v\omega_3^2\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2 - \\
&\quad \frac{5}{4}\omega_4\omega_1u^2 + \frac{1}{2}\omega_3\omega_4^2u^2 + \frac{1}{2}v^2\omega_3^2\omega_1 - \frac{1}{4}\omega_3^2\omega_1u^2\omega_2 + \omega_2 + \frac{1}{4}\omega_4\omega_1^2 - v^2\omega_4 + \frac{1}{4}v\omega_4\omega_1\omega_2 - \omega_3c_s^2\omega_1\omega_2 + \\
&\quad \frac{7}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{2}\omega_3^2\omega_4\omega_1u^2 + \frac{1}{2}\omega_1^2\omega_2 + \frac{1}{2}\omega_3^2\omega_4u^2 - \frac{5}{4}v^2\omega_3\omega_2 - \omega_1^2 - \frac{1}{2}v^2\omega_3^2, \\
\alpha_{x,y+\delta_l}^{[\mu_4],t-3\delta_t} &= 3 + \frac{1}{2}\omega_3^2\omega_4\omega_1 + 2\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4^2 + \frac{1}{2}\omega_3\omega_2^2\omega_1 - \omega_3\omega_1^2 - \frac{15}{4}\omega_3 - \frac{3}{4}\omega_3\omega_4\omega_2 - \frac{9}{4}\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3^2\omega_2 + \\
&\quad \frac{19}{4}\omega_3\omega_1 + \frac{3}{4}\omega_4\omega_2 + \frac{13}{4}\omega_3\omega_4 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 + \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{11}{4}\omega_4 - \frac{1}{2}\omega_3^2\omega_4 - 4\omega_1 + \frac{13}{4}\omega_4\omega_1 + \frac{3}{4}\omega_3^2 + \\
&\quad \frac{7}{4}\omega_3\omega_2 + \frac{1}{2}\omega_3\omega_1^2\omega_2 - \frac{3}{4}\omega_3^2\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1^2 - \frac{15}{4}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2 - \frac{3}{4}\omega_4\omega_1\omega_2 - \frac{3}{2}\omega_2 - \frac{1}{2}\omega_4\omega_1^2 - \frac{1}{2}\omega_1^2\omega_2 + \omega_1^2, \\
\alpha_{x,y}^{[\mu_1],t-4\delta_t} &= 2 - \frac{1}{2}v^2\omega_4\omega_1\omega_2^2 + \frac{5}{2}v^2\omega_3\omega_1 - \omega_3c_s^2\omega_1^2 - \omega_3^2\omega_4\omega_1u^2\omega_2 + \frac{1}{2}v^2\omega_3\omega_1^2\omega_2 - 6\omega_3c_s^2\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1u^2\omega_2^2 + \\
&\quad \omega_3^2\omega_4u^2\omega_2 + 3\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_2^2 + \frac{1}{2}\omega_4^2\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1u^2 - \frac{1}{2}v^2\omega_3^2\omega_2 + \frac{1}{2}v^2\omega_3\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_1^2 + \omega_3\omega_4c_s^2\omega_1^2 + \frac{1}{2}v^2\omega_4^2\omega_1 + \\
&\quad \frac{5}{2}\omega_4u^2\omega_2 - \frac{1}{2}\omega_4\omega_1^2u^2 + \omega_3\omega_4c_s^2\omega_2 + \frac{1}{2}\omega_4\omega_1^2\omega_2 - 4\omega_3c_s^2 - \frac{5}{2}v^2\omega_4\omega_2 - \frac{1}{2}\omega_3 - \frac{1}{2}\omega_3\omega_4\omega_2 + 7\omega_3\omega_4\omega_1u^2\omega_2 + 5\omega_3\omega_4u^2 + \\
&\quad \frac{1}{2}\omega_4\omega_1u^2\omega_2^2 - \omega_3\omega_4c_s^2\omega_1\omega_2^2 - \frac{1}{2}\omega_3\omega_1\omega_2^2 - \omega_3\omega_4^2c_s^2 + \frac{1}{2}v^2\omega_4\omega_2^2 - \omega_3^2c_s^2\omega_2 - \omega_3\omega_4\omega_1u^2\omega_2^2 + \frac{1}{2}\omega_3^2u^2 - \frac{1}{2}\omega_3\omega_1\omega_2 + \\
&\quad \frac{3}{2}\omega_3\omega_1u^2 + 7\omega_3\omega_4c_s^2\omega_1\omega_2 - 3\omega_4\omega_1u^2\omega_2 - 6\omega_3\omega_4c_s^2\omega_1 + \omega_3\omega_1 + \omega_3\omega_4u^2\omega_2 - \frac{1}{2}\omega_4u^2\omega_2^2 + \omega_3\omega_4^2c_s^2\omega_2 + 3\omega_4\omega_2 - \\
&\quad 2\omega_4u^2 - \omega_3^2\omega_4c_s^2 - 6\omega_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3\omega_4 + \frac{1}{2}\omega_3\omega_4\omega_1\omega_2 + 5\omega_3c_s^2\omega_1 - \frac{1}{2}v^2\omega_3\omega_1^2 + 3v^2\omega_4\omega_1\omega_2 + \omega_3c_s^2\omega_1\omega_2^2 - \\
&\quad \frac{1}{2}\omega_3^2u^2\omega_2 - \omega_3^2\omega_4c_s^2\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 - 3\omega_3\omega_1u^2\omega_2 + \frac{1}{2}\omega_4^2u^2 - \frac{1}{2}\omega_3\omega_1u^2 + \frac{1}{2}\omega_4\omega_1^2u^2\omega_2 - \frac{1}{2}\omega_4^2\omega_2 - \frac{5}{2}\omega_4 - \frac{1}{2}v^2\omega_3\omega_2^2 + \\
&\quad 5\omega_3c_s^2\omega_2 + \omega_3\omega_4\omega_1^2u^2 - 2v^2\omega_3 + \omega_3^2c_s^2\omega_1\omega_2 - \frac{1}{2}v^2\omega_4\omega_1^2\omega_2 - 6\omega_3\omega_4u^2\omega_2 - \frac{1}{2}v^2\omega_4^2 - 3\omega_1 + \omega_3\omega_4^2c_s^2\omega_1 + 3\omega_4\omega_1 + \\
&\quad \frac{1}{2}v^2\omega_3\omega_1\omega_2^2 + \omega_3\omega_4\omega_1u^2 - \omega_3\omega_4^2\omega_1u^2\omega_2 + 5\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_4\omega_1\omega_2^2 - 6\omega_3\omega_4c_s^2\omega_2 - \omega_3\omega_4c_s^2\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_1u^2 - \\
&\quad 2\omega_3u^2 + \frac{1}{2}\omega_3\omega_1^2\omega_2 + \frac{1}{2}\omega_3\omega_1^2u^2\omega_2 + \frac{5}{2}\omega_3u^2\omega_2 + \frac{1}{2}v^2\omega_4\omega_1^2 - \omega_3^2c_s^2\omega_1 - \frac{1}{2}v^2\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_1^2\omega_2^2 - \frac{1}{2}\omega_3\omega_4\omega_1 + \\
&\quad \frac{1}{2}\omega_4^2 - \frac{5}{2}v^2\omega_4\omega_1 + \omega_3\omega_4c_s^2\omega_1 + \omega_3^2c_s^2 + \frac{1}{2}v^2\omega_4^2\omega_2 - \frac{7}{2}\omega_4\omega_1\omega_2 + \frac{5}{2}\omega_4\omega_1u^2 + \frac{1}{2}\omega_4^2\omega_1\omega_2^2 - \omega_3\omega_4^2c_s^2\omega_1\omega_2 + \\
&\quad \frac{1}{2}\omega_3\omega_2^2 + \omega_3\omega_4c_s^2\omega_2^2 - \omega_3\omega_4^2u^2 - \frac{1}{2}v^2\omega_3^2\omega_1 - \frac{1}{2}\omega_4u^2\omega_2 + \frac{1}{2}\omega_3^2\omega_1u^2\omega_2 - 2\omega_2 + \omega_3\omega_4u^2\omega_2^2 - \frac{1}{2}\omega_4\omega_1^2 + 2v^2\omega_4 + \\
&\quad \omega_3c_s^2\omega_1^2\omega_2 - 3v^2\omega_3\omega_1\omega_2 + \omega_3^2\omega_4\omega_1u^2 - \omega_1^2\omega_2 - \omega_3^2\omega_4u^2 - \omega_3\omega_4\omega_1^2u^2\omega_2 - \omega_3c_s^2\omega_1\omega_2^2 + \omega_1^2 + \frac{1}{2}v^2\omega_3^2, \\
\alpha_{x,y}^{[\mu_4],t-4\delta_t} &= -4 - \omega_2^2 - \omega_3^2\omega_4\omega_1 - 6\omega_1\omega_2 + \omega_4\omega_2^2 - \omega_4^2\omega_1\omega_2 + \omega_3\omega_4\omega_1\omega_2^2 + \omega_3\omega_4^2 - \omega_3\omega_4^2\omega_1 + \omega_3\omega_1^2 - \omega_4\omega_1^2\omega_2 + 5\omega_3 + \\
&\quad 7\omega_3\omega_4\omega_2 - \omega_3\omega_1\omega_2^2 - \omega_3\omega_4\omega_2^2 + 7\omega_3\omega_1\omega_2 + \omega_3^2\omega_2 - 6\omega_3\omega_1 + \omega_1\omega_2^2 - 6\omega_4\omega_2 - 6\omega_3\omega_4 - 8\omega_3\omega_4\omega_1\omega_2 + \omega_4^2\omega_1 - \\
&\quad \omega_3^2\omega_1\omega_2 + \omega_4^2\omega_2 + 5\omega_4 + \omega_3\omega_4\omega_1^2\omega_2 + \omega_3^2\omega_4 + 5\omega_1 - 6\omega_4\omega_1 - \omega_3^2 + \omega_3\omega_4^2\omega_1\omega_2 - \omega_4\omega_1\omega_2^2 - 6\omega_3\omega_2 - \omega_3\omega_1^2\omega_2 + \\
&\quad \omega_3^2\omega_1 - \omega_3\omega_4\omega_1^2 + 7\omega_3\omega_4\omega_1 - \omega_4^2 + 7\omega_4\omega_1\omega_2 + \omega_3\omega_2^2 - \omega_3\omega_4^2\omega_2 + 5\omega_2 + \omega_4\omega_1^2 - \omega_3^2\omega_4\omega_2 + \omega_1^2\omega_2 + \omega_3^2\omega_4\omega_1\omega_2 - \omega_1^2,
\end{aligned}$$

## 6.6 EFDE for $\mu_5$

$$\mu_{5,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_5],t-\ell\delta_t} \mu_{5,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x,y-\delta_l}^{[\mu_1],t} = 1 + \frac{1}{2}\omega_3 c_s^2 - \frac{1}{4}\omega_3 - \frac{1}{4}\omega_4 u^2 - \frac{1}{4}\omega_4 + \frac{1}{4}v^2\omega_3 + \frac{1}{4}\omega_3 u^2 + \frac{1}{2}v\omega_2 - \frac{1}{2}\omega_2 + \frac{1}{4}v^2\omega_4.$$

$$\alpha_{x,y+\delta_l}^{[\mu_1],t} = 1 + \frac{1}{2}\omega_3 c_s^2 - \frac{1}{4}\omega_3 - \frac{1}{4}\omega_4 u^2 - \frac{1}{4}\omega_4 + \frac{1}{4}v^2\omega_3 + \frac{1}{4}\omega_3 u^2 - \frac{1}{2}v\omega_2 - \frac{1}{2}\omega_2 + \frac{1}{4}v^2\omega_4.$$

$$\alpha_{x-\delta_1, y-\delta_1}^{[\mu_1], t-\delta_t} = -1 - \frac{1}{4}\omega_1 w_2 + \frac{1}{4}\omega_1 u w_2 + \frac{1}{8}\omega_4 u^2 w_2 - \frac{1}{2}\omega_3 c_s^2 - \frac{1}{8}v^2 \omega_4 w_2 + \frac{1}{4}\omega_3 + \frac{1}{8}\omega_3 \omega_4 u^2 + \frac{1}{8}v^2 \omega_3 \omega_4 - \frac{1}{2}\omega_1 u - \frac{1}{8}\omega_4 w_2 - \frac{1}{4}\omega_4 u^2 - \frac{1}{8}\omega_3 \omega_4 + \frac{1}{8}\omega_4 u^2 + \frac{3}{4}\omega_4 + \frac{1}{4}\omega_3 c_s^2 w_2 - \frac{1}{4}v^2 \omega_3 - \frac{1}{8}v^2 \omega_4^2 + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_4 \omega_1 + \frac{1}{4}\omega_4 \omega_1 u + \frac{1}{4}\omega_3 \omega_4 c_s^2 - \frac{1}{8}\omega_3 \omega_2 - \frac{1}{4}\omega_3 u^2 + \frac{1}{8}\omega_3 u^2 w_2 - \frac{1}{8}\omega_4^2 + \frac{1}{2}\omega_2 + \frac{1}{4}v^2 \omega_4 + \frac{1}{8}v^2 \omega_3 \omega_2,$$

$$\alpha_{x-\delta_l, y-\delta_l}^{[\mu_5], t-\delta_t} = 1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x,y-\delta_l}^{[\mu_1,t-\delta_t]} = -1 + 2\omega_3 c_s^2 + \frac{1}{4}\omega_3 - \frac{1}{4}\omega_3\omega_4 u^2 - \frac{1}{4}v^2\omega_3\omega_4 - \frac{1}{4}\omega_3^2 u^2 + \frac{1}{4}\omega_4 - \omega_3 c_s^2 \omega_2 + v^2\omega_3 - \frac{1}{2}\omega_3\omega_4 c_s^2 + \omega_3 u^2 - \frac{1}{2}\omega_3 u^2 \omega_2 - \frac{1}{2}\omega_3^2 c_s^2 + \frac{1}{2}\omega_2 - \frac{1}{2}v^2\omega_3\omega_2 - \frac{1}{4}v^2\omega_3^2,$$

$$\alpha_{x,y-\delta_t}^{[\mu_5],t-\delta_t} = 1 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x+\delta i, y-\delta i}^{[\mu_1], t-\delta t} = -1 - \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_1 u\omega_2 + \frac{1}{8}\omega_4 u^2\omega_2 - \frac{1}{2}\omega_3 c_s^2 - \frac{1}{8}v^2\omega_4\omega_2 + \frac{1}{4}\omega_3 + \frac{1}{8}\omega_3\omega_4 u^2 + \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{2}\omega_1 u - \frac{1}{8}\omega_4\omega_2 - \frac{1}{4}\omega_4 u^2 - \frac{1}{8}\omega_3\omega_4 + \frac{1}{8}\omega_4^2 u^2 + \frac{3}{4}\omega_4 + \frac{1}{4}\omega_3 c_s^2 \omega_2 - \frac{1}{4}v^2\omega_3 - \frac{1}{8}v^2\omega_4^2 + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_4\omega_1 u + \frac{1}{4}\omega_3\omega_4 c_s^2 - \frac{1}{8}\omega_3\omega_2 - \frac{1}{4}\omega_3 u^2 + \frac{1}{8}\omega_3 u^2\omega_2 - \frac{1}{8}\omega_4^2 + \frac{1}{2}\omega_2 + \frac{1}{4}v^2\omega_4 + \frac{1}{8}v^2\omega_3\omega_2,$$

$$\alpha_{x+\delta_1, y-\delta_1}^{[\mu_5], t-\delta_t} = 1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x-\delta_t,y}^{[\mu_5],t-\delta_t} = 1 - \frac{5}{4}\omega_3 + \frac{1}{2}\omega_3\omega_1 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3^2,$$

$$\alpha_{x,y}^{[\mu_1],t-\delta_t} = -2 - \omega_2^2 - \frac{1}{2}\omega_4 u^2 \omega_2 - \omega_3 c_s^2 + \frac{1}{2}v^2 \omega_4 \omega_2 + \frac{1}{2}\omega_3 - \frac{1}{2}\omega_4 \omega_2 + \frac{1}{2}\omega_4 u^2 + \frac{1}{2}\omega_4 + \omega_3 c_s^2 \omega_2 - \frac{1}{2}v^2 \omega_3 - \frac{1}{2}\omega_3 \omega_2 - \frac{1}{2}\omega_3 u^2 + \frac{1}{2}\omega_3 u^2 \omega_2 + 3\omega_2 - \frac{1}{2}v^2 \omega_4 + \frac{1}{2}v^2 \omega_3 \omega_2,$$

$$\alpha_{x,y}^{[\mu_5],t-\delta_t} = 2 + \omega_2^2 - 2\omega_1 - 2\omega_2 + \omega_1^2,$$

$$\alpha_{x+\delta_t,y}^{[\mu_5],t-\delta_t} = 1 - \frac{5}{4}\omega_3 + \frac{1}{2}\omega_3\omega_1 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_3^2,$$

$$\alpha_{x-\delta t, y+\delta t}^{[\mu_1], t-\delta t} = -1 - \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_1 u\omega_2 + \frac{1}{8}\omega_4 u^2\omega_2 - \frac{1}{2}\omega_3 c_s^2 - \frac{1}{8}v^2\omega_4\omega_2 + \frac{1}{4}\omega_3 + \frac{1}{8}\omega_3\omega_4 u^2 + \frac{1}{8}v^2\omega_3\omega_4 - \frac{1}{2}\omega_1 u - \frac{1}{8}\omega_4\omega_2 - \frac{1}{4}\omega_4 u^2 - \frac{1}{8}\omega_3\omega_4 + \frac{1}{8}\omega_4^2 u^2 + \frac{3}{4}\omega_4 + \frac{1}{4}\omega_3 c_s^2\omega_2 - \frac{1}{4}v^2\omega_3 - \frac{1}{8}v^2\omega_4^2 + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_1 u + \frac{1}{4}\omega_3\omega_4 c_s^2 - \frac{1}{8}\omega_3\omega_2 - \frac{1}{4}\omega_3 u^2 + \frac{1}{8}\omega_3 u^2\omega_2 - \frac{1}{8}\omega_4^2 + \frac{1}{2}\omega_2 + \frac{1}{4}v^2\omega_4 + \frac{1}{8}v^2\omega_3\omega_2,$$

$$\alpha_{x-\delta_l, y+\delta_l}^{[\mu_5], t-\delta_t} = 1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x,y+\delta_1}^{[\mu_1],t-\delta_1} = -1 + 2\omega_3 c_s^2 + \frac{1}{4}\omega_3 - \frac{1}{4}\omega_3\omega_4 u^2 - \frac{1}{4}v^2\omega_3\omega_4 - \frac{1}{4}\omega_3^2 u^2 + \frac{1}{4}\omega_4 - \omega_3 c_s^2 \omega_2 + v^2\omega_3 - \frac{1}{2}\omega_3\omega_4 c_s^2 + \omega_3 u^2 - \frac{1}{2}\omega_3 u^2 \omega_2 - \frac{1}{2}\omega_3^2 c_s^2 + \frac{1}{2}\omega_2 - \frac{1}{2}v^2\omega_3\omega_2 - \frac{1}{4}v^2\omega_3^2,$$

$$\alpha_{x,y+\delta}^{[\mu_5],t-\delta_t} = 1 - \frac{5}{4}\omega_3 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x+\delta_t, y+\delta_t}^{[\mu_1], t-\delta_t} = -1 - \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_1u\omega_2 + \frac{1}{8}\omega_4u^2\omega_2 - \frac{1}{2}\omega_3c_s^2 - \frac{1}{8}v^2\omega_4\omega_2 + \frac{1}{4}\omega_3 + \frac{1}{8}\omega_3\omega_4u^2 + \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{2}\omega_1u - \frac{1}{8}\omega_4\omega_2 - \frac{1}{4}\omega_4u^2 - \frac{1}{8}\omega_3\omega_4 + \frac{1}{8}\omega_4^2u^2 + \frac{3}{4}\omega_4 + \frac{1}{4}\omega_3c_s^2\omega_2 - \frac{1}{4}v^2\omega_3 - \frac{1}{8}v^2\omega_4^2 + \frac{1}{2}\omega_1 - \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_4\omega_1u + \frac{1}{4}\omega_3\omega_4c_s^2 - \frac{1}{8}\omega_3\omega_2 - \frac{1}{4}\omega_3u^2 + \frac{1}{8}\omega_3u^2\omega_2 - \frac{1}{8}\omega_4^2 + \frac{1}{2}\omega_2 + \frac{1}{4}v^2\omega_4 + \frac{1}{8}v^2\omega_3\omega_2,$$

$$\alpha_{x+\delta_1, y+\delta_1}^{[\mu_5], t-\delta_t} = 1 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2 - \omega_4 - \frac{1}{2}\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{2}\omega_2,$$

$$\alpha_{x-\delta_t, y-\delta_t}^{[\mu_1], t-2\delta_t} = 1 - \frac{1}{8}v\omega_3\omega_4\omega_2 + \frac{5}{8}v^2\omega_3\omega_1 - \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{8}\omega_3\omega_4\omega_1u - \frac{1}{4}\omega_1u\omega_2 - \frac{1}{8}\omega_4u^2\omega_2 - 2\omega_3c_s^2 + \frac{1}{8}v^2\omega_4\omega_2 + \frac{5}{8}v\omega_3\omega_2 - \frac{1}{4}\omega_3 + \frac{1}{8}\omega_3\omega_4u^2 - \frac{5}{8}\omega_3\omega_1u + \frac{11}{8}v^2\omega_3\omega_4 - \frac{1}{4}\omega_3\omega_4^2c_s^2 + \frac{1}{4}\omega_3^2u^2 + \frac{5}{8}\omega_3\omega_1u^2 - \frac{1}{4}v^2\omega_3\omega_4^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 + \frac{1}{2}\omega_1u + \frac{1}{8}\omega_4\omega_2 - \frac{3}{8}v^2\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4u^2 - \frac{1}{4}\omega_3^2\omega_4c_s^2 - \frac{1}{8}\omega_3\omega_4\omega_1u^2 + \frac{1}{8}\omega_3\omega_4 + \frac{1}{4}\omega_3c_s^2\omega_1 - \frac{1}{4}v\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u^2\omega_2 - \frac{1}{8}\omega_4^2u^2 - \frac{1}{8}\omega_3^2\omega_1u^2 - \frac{3}{4}\omega_4 + \frac{3}{4}\omega_3c_s^2\omega_2 + \frac{1}{4}v\omega_1\omega_2 - v^2\omega_3 + \frac{1}{4}\omega_3\omega_1u\omega_2 + \frac{1}{8}v^2\omega_4^2 - \frac{1}{2}\omega_1 - \frac{1}{4}v^2\omega_3\omega_4\omega_2 + \frac{1}{4}\omega_4\omega_1 -$$

$$\begin{aligned}
& \frac{1}{8}w_4\omega_1u + \frac{3}{2}w_3\omega_4c_s^2 - \frac{1}{4}w_3\omega_4c_s^2w_2 + \frac{1}{8}\omega_3\omega_2 - \omega_3u^2 + \frac{3}{8}w_3u^2w_2 - \frac{1}{4}w_3^2c_s^2\omega_1 + \frac{1}{8}\omega_4^2 - \frac{1}{2}v\omega_2 + \frac{1}{8}v^2w_4\omega_1 + \frac{1}{2}w_3^2c_s^2 \\
& - \frac{1}{8}vw_3^2\omega_2 - \frac{1}{8}w_4\omega_1u^2 - \frac{1}{4}v^2w_3^2w_4 - \frac{1}{8}v^2w_3^2\omega_1 - \frac{1}{2}\omega_2 - \frac{1}{2}v^2\omega_4 - \frac{1}{4}v^2w_3\omega_1w_2 + \frac{1}{8}w_3^2\omega_1 + \frac{3}{8}v^2w_3\omega_2 + \frac{1}{8}vw_4\omega_2 + \frac{1}{4}v^2w_3^2, \\
\alpha_{x-\delta_1,y-\delta_1}^{[\mu_5],t-2\delta_t} &= -2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}w_3\omega_4^2 + \frac{5}{2}w_3 + \frac{3}{8}w_3\omega_4\omega_2 + \frac{1}{2}w_3\omega_1\omega_2 + \frac{1}{8}w_3^2\omega_2 - \frac{9}{8}w_3\omega_1 - \frac{3}{8}w_4\omega_2 - \frac{7}{4}w_3\omega_4 + \frac{3}{2}w_4 + \\
& \frac{1}{4}w_3^2\omega_4 + \omega_1 - \frac{3}{8}w_4\omega_1 - \frac{1}{2}\omega_3^2 - \frac{9}{8}w_3\omega_2 + \frac{1}{8}w_3^2\omega_1 + \frac{3}{8}w_3\omega_4\omega_1 - \frac{1}{4}\omega_4^2 + \omega_2, \\
\alpha_{x,y-\delta_1}^{[\mu_1],t-2\delta_t} &= 1 - \frac{1}{2}w_3c_s^2\omega_1^2 + \frac{1}{2}w_3c_s^2\omega_1\omega_2 + \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}\omega_4^2\omega_1u^2 + \frac{1}{4}\omega_3\omega_1^2 - \frac{1}{4}v^2w_4^2\omega_1 - \frac{1}{4}\omega_4u^2\omega_2 + \frac{1}{4}\omega_4\omega_1^2u^2 + \frac{1}{2}w_3c_s^2 + \\
& \frac{1}{4}v^2w_4\omega_2 - \frac{1}{4}\omega_3 - \frac{1}{4}w_3\omega_4u^2 - \frac{1}{4}v^2w_3\omega_4 - \frac{1}{4}\omega_3\omega_1\omega_2 + \frac{1}{4}w_4\omega_1u^2w_2 + \frac{1}{2}w_3\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_4\omega_2 + \frac{1}{4}v^2w_3\omega_4\omega_1 + \frac{3}{4}w_4u^2 - \\
& \frac{1}{2}vw_1^2\omega_2 + \frac{1}{4}w_3\omega_4\omega_1u^2 + \frac{1}{4}w_3\omega_4 - \frac{1}{4}v^2w_3\omega_1^2 - \frac{1}{4}v^2w_4\omega_1\omega_2 - \frac{1}{4}\omega_4^2\omega_1 + \frac{1}{4}w_3\omega_1u^2w_2 - \frac{1}{4}w_4^2u^2 - \frac{5}{4}\omega_4 - \frac{1}{2}w_3c_s^2\omega_2 + \\
& v\omega_1\omega_2 + \frac{1}{4}v^2w_3 + \frac{1}{4}v^2w_4^2 - \omega_1 + \frac{3}{2}w_4\omega_1 - \frac{1}{2}w_3\omega_4c_s^2 - \frac{1}{4}w_3\omega_1^2u^2 + \frac{1}{4}w_3\omega_2 + \frac{1}{4}\omega_3u^2 - \frac{1}{4}w_3\omega_1^2\omega_2 - \frac{1}{4}v^2w_4\omega_1^2 - \\
& \frac{1}{4}w_3\omega_4\omega_1 + \frac{1}{4}\omega_4^2 - \frac{1}{2}vw_2 + v^2w_4\omega_1 - \frac{1}{4}w_4\omega_1\omega_2 - w_4\omega_1u^2 - \frac{1}{2}\omega_2 - \frac{1}{4}\omega_4\omega_2^2 - \frac{3}{4}v^2w_4 + \frac{1}{4}v^2w_3\omega_1\omega_2 - \frac{1}{4}v^2w_3\omega_2, \\
\alpha_{x,y-\delta_1}^{[\mu_5],t-2\delta_t} &= -2 - \frac{3}{2}\omega_1\omega_2 - \frac{1}{2}w_4\omega_2 + \frac{1}{2}\omega_4^2\omega_1 + 2w_4 + 3\omega_1 - \frac{5}{2}w_4\omega_1 - \frac{1}{2}\omega_4^2 + \frac{1}{2}w_4\omega_1\omega_2 + \omega_2 + \frac{1}{2}w_4\omega_1^2 + \frac{1}{2}\omega_1^2\omega_2 - \omega_1^2, \\
\alpha_{x+\delta_1,y-\delta_1}^{[\mu_1],t-2\delta_t} &= 1 - \frac{1}{8}vw_3\omega_4\omega_2 + \frac{5}{8}v^2w_3\omega_1 - \frac{1}{2}w_3c_s^2\omega_1\omega_2 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{8}w_3\omega_4\omega_1u + \frac{1}{4}\omega_1u\omega_2 - \frac{1}{8}w_4u^2\omega_2 - 2w_3c_s^2 + \frac{1}{8}v^2w_4\omega_2 + \\
& \frac{5}{8}vw_3\omega_2 - \frac{1}{4}\omega_3 + \frac{1}{8}w_3\omega_4u^2 + \frac{5}{8}w_3\omega_1u + \frac{11}{8}v^2w_3\omega_4 - \frac{1}{4}w_3\omega_4^2c_s^2 + \frac{1}{4}w_3^2u^2 + \frac{5}{8}w_3\omega_1u^2 - \frac{1}{4}v^2w_3\omega_4^2 - \frac{1}{2}w_3\omega_4c_s^2\omega_1 - \\
& \frac{1}{2}\omega_1u + \frac{1}{8}w_4\omega_2 - \frac{3}{8}v^2w_3\omega_4\omega_1 + \frac{1}{2}w_4u^2 - \frac{1}{4}w_3^2w_4c_s^2 - \frac{1}{8}w_3\omega_4\omega_1u^2 + \frac{8}{8}w_3\omega_4 + \frac{3}{4}w_3c_s^2\omega_1 - \frac{1}{4}vw_3\omega_1\omega_2 - \frac{1}{4}w_3\omega_1u^2\omega_2 - \\
& \frac{1}{8}\omega_4^2u^2 - \frac{1}{8}w_3^2\omega_1u^2 - \frac{3}{4}\omega_4 + \frac{3}{4}w_3c_s^2\omega_2 + \frac{1}{4}vw_1\omega_2 - v^2w_3 - \frac{1}{4}\omega_3\omega_1u\omega_2 + \frac{1}{8}v^2w_4^2 - \frac{1}{2}\omega_1 - \frac{1}{4}v^2w_3\omega_4\omega_2 + \frac{1}{4}\omega_4\omega_1 + \\
& \frac{1}{8}w_4\omega_1u + \frac{3}{2}w_3\omega_4c_s^2 - \frac{1}{4}w_3\omega_4c_s^2w_2 + \frac{1}{8}w_3\omega_2 - w_3u^2 + \frac{3}{8}w_3u^2\omega_2 - \frac{1}{4}w_3^2c_s^2\omega_1 + \frac{1}{8}\omega_4^2 - \frac{1}{2}vw_2 + \frac{1}{8}v^2w_4\omega_1 + \frac{1}{2}w_3^2c_s^2 - \\
& \frac{8}{8}vw_3^2\omega_2 - \frac{1}{8}w_4\omega_1u^2 - \frac{1}{4}v^2w_3^2\omega_4 - \frac{1}{8}v^2w_3^2\omega_1 - \frac{1}{2}\omega_2 - \frac{1}{2}v^2w_4 - \frac{1}{4}v^2w_3\omega_1\omega_2 - \frac{1}{8}w_3^2\omega_1u + \frac{3}{8}v^2w_3\omega_2 + \frac{1}{8}vw_4\omega_2 + \frac{1}{4}v^2w_3^2, \\
\alpha_{x+\delta_1,y-\delta_1}^{[\mu_5],t-2\delta_t} &= -2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}w_3\omega_4^2 + \frac{5}{2}w_3 + \frac{3}{8}w_3\omega_4\omega_2 + \frac{1}{2}w_3\omega_1\omega_2 + \frac{1}{8}w_3^2\omega_2 - \frac{9}{8}w_3\omega_1 - \frac{3}{8}w_4\omega_2 - \frac{7}{4}w_3\omega_4 + \frac{3}{2}w_4 + \\
& \frac{1}{4}\omega_3^2\omega_4 + \omega_1 - \frac{3}{8}w_4\omega_1 - \frac{1}{2}\omega_3^2 - \frac{9}{8}w_3\omega_2 + \frac{1}{8}w_3^2\omega_1 + \frac{3}{8}w_3\omega_4\omega_1 - \frac{1}{4}\omega_4^2 + \omega_2, \\
\alpha_{x-\delta_1,y}^{[\mu_1],t-2\delta_t} &= 2 + w_2^2 + \frac{3}{2}\omega_1\omega_2 - \frac{1}{4}w_4\omega_2^2 - \frac{3}{2}\omega_1u\omega_2 - \frac{3}{4}w_4u^2\omega_2 + w_3c_s^2 + \frac{3}{4}v^2w_4\omega_2 - \frac{1}{2}\omega_3 - \frac{1}{4}w_3\omega_4\omega_2 - \frac{1}{4}w_3\omega_4u^2 - \\
& \frac{1}{4}v^2w_3\omega_4 - \frac{1}{4}v^2w_4\omega_2^2 + \frac{1}{2}\omega_1u\omega_2^2 + \frac{1}{2}\omega_4u^2\omega_2^2 + \omega_1u - \frac{1}{2}\omega_1\omega_2^2 + \frac{7}{4}w_4\omega_2 + \frac{1}{2}w_4u^2 + \frac{1}{4}w_3\omega_4 - \frac{1}{4}w_4^2u^2 - \frac{1}{4}w_4^2\omega_2 - \\
& \frac{3}{4}\omega_4 + \frac{1}{4}v^2w_3\omega_2^2 - \frac{3}{2}w_3c_s^2\omega_2^2 + \frac{1}{2}v^2w_3 + \frac{1}{4}w_3\omega_4u^2\omega_2 + \frac{1}{4}v^2w_4^2 - \omega_1 + \frac{1}{4}v^2w_3\omega_4\omega_2 + \frac{1}{2}\omega_4\omega_1 - \frac{1}{2}w_4\omega_1u - \\
& \frac{1}{2}w_3\omega_4c_s^2 + \frac{1}{2}w_3\omega_4c_s^2\omega_2 + \frac{3}{4}w_3\omega_2 + \frac{1}{2}w_4\omega_1u\omega_2 + \frac{1}{2}w_3u^2 - \frac{3}{4}w_3u^2\omega_2 + \frac{1}{4}w_3u^2\omega_2^2 + \frac{1}{4}\omega_4^2 - \frac{1}{4}v^2w_4\omega_2 - \\
& \frac{1}{2}w_4\omega_1\omega_2 - \frac{1}{4}w_3\omega_2^2 + \frac{1}{4}w_2^2u^2\omega_2 - 3\omega_2 - \frac{1}{2}v^2w_4 + \frac{1}{2}w_3c_s^2\omega_2^2 - \frac{3}{4}v^2w_3\omega_2, \\
\alpha_{x-\delta_1,y}^{[\mu_5],t-2\delta_t} &= -2 - \omega_2^2 - \frac{3}{2}\omega_1\omega_2 + \frac{1}{2}w_4\omega_2^2 + \frac{1}{2}\omega_1\omega_2^2 - \frac{5}{2}w_4\omega_2 + \frac{1}{2}\omega_4^2\omega_2 + 2w_4 + \omega_1 - \frac{1}{2}w_4\omega_1 - \frac{1}{2}\omega_4^2 + \frac{1}{2}w_4\omega_1\omega_2 + 3\omega_2, \\
\alpha_{x,y}^{[\mu_1],t-2\delta_t} &= 2 + w_2^2 - \frac{1}{2}v^2w_3^2\omega_2 - 4w_3c_s^2 - \frac{1}{2}\omega_3 + \frac{1}{2}w_3\omega_4u^2 + \frac{1}{2}v^2w_3\omega_4 - w_3^2c_s^2\omega_2 + \frac{1}{2}\omega_3^2u^2 + \frac{1}{2}w_4\omega_2 - \\
& \frac{1}{2}\omega_3^2u^2\omega_2 - \frac{1}{2}\omega_4 - v^2w_3\omega_2^2 + 6w_3c_s^2\omega_2 - 2v^2w_3 - \frac{1}{2}w_3\omega_4u^2\omega_2 - \frac{1}{2}v^2w_3\omega_4\omega_2 + w_3\omega_4c_s^2 - w_3\omega_4c_s^2\omega_2 + \\
& \frac{1}{2}w_3\omega_2 - 2w_3u^2 + 3w_3u^2\omega_2 - w_3u^2\omega_2^2 + w_3^2c_s^2 - 3\omega_2 - 2w_3c_s^2\omega_2^2 + 3v^2w_3\omega_2 + \frac{1}{2}v^2w_3^2, \\
\alpha_{x,y}^{[\mu_5],t-2\delta_t} &= -4 - \omega_2^2 + w_3\omega_1^2 + 5\omega_3 + \frac{1}{2}w_3\omega_4\omega_2 + \frac{1}{2}w_3^2\omega_2 - \frac{7}{2}w_3\omega_1 - \frac{1}{2}\omega_4\omega_2 - w_3\omega_4 + \omega_4 + 3\omega_1 - \frac{1}{2}w_4\omega_1 - \omega_3^2 - \\
& \frac{7}{2}w_3\omega_2 + \frac{1}{2}w_3^2\omega_1 + \frac{1}{2}w_3\omega_4\omega_1 + w_3\omega_2^2 + 3\omega_2 - \omega_1^2, \\
\alpha_{x+\delta_1,y}^{[\mu_1],t-2\delta_t} &= 2 + w_2^2 + \frac{3}{2}\omega_1\omega_2 - \frac{1}{4}w_4\omega_2^2 + \frac{3}{2}\omega_1u\omega_2 - \frac{3}{4}w_4u^2\omega_2 + w_3c_s^2 + \frac{3}{4}v^2w_4\omega_2 - \frac{1}{2}\omega_3 - \frac{1}{4}w_3\omega_4\omega_2 - \frac{1}{4}w_3\omega_4u^2 - \\
& \frac{1}{4}v^2w_3\omega_4 - \frac{1}{4}v^2w_4\omega_2^2 - \frac{1}{2}\omega_1u\omega_2^2 + \frac{1}{4}\omega_4u^2\omega_2^2 - \omega_1u - \frac{1}{2}\omega_1\omega_2^2 + \frac{7}{4}w_4\omega_2 + \frac{1}{2}w_4u^2 + \frac{1}{4}w_3\omega_4 - \frac{1}{4}w_4^2u^2 - \frac{1}{4}w_4^2\omega_2 - \\
& \frac{3}{2}\omega_4 + \frac{1}{4}v^2w_3\omega_2^2 - \frac{3}{2}w_3c_s^2\omega_2^2 + \frac{1}{2}v^2w_3 + \frac{1}{4}w_3\omega_4u^2\omega_2 + \frac{1}{4}v^2w_4^2 - \omega_1 + \frac{1}{4}v^2w_3\omega_4\omega_2 + \frac{1}{2}\omega_4\omega_1 - \frac{1}{2}w_4\omega_1u - \\
& \frac{1}{2}w_3\omega_4c_s^2 + \frac{1}{2}w_3\omega_4c_s^2\omega_2 + \frac{3}{4}w_3\omega_2 - \frac{1}{2}w_4\omega_1u\omega_2 + \frac{1}{2}w_3u^2 - \frac{3}{4}w_3u^2\omega_2 + \frac{1}{4}w_3u^2\omega_2^2 + \frac{1}{4}\omega_4^2 - \frac{1}{4}v^2w_4\omega_2 - \\
& \frac{1}{2}w_4\omega_1\omega_2 - \frac{1}{4}w_3\omega_2^2 + \frac{1}{4}w_2^2u^2\omega_2 - 3\omega_2 - \frac{1}{2}v^2w_4 + \frac{1}{2}w_3c_s^2\omega_2^2 - \frac{3}{4}v^2w_3\omega_2, \\
\alpha_{x+\delta_1,y}^{[\mu_5],t-2\delta_t} &= -2 - \omega_2^2 - \frac{3}{2}\omega_1\omega_2 + \frac{1}{2}w_4\omega_2^2 + \frac{1}{2}\omega_1\omega_2^2 - \frac{5}{2}w_4\omega_2 + \frac{1}{2}\omega_4^2\omega_2 + 2w_4 + \omega_1 - \frac{1}{2}w_4\omega_1 - \frac{1}{2}\omega_4^2 + \frac{1}{2}w_4\omega_1\omega_2 + 3\omega_2, \\
\alpha_{x-\delta_1,y+\delta_1}^{[\mu_1],t-2\delta_t} &= 1 + \frac{1}{8}vw_3\omega_4\omega_2 + \frac{5}{8}v^2w_3\omega_1 - \frac{1}{2}w_3c_s^2\omega_1\omega_2 + \frac{1}{4}\omega_1\omega_2 + \frac{1}{8}w_3\omega_4\omega_1u - \frac{1}{4}\omega_1u\omega_2 - \frac{1}{8}w_4u^2\omega_2 - 2w_3c_s^2 + \frac{1}{8}v^2w_4\omega_2 - \\
& \frac{5}{8}vw_3\omega_2 - \frac{1}{4}\omega_3 + \frac{1}{8}w_3\omega_4u^2 - \frac{5}{8}w_3\omega_1u + \frac{11}{8}v^2w_3\omega_4 - \frac{1}{4}w_3\omega_4^2c_s^2 + \frac{1}{4}w_3^2u^2 + \frac{5}{8}w_3\omega_1u^2 - \frac{1}{4}v^2w_3\omega_4^2 - \frac{1}{2}w_3\omega_4c_s^2\omega_1 + \\
& \frac{1}{2}\omega_1u + \frac{1}{8}w_4\omega_2 - \frac{3}{8}v^2w_3\omega_4\omega_1 + \frac{1}{2}w_4u^2 - \frac{1}{4}w_3^2w_4c_s^2 - \frac{1}{8}w_3\omega_4\omega_1u^2 + \frac{8}{8}w_3\omega_4 + \frac{5}{8}w_3c_s^2\omega_1 + \frac{1}{4}vw_3\omega_1\omega_2 - \frac{1}{4}w_3\omega_1u^2\omega_2 - \\
& \frac{1}{8}\omega_4^2u^2 - \frac{1}{8}w_3^2\omega_1u^2 - \frac{3}{4}\omega_4 + \frac{3}{4}w_3c_s^2\omega_2 - \frac{1}{4}w_4\omega_1u\omega_2 - \frac{1}{4}v^2w_3 - \frac{1}{4}w_3\omega_1u\omega_2 + \frac{1}{8}v^2w_4^2 - \frac{1}{2}\omega_1 - \frac{1}{4}v^2w_3\omega_4\omega_2 + \frac{1}{4}\omega_4\omega_1 - \\
& \frac{1}{8}w_4\omega_1u + \frac{3}{2}w_3\omega_4c_s^2 - \frac{1}{4}w_3\omega_4c_s^2\omega_2 + \frac{1}{8}w_3\omega_2 - w_3u^2 + \frac{3}{8}w_3u^2\omega_2 - \frac{1}{4}w_3^2c_s^2\omega_1 + \frac{1}{8}\omega_4^2 + \frac{1}{2}v^2w_4\omega_1 + \frac{1}{2}w_3^2c_s^2 + 
\end{aligned}$$



$$\begin{aligned}
& \frac{3}{4}\omega_4\omega_1 + \frac{3}{4}\omega_3^2 + \frac{19}{4}\omega_3\omega_2 - \frac{1}{4}\omega_3^2\omega_1 - \frac{3}{4}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2 - \frac{3}{4}\omega_4\omega_1\omega_2 - \omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_4^2\omega_2 - 4\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_2, \\
\alpha_{x,y}^{[\mu_1],t-3\delta_t} &= -2 - \omega_2^2 - \frac{1}{2}v^2\omega_4\omega_1\omega_2^2 + \omega_3c_s^2\omega_1^2 - \frac{1}{2}v^2\omega_3\omega_1^2\omega_2 - \omega_3c_s^2\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1u^2\omega_2^2 - 3\omega_1\omega_2 + \frac{1}{2}\omega_4\omega_2^2 - \frac{1}{2}\omega_4^2\omega_1\omega_2 - \\
&\frac{1}{2}\omega_4^2\omega_1u^2 - \frac{1}{2}\omega_3\omega_1^2 + \frac{1}{2}v^2\omega_4^2\omega_1 + 2\omega_4u^2\omega_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_1^2u^2 - \frac{1}{2}\omega_4\omega_1^2\omega_2 - \omega_3c_s^2 - 2v^2\omega_4\omega_2 + \\
&\frac{1}{2}\omega_3 + \frac{1}{2}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_4\omega_1u^2\omega_2 + \frac{1}{2}\omega_3\omega_4u^2 + \frac{1}{2}\omega_4\omega_1u^2\omega_2^2 + \frac{1}{2}v^2\omega_3\omega_4 - \frac{1}{2}\omega_3\omega_1\omega_2^2 + \frac{1}{2}v^2\omega_4\omega_2^2 + \frac{1}{2}\omega_3\omega_1\omega_2 + \\
&\omega_3\omega_4c_s^2\omega_1\omega_2 - \frac{5}{2}\omega_4\omega_1u^2\omega_2 - \omega_3\omega_4c_s^2\omega_1 - \frac{1}{2}\omega_4u^2\omega_2^2 + \omega_1\omega_2^2 - 3\omega_4\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1 - \frac{3}{2}\omega_4u^2 - \frac{1}{2}\omega_3\omega_4\omega_1u^2 - \\
&\frac{1}{2}\omega_3\omega_4 - \frac{1}{2}\omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}v^2\omega_3\omega_1^2 + \frac{5}{2}v^2\omega_4\omega_1\omega_2 + \omega_3c_s^2\omega_1\omega_2^2 + \frac{1}{2}\omega_4^2\omega_1 - \frac{1}{2}\omega_3\omega_1u^2\omega_2 + \frac{1}{2}\omega_4u^2 + \frac{1}{2}\omega_4\omega_1^2u^2\omega_2 + \\
&\frac{1}{2}\omega_4^2\omega_2 + \frac{5}{2}\omega_4 - \frac{1}{2}v^2\omega_3\omega_2^2 + 2\omega_3c_s^2\omega_2 - \frac{1}{2}v^2\omega_3 - \frac{1}{2}v^2\omega_4\omega_1^2\omega_2 - \frac{1}{2}\omega_3\omega_4u^2\omega_2 - \frac{1}{2}v^2\omega_4^2 + 2\omega_1 - \frac{1}{2}v^2\omega_3\omega_4\omega_2 - \\
&3\omega_4\omega_1 + \frac{1}{2}v^2\omega_3\omega_1\omega_2^2 + \omega_3\omega_4c_s^2 - \frac{1}{2}\omega_4\omega_1\omega_2^2 - \omega_3\omega_4c_s^2\omega_2 + \frac{1}{2}\omega_3\omega_2^2u^2 - \omega_3\omega_2 - \frac{1}{2}\omega_3u^2 + \frac{1}{2}\omega_3\omega_1^2\omega_2 - \frac{1}{2}\omega_3\omega_1u^2\omega_2 + \\
&\omega_3u^2\omega_2 + \frac{1}{2}v^2\omega_4\omega_1^2 - \frac{1}{2}v^2\omega_4^2\omega_1\omega_2 - \frac{1}{2}\omega_3u^2\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_4^2 - 2v^2\omega_4\omega_1 + \frac{1}{2}v^2\omega_4^2\omega_2 + \frac{7}{2}\omega_4\omega_1\omega_2 + 2\omega_4\omega_1u^2 + \\
&\frac{1}{2}\omega_4^2\omega_1u^2\omega_2 + \frac{1}{2}\omega_3\omega_2^2 - \frac{1}{2}\omega_4^2u^2\omega_2 + 3\omega_2 + \frac{1}{2}\omega_4\omega_1^2 + \frac{3}{2}v^2\omega_4 - \omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}v^2\omega_3\omega_1\omega_2 - \omega_3c_s^2\omega_2^2 + v^2\omega_3\omega_2, \\
\alpha_{x,y}^{[\mu_5],t-3\delta_t} &= 3 + \omega_2^2 + 5\omega_1\omega_2 - \omega_4\omega_2^2 + \omega_4^2\omega_1\omega_2 + \omega_4\omega_1^2\omega_2 - \omega_1\omega_2^2 + 5\omega_4\omega_2 - \omega_4^2\omega_1 - \omega_4^2\omega_2 - 4\omega_4 - 4\omega_1 + 5\omega_4\omega_1 + \\
&\omega_4\omega_1\omega_2^2 + \frac{1}{4}\omega_4^2 - 6\omega_4\omega_1\omega_2 - 4\omega_2 - \omega_4\omega_1^2 - \omega_1^2\omega_2 + \omega_1^2, \\
\alpha_{x+\delta_1,y}^{[\mu_1],t-3\delta_t} &= -2 - \frac{1}{4}\omega_3^2\omega_1\omega_2 - \omega_2^2 - \frac{5}{4}v^2\omega_3\omega_1 + \frac{7}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_1u^2\omega_2^2 - \frac{3}{2}\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_1u + \\
&\frac{1}{2}v^2\omega_3^2\omega_2 - \frac{1}{4}v^2\omega_3^2\omega_1\omega_2 - \frac{3}{2}\omega_1\omega_2 + \frac{5}{4}\omega_4u^2\omega_2 - \frac{3}{4}v^2\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_3^2\omega_4c_s^2\omega_2 + 4\omega_3c_s^2 - \frac{5}{4}v^2\omega_4\omega_2 + \frac{1}{2}\omega_3 + \\
&\frac{1}{4}\omega_3\omega_4\omega_2 - \frac{1}{4}\omega_3\omega_4\omega_1u^2\omega_2 - \frac{1}{4}\omega_3\omega_4u^2 - \frac{5}{4}\omega_3\omega_1u - \frac{11}{4}v^2\omega_3\omega_4 + \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{1}{4}v^2\omega_4\omega_2^2 + \omega_3c_s^2\omega_2 - \frac{1}{2}\omega_3u^2 - \\
&\frac{5}{4}\omega_3\omega_1u^2 + \frac{5}{2}v^2\omega_3\omega_4 - \omega_3\omega_4c_s^2\omega_1\omega_2 - \frac{1}{4}\omega_4\omega_1u^2\omega_2 + \frac{1}{2}\omega_1\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_2 + \omega_3\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_4u^2\omega_2^2 + \\
&\omega_1\omega_1 + \frac{1}{2}\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4^2\omega_2 - \frac{7}{4}\omega_4\omega_2 + \frac{3}{4}v^2\omega_3\omega_4\omega_1 - \omega_4u^2 + \frac{1}{2}\omega_3\omega_4\omega_1u^2 + \frac{1}{4}v^2\omega_3\omega_4\omega_2^2 - \frac{1}{4}\omega_3\omega_4 - \\
&\frac{5}{2}\omega_3c_s^2\omega_1 + \frac{1}{4}v^2\omega_4\omega_1\omega_2 - \omega_3c_s^2\omega_1\omega_2^2 + \frac{1}{2}\omega_3^2u^2\omega_2 + \frac{7}{4}\omega_3\omega_1u^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_4^2\omega_2 + \frac{1}{4}\omega_4u^2 + \frac{1}{2}\omega_3\omega_1u^2 + \\
&\frac{1}{4}\omega_4^2\omega_2 + \frac{3}{2}\omega_4 + \frac{3}{4}v^2\omega_3\omega_2^2 - \frac{11}{4}\omega_3c_s^2\omega_2 + 2v^2\omega_3 - \frac{1}{2}\omega_3^2c_s^2\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_4u^2\omega_2 + \frac{7}{4}\omega_3\omega_1\omega_2 - \frac{1}{4}v^2\omega_4^2 + \omega_1 + \\
&\frac{13}{4}v^2\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_4\omega_1 - \frac{1}{2}v^2\omega_3\omega_1\omega_2^2 - \frac{1}{4}\omega_4\omega_1u - 3\omega_3\omega_4c_s^2 + \frac{7}{2}\omega_3\omega_4c_s^2\omega_2 - \frac{3}{4}\omega_3\omega_2 + \frac{1}{4}\omega_4\omega_1u\omega_2 + 2\omega_3u^2 - \\
&\frac{11}{4}\omega_3u^2\omega_2 + \frac{1}{2}\omega_3^2c_s^2\omega_1 + \frac{3}{4}\omega_3u^2\omega_2^2 - \frac{1}{4}\omega_4^2 - \frac{1}{2}v^2\omega_4\omega_1 - \omega_3c_s^2 + \frac{1}{4}v^2\omega_4^2\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1u^2 + \\
&\frac{1}{4}\omega_3\omega_2^2 + \frac{1}{2}v^2\omega_3^2\omega_4 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2^2 - \frac{1}{4}\omega_3\omega_4\omega_1\omega_2 + \frac{1}{4}v^2\omega_3^2\omega_1 - \frac{1}{4}\omega_4^2u^2\omega_2 - \frac{1}{4}\omega_3^2\omega_1u^2\omega_2 + 3\omega_2 + v^2\omega_4 - \\
&\frac{1}{2}\omega_3\omega_1\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_2 + \frac{7}{4}\omega_3\omega_1\omega_2 + \frac{1}{2}\omega_3c_s^2\omega_2^2 - \frac{11}{4}v^2\omega_3\omega_2 - \frac{1}{2}v^2\omega_3^2, \\
\alpha_{x+\delta_1,y}^{[\mu_5],t-3\delta_t} &= 3 + \omega_2^2 + 2\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_2^2 - \frac{1}{2}\omega_3\omega_4^2 - \frac{15}{4}\omega_3 - \frac{15}{4}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_2^2 - \frac{9}{4}\omega_3\omega_1\omega_2 - \\
&\frac{3}{4}\omega_3^2\omega_2 + \frac{7}{4}\omega_3\omega_1 - \frac{1}{2}\omega_1\omega_2^2 + \frac{13}{4}\omega_4\omega_2 + \frac{13}{4}\omega_3\omega_4 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_2 - \frac{11}{4}\omega_4 - \frac{1}{2}\omega_3^2\omega_4 - \frac{3}{2}\omega_1 + \\
&\frac{3}{4}\omega_4\omega_1 + \frac{3}{4}\omega_3^2 + \frac{19}{4}\omega_3\omega_2 - \frac{1}{4}\omega_3^2\omega_1 - \frac{3}{4}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2 - \frac{3}{4}\omega_4\omega_1\omega_2 - \omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_4^2\omega_2 - 4\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_2, \\
\alpha_{x,y+\delta_1}^{[\mu_1],t-3\delta_t} &= -1 - \frac{1}{4}v\omega_3\omega_4\omega_2 - \frac{5}{4}v^2\omega_3\omega_1 + \frac{1}{2}\omega_3c_s^2\omega_1^2 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}\omega_1\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1^2 - \frac{1}{4}\omega_4^2\omega_1u^2 + \\
&\frac{1}{4}v\omega_3\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1^2 + \frac{1}{4}v^2\omega_4^2\omega_1 + \frac{1}{4}\omega_4u^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_4\omega_1^2u^2 + 2\omega_3c_s^2 - \\
&\frac{1}{4}v^2\omega_4\omega_2 + \frac{5}{2}v\omega_3\omega_2 + \frac{1}{4}\omega_3 - \frac{5}{2}v^2\omega_3\omega_4 + \frac{1}{2}\omega_3\omega_4^2\omega_1^2 - \frac{1}{4}\omega_3^2u^2 + \frac{1}{4}\omega_3\omega_1\omega_2 - \frac{5}{4}\omega_3\omega_1u^2 + \frac{1}{2}v^2\omega_3\omega_4^2 - \\
&\frac{1}{4}\omega_3\omega_4c_s^2\omega_1\omega_2 - \frac{1}{4}\omega_4\omega_1u^2\omega_2 + 3\omega_3\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_4\omega_2 + 3v^2\omega_3\omega_4\omega_1 - \omega_4u^2 + \frac{1}{2}\omega_3\omega_4c_s^2 - \frac{1}{2}v\omega_1^2\omega_2 - \frac{1}{4}\omega_3\omega_4 - \\
&\frac{5}{2}\omega_3c_s^2\omega_1 + \frac{1}{4}v^2\omega_3\omega_1^2 - \frac{7}{4}v\omega_3\omega_1\omega_2 + \frac{1}{4}v^2\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_4^2\omega_1 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 + \frac{1}{4}\omega_4^2u^2 - \frac{1}{2}v^2\omega_3\omega_4^2\omega_1 + \frac{1}{4}\omega_3\omega_1u^2 + \\
&\frac{5}{4}\omega_4 - \frac{1}{2}\omega_3c_s^2\omega_2 + \frac{3}{2}v\omega_1\omega_2 + v^2\omega_3 + \frac{1}{2}v\omega_3\omega_1\omega_2^2 - \frac{1}{3}v^2\omega_4^2 + \omega_1 + \frac{1}{2}v^2\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_4^2\omega_1^2 - \frac{3}{2}\omega_4\omega_1 - \\
&\frac{5}{2}\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \frac{1}{4}\omega_3\omega_1^2u^2 - \frac{1}{4}\omega_3\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1 + \omega_3u^2 - \frac{1}{4}\omega_3u^2\omega_2 + \frac{1}{4}v^2\omega_4\omega_1^2 + \frac{1}{4}\omega_3\omega_1\omega_2 + \\
&\frac{1}{2}\omega_3^2c_s^2\omega_1 + \frac{1}{4}\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_4^2 - \omega_2 - \frac{5}{4}v^2\omega_4\omega_1 - \frac{1}{2}\omega_3^2\omega_4c_s^2\omega_1 - \frac{1}{2}\omega_3^2c_s^2 - \frac{1}{4}\omega_3\omega_2^2 + \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{5}{4}\omega_4\omega_1u^2 + \\
&\frac{1}{2}v^2\omega_3^2\omega_4 + \frac{1}{4}v^2\omega_3^2\omega_1 + \frac{1}{2}\omega_2 + \frac{1}{4}\omega_4\omega_1^2 + v^2\omega_4 - \frac{1}{4}v\omega_4\omega_1\omega_2 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{4}v^2\omega_3\omega_2 + \frac{1}{4}v\omega_4\omega_2 - \frac{1}{4}v^2\omega_3^2, \\
\alpha_{x,y+\delta_1}^{[\mu_5],t-3\delta_t} &= 3 + \frac{1}{2}\omega_3^2\omega_4\omega_1 + 2\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4^2 + \frac{1}{2}\omega_3\omega_4\omega_1\omega_2 - \omega_3\omega_1^2 - \frac{15}{4}\omega_3 - \frac{3}{4}\omega_3\omega_4\omega_2 - \frac{9}{4}\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3^2\omega_2 + \\
&\frac{19}{4}\omega_3\omega_1 + \frac{3}{4}\omega_4\omega_2 + \frac{13}{4}\omega_3\omega_4 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_4^2\omega_1 + \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{11}{4}\omega_4 - \frac{1}{2}\omega_3^2\omega_4 - 4\omega_1 + \frac{13}{4}\omega_4\omega_1 + \frac{3}{4}\omega_3^2 + \\
&\frac{7}{4}\omega_3\omega_2 + \frac{1}{2}\omega_3\omega_1^2\omega_2 - \frac{3}{4}\omega_3^2\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1\omega_2 - \frac{15}{4}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2 - \frac{3}{4}\omega_4\omega_1\omega_2 - \frac{3}{2}\omega_2 - \frac{1}{2}\omega_4\omega_1^2 - \frac{1}{2}\omega_3^2\omega_2 + \omega_1^2, \\
\alpha_{x,y}^{[\mu_1],t-4\delta_t} &= 2 + \omega_2^2 + \frac{1}{2}v^2\omega_4\omega_1\omega_2^2 + \frac{5}{2}v^2\omega_3\omega_1 - \omega_3c_s^2\omega_1^2 + \frac{1}{2}v^2\omega_3\omega_1^2\omega_2 - 6\omega_3c_s^2\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1u^2\omega_2^2 + 3\omega_1\omega_2 + \\
&v^2\omega_3\omega_4\omega_1^2 - \frac{1}{2}\omega_4\omega_2^2 + \frac{1}{2}\omega_4^2\omega_1\omega_2 + \frac{1}{2}\omega_4^2\omega_1u^2 - \frac{1}{2}v^2\omega_3^2\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1^2 + \omega_3\omega_4c_s^2\omega_1^2 - \frac{1}{2}v^2\omega_4^2\omega_1 - \\
&\frac{5}{2}\omega_4u^2\omega_2 + 7v^2\omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_4\omega_1^2u^2 + \omega_3^2c_s^2\omega_2 + \frac{1}{2}\omega_4\omega_1^2\omega_2 - 4\omega_3c_s^2 + \frac{5}{2}v^2\omega_4\omega_2 - \frac{1}{2}\omega_3 - \frac{1}{2}\omega_3\omega_4\omega_2 - \\
&\frac{1}{2}\omega_4\omega_1u^2\omega_2^2 - \omega_3\omega_4c_s^2\omega_1\omega_2^2 + 5v^2\omega_3\omega_4 + \frac{1}{2}\omega_3\omega_1\omega_2^2 - \omega_3\omega_4^2\omega_1^2 - \frac{1}{2}v^2\omega_4\omega_2^2 - \omega_3^2c_s^2\omega_2 + \frac{1}{2}\omega_3^2u^2 - \\
&\frac{1}{2}\omega_3\omega_1\omega_2 + \frac{5}{2}\omega_3\omega_1u^2 - v^2\omega_3\omega_2^2 + 7\omega_3\omega_4c_s^2\omega_1\omega_2 + 3\omega_4\omega_1u^2\omega_2 + v^2\omega_3^2\omega_4\omega_2 - 6\omega_3\omega_4c_s^2\omega_1 + \frac{1}{2}\omega_4u^2\omega_2^2 - \\
&v^2\omega_3\omega_4\omega_1\omega_2^2 - \omega_1\omega_2^2 + \omega_3\omega_4c_s^2\omega_2 + 3\omega_4\omega_2 - 6v^2\omega_3\omega_4\omega_1 + 2\omega_4u^2 - \omega_3\omega_4c_s^2 + \frac{1}{2}\omega_3\omega_4 + \frac{1}{2}\omega_3\omega_4\omega_1\omega_2 +
\end{aligned}$$

$$\begin{aligned}
& 5\omega_3 c_s^2 \omega_1 - \frac{1}{2}v^2 \omega_3 \omega_1^2 - 3v^2 \omega_4 \omega_1 \omega_2 + \omega_3 c_s^2 \omega_1 \omega_2^2 - \frac{1}{2}\omega_3^2 u^2 \omega_2 - \omega_3^2 \omega_4 c_s^2 \omega_1 \omega_2 - \frac{1}{2}\omega_4^2 \omega_1 - 3\omega_3 \omega_1 u^2 \omega_2 + \\
& v^2 \omega_3 \omega_4^2 \omega_2 - \frac{1}{2}\omega_4^2 u^2 + v^2 \omega_3 \omega_4^2 \omega_1 - \frac{1}{2}\omega_3^2 \omega_1 u^2 - \frac{1}{2}\omega_4 \omega_1^2 u^2 \omega_2 - \frac{1}{2}\omega_4^2 \omega_2 - \frac{5}{2}\omega_4 - \frac{1}{2}v^2 \omega_3 \omega_2^2 + 5\omega_3 c_s^2 \omega_2 - \\
& 2v^2 \omega_3 + \omega_3^2 c_s^2 \omega_1 \omega_2 + \frac{1}{2}v^2 \omega_4 \omega_1^2 \omega_2 + \frac{1}{2}v^2 \omega_4^2 - 2\omega_1 - 6v^2 \omega_3 \omega_4 \omega_2 + \omega_3 \omega_4^2 c_s^2 \omega_1 + 3\omega_4 \omega_1 + \frac{1}{2}v^2 \omega_3 \omega_1 \omega_2^2 + \\
& 5\omega_3 \omega_4 c_s^2 + \frac{1}{2}\omega_4 \omega_1 \omega_2^2 - 6\omega_3 \omega_4 c_s^2 \omega_2 - \omega_3 \omega_4 c_s^2 \omega_1^2 \omega_2 - \frac{1}{2}\omega_3 \omega_1^2 u^2 + \omega_3 \omega_2 + v^2 \omega_3^2 \omega_4 \omega_1 - 2\omega_3 u^2 - \frac{1}{2}\omega_3 \omega_1^2 \omega_2 + \\
& \frac{1}{2}\omega_3 \omega_1^2 u^2 \omega_2 + \frac{5}{2}\omega_3 u^2 \omega_2 - v^2 \omega_3^2 \omega_4 \omega_1 \omega_2 - \frac{1}{2}v^2 \omega_4 \omega_1^2 - \omega_3^2 c_s^2 \omega_1 + \frac{1}{2}v^2 \omega_4^2 \omega_1 \omega_2 - \frac{1}{2}\omega_3 u^2 \omega_2^2 - \frac{1}{2}\omega_3 \omega_4 \omega_1 + \\
& \frac{1}{2}\omega_4^2 - v^2 \omega_3 \omega_4 \omega_1^2 \omega_2 + \frac{5}{2}v^2 \omega_4 \omega_1 + \omega_3^2 \omega_4 c_s^2 \omega_1 + \omega_3^2 c_s^2 - \frac{1}{2}v^2 \omega_4^2 \omega_2 - \frac{7}{2}\omega_4 \omega_1 \omega_2 - \frac{5}{2}\omega_4 \omega_1 u^2 - \frac{1}{2}\omega_4^2 \omega_1 u^2 \omega_2 - \\
& \omega_3 \omega_4^2 c_s^2 \omega_1 \omega_2 - \frac{1}{2}\omega_3 \omega_2^2 - v^2 \omega_3^2 \omega_4 + \omega_3 \omega_4 c_s^2 \omega_2^2 - \frac{1}{2}v^2 \omega_3^2 \omega_1 \omega_2 - v^2 \omega_3 \omega_4^2 \omega_1 \omega_2 + \frac{1}{2}\omega_4^2 u^2 \omega_2 + \frac{1}{2}\omega_3^2 \omega_1 u^2 \omega_2 - \\
& 3\omega_2 - \frac{1}{2}\omega_4 \omega_1^2 - 2v^2 \omega_4 + v^2 \omega_3 \omega_4 \omega_2^2 + \omega_3 c_s^2 \omega_1^2 \omega_2 - 3v^2 \omega_3 \omega_1 \omega_2 - \omega_3 c_s^2 \omega_2^2 + \frac{5}{2}v^2 \omega_3 \omega_2 + \frac{1}{2}v^2 \omega_2^2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_5], t-4\delta_t} = & -4 - \omega_2^2 - \omega_3^2 \omega_4 \omega_1 - 6\omega_1 \omega_2 + \omega_4 \omega_2^2 - \omega_4^2 \omega_1 \omega_2 + \omega_3 \omega_4 \omega_1 \omega_2^2 + \omega_3 \omega_4^2 \omega_1 + \omega_3 \omega_1^2 - \omega_4 \omega_1^2 \omega_2 + 5\omega_3 + \\
& 7\omega_3 \omega_4 \omega_2 - \omega_3 \omega_1 \omega_2^2 - \omega_3 \omega_4 \omega_2^2 + 7\omega_3 \omega_1 \omega_2 + \omega_3^2 \omega_2 - 6\omega_3 \omega_1 + \omega_1 \omega_2^2 - 6\omega_4 \omega_2 - 6\omega_3 \omega_4 - 8\omega_3 \omega_4 \omega_1 \omega_2 + \omega_4^2 \omega_1 - \\
& \omega_3^2 \omega_1 \omega_2 + \omega_4^2 \omega_2 + 5\omega_4 + \omega_3 \omega_4 \omega_1 \omega_2 + \omega_3^2 \omega_4 + 5\omega_1 - 6\omega_4 \omega_1 - \omega_3^2 + \omega_3 \omega_4^2 \omega_1 \omega_2 - \omega_4 \omega_1 \omega_2^2 - 6\omega_3 \omega_2 - \omega_3 \omega_1^2 \omega_2 + \\
& \omega_3^2 \omega_1 - \omega_3 \omega_4 \omega_1^2 + 7\omega_3 \omega_4 \omega_1 - \omega_4^2 + 7\omega_4 \omega_1 \omega_2 + \omega_3 \omega_2^2 - \omega_3 \omega_4 \omega_2 + 5\omega_2 + \omega_4 \omega_1^2 - \omega_3^2 \omega_4 \omega_2 + \omega_3^2 \omega_2 + \omega_3^2 \omega_4 \omega_1 \omega_2 - \omega_1^2,
\end{aligned}$$

## 7 CLBM 1: relaxation of $k_{00}, k_{10}, k_{01}, k_{20}, k_{02}$

### 7.1 Definitions

Matrix  $\mathbf{A} = \mathbf{K}^{-1} \mathbf{S} \mathbf{K}$ :

$$\begin{aligned}
\mathbf{A}_{1,1} &= -\omega_4 v^2 + 2v^2 \omega_2 - u^2 \omega_3 - u^2 \omega_0 + \omega_0 - v^2 \omega_0 + 2u^2 \omega_1, \\
\mathbf{A}_{1,2} &= -2u\omega_1 - \omega_3 - \omega_4 v^2 + 2v^2 \omega_2 - u^2 \omega_3 - u^2 \omega_0 + \omega_0 + 2u\omega_3 - v^2 \omega_0 + 2u^2 \omega_1, \\
\mathbf{A}_{1,3} &= 2\omega_4 v - \omega_4 - \omega_4 v^2 + 2v^2 \omega_2 - u^2 \omega_3 - u^2 \omega_0 + \omega_0 - 2v\omega_2 - v^2 \omega_0 + 2u^2 \omega_1, \\
\mathbf{A}_{1,4} &= 2u\omega_1 - \omega_3 - \omega_4 v^2 + 2v^2 \omega_2 - u^2 \omega_3 - u^2 \omega_0 + \omega_0 - 2u\omega_3 - v^2 \omega_0 + 2u^2 \omega_1, \\
\mathbf{A}_{1,5} &= -2\omega_4 v - \omega_4 - \omega_4 v^2 + 2v^2 \omega_2 - u^2 \omega_3 - u^2 \omega_0 + \omega_0 + 2v\omega_2 - v^2 \omega_0 + 2u^2 \omega_1, \\
\mathbf{A}_{2,1} &= \frac{1}{2}u(\omega_0 - \omega_1(1 + 2u) + u(\omega_3 + \omega_0)), \\
\mathbf{A}_{2,2} &= \frac{1}{2}u\omega_1 + \frac{1}{2}\omega_1 + \frac{1}{2}u\omega_0 + \frac{1}{2}\omega_3 + \frac{1}{2}u^2 \omega_3 + \frac{1}{2}u^2 \omega_0 - u\omega_3 - u^2 \omega_1, \\
\mathbf{A}_{2,3} &= \frac{1}{2}u(\omega_0 - \omega_1(1 + 2u) + u(\omega_3 + \omega_0)), \\
\mathbf{A}_{2,4} &= \frac{1}{2}(\omega_3 - \omega_1(1 + 2u) + u(\omega_3 + \omega_0))(1 + u), \\
\mathbf{A}_{2,5} &= \frac{1}{2}u(\omega_0 - \omega_1(1 + 2u) + u(\omega_3 + \omega_0)), \\
\mathbf{A}_{3,1} &= \frac{1}{2}v(\omega_4 v + (\omega_0 - 2\omega_2)v + \omega_0 - \omega_2), \\
\mathbf{A}_{3,2} &= \frac{1}{2}v(\omega_4 v + (\omega_0 - 2\omega_2)v + \omega_0 - \omega_2), \\
\mathbf{A}_{3,3} &= -\omega_4 v + \frac{1}{2}\omega_4 + \frac{1}{2}v\omega_0 + \frac{1}{2}\omega_4 v^2 - v^2 \omega_2 + \frac{1}{2}v\omega_2 + \frac{1}{2}v^2 \omega_0 + \frac{1}{2}\omega_2, \\
\mathbf{A}_{3,4} &= \frac{1}{2}v(\omega_4 v + (\omega_0 - 2\omega_2)v + \omega_0 - \omega_2), \\
\mathbf{A}_{3,5} &= \frac{1}{2}(1 + v)((\omega_0 - 2\omega_2)v - \omega_2 + (1 + v)\omega_4), \\
\mathbf{A}_{4,1} &= -\frac{1}{2}u(\omega_0 - u(\omega_3 + \omega_0) + (-1 + 2u)\omega_1), \\
\mathbf{A}_{4,2} &= -\frac{1}{2}(\omega_3 - u(\omega_3 + \omega_0) + (-1 + 2u)\omega_1)(-1 + u),
\end{aligned}$$

$$\begin{aligned}
\mathbf{A}_{4,3} &= -\frac{1}{2}u(\omega_0 - u(\omega_3 + \omega_0) + (-1 + 2u)\omega_1), \\
\mathbf{A}_{4,4} &= -\frac{1}{2}u\omega_1 + \frac{1}{2}\omega_1 - \frac{1}{2}u\omega_0 + \frac{1}{2}\omega_3 + \frac{1}{2}u^2\omega_3 + \frac{1}{2}u^2\omega_0 + u\omega_3 - u^2\omega_1, \\
\mathbf{A}_{4,5} &= -\frac{1}{2}u(\omega_0 - u(\omega_3 + \omega_0) + (-1 + 2u)\omega_1), \\
\mathbf{A}_{5,1} &= \frac{1}{2}v(\omega_4v + (\omega_0 - 2\omega_2)v - \omega_0 + \omega_2), \\
\mathbf{A}_{5,2} &= \frac{1}{2}v(\omega_4v + (\omega_0 - 2\omega_2)v - \omega_0 + \omega_2), \\
\mathbf{A}_{5,3} &= \frac{1}{2}((\omega_0 - 2\omega_2)v + \omega_4(-1 + v) + \omega_2)(-1 + v), \\
\mathbf{A}_{5,4} &= \frac{1}{2}v(\omega_4v + (\omega_0 - 2\omega_2)v - \omega_0 + \omega_2), \\
\mathbf{A}_{5,5} &= \omega_4v + \frac{1}{2}\omega_4 - \frac{1}{2}v\omega_0 + \frac{1}{2}\omega_4v^2 - v^2\omega_2 - \frac{1}{2}v\omega_2 + \frac{1}{2}v^2\omega_0 + \frac{1}{2}\omega_2.
\end{aligned}$$

where

$$\mathbf{S} = \text{diag}(\omega_0, \omega_1, \omega_2, \omega_3, \omega_4)$$

and

$$\mathbf{K} = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 \\ -u & 1-u & -u & -u-1 & -u \\ -v & -v & 1-v & -v & -v-1 \\ u^2 & (1-u)^2 & u^2 & (u+1)^2 & u^2 \\ v^2 & v^2 & (1-v)^2 & v^2 & (v+1)^2 \end{pmatrix}$$

Matrix  $\mathbf{B}$ :

$$\begin{aligned}
\mathbf{B}_{1,1} &= 0, \\
\mathbf{B}_{1,2} &= -1 + 2u\omega_1 + \omega_3 - 2u\omega_3, \\
\mathbf{B}_{1,3} &= -1 - 2\omega_4v + \omega_4 + 2v\omega_2, \\
\mathbf{B}_{1,4} &= -1 - 2u\omega_1 + \omega_3 + 2u\omega_3, \\
\mathbf{B}_{1,5} &= -1 + 2\omega_4v + \omega_4 - 2v\omega_2, \\
\mathbf{B}_{2,1} &= -1 + u\omega_1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 - u\omega_3, \\
\mathbf{B}_{2,2} &= 0, \\
\mathbf{B}_{2,3} &= -1 + u\omega_1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 - u\omega_3, \\
\mathbf{B}_{2,4} &= -1 + 2u\omega_1 + \omega_1 - 2u\omega_3, \\
\mathbf{B}_{2,5} &= -1 + u\omega_1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 - u\omega_3, \\
\mathbf{B}_{3,1} &= -1 - \omega_4v + \frac{1}{2}\omega_4 + v\omega_2 + \frac{1}{2}\omega_2, \\
\mathbf{B}_{3,2} &= -1 - \omega_4v + \frac{1}{2}\omega_4 + v\omega_2 + \frac{1}{2}\omega_2, \\
\mathbf{B}_{3,3} &= 0, \\
\mathbf{B}_{3,4} &= -1 - \omega_4v + \frac{1}{2}\omega_4 + v\omega_2 + \frac{1}{2}\omega_2, \\
\mathbf{B}_{3,5} &= -1 - 2\omega_4v + 2v\omega_2 + \omega_2, \\
\mathbf{B}_{4,1} &= -1 - u\omega_1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 + u\omega_3, \\
\mathbf{B}_{4,2} &= -1 - 2u\omega_1 + \omega_1 + 2u\omega_3,
\end{aligned}$$

$$\begin{aligned}
\mathbf{B}_{4,3} &= -1 - u\omega_1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 + u\omega_3, \\
\mathbf{B}_{4,4} &= 0, \\
\mathbf{B}_{4,5} &= -1 - u\omega_1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 + u\omega_3, \\
\mathbf{B}_{5,1} &= -1 + \omega_4 v + \frac{1}{2}\omega_4 - v\omega_2 + \frac{1}{2}\omega_2, \\
\mathbf{B}_{5,2} &= -1 + \omega_4 v + \frac{1}{2}\omega_4 - v\omega_2 + \frac{1}{2}\omega_2, \\
\mathbf{B}_{5,3} &= -1 + 2\omega_4 v - 2v\omega_2 + \omega_2, \\
\mathbf{B}_{5,4} &= -1 + \omega_4 v + \frac{1}{2}\omega_4 - v\omega_2 + \frac{1}{2}\omega_2, \\
\mathbf{B}_{5,5} &= 0.
\end{aligned}$$

## 7.2 EFDE for $\mu_1$

$$\mu_{1,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_t,y+j\delta_t}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_t,y+j\delta_t}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x,-\delta_t,y}^{[\mu_1],t} = 1 - \frac{1}{2}v^2\omega_4 - \frac{1}{2}\omega_2 + \omega_2 v^2 + \frac{1}{2}c_s^2\omega_4 + v\omega_4 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_2 v.$$

$$\alpha_{x-\delta_t,y}^{[\mu_1],t} = 1 - \frac{1}{2}u^2\omega_3 - \frac{1}{2}u\omega_1 + \frac{1}{2}c_s^2\omega_3 - \frac{1}{2}\omega_3 + u^2\omega_1 - \frac{1}{2}\omega_1 + u\omega_3.$$

$$\alpha_{x,y}^{[\mu_1],t} = 1 + u^2\omega_3 + v^2\omega_4 - c_s^2\omega_3 - 2\omega_2 v^2 - c_s^2\omega_4 - 2u^2\omega_1.$$

$$\alpha_{x+\delta_t,y}^{[\mu_1],t} = 1 - \frac{1}{2}u^2\omega_3 + \frac{1}{2}u\omega_1 + \frac{1}{2}c_s^2\omega_3 - \frac{1}{2}\omega_3 + u^2\omega_1 - \frac{1}{2}\omega_1 - u\omega_3.$$

$$\alpha_{x,y+\delta_t}^{[\mu_1],t} = 1 - \frac{1}{2}v^2\omega_4 - \frac{1}{2}\omega_2 + \omega_2 v^2 + \frac{1}{2}c_s^2\omega_4 - v\omega_4 - \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2 v.$$

$$\begin{aligned}
\alpha_{x-\delta_t,y-\delta_t}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{2}uv\omega_4\omega_1 + \frac{1}{2}u\omega_3v^2\omega_4 - \frac{1}{2}c_s^2\omega_3v\omega_4 + \frac{1}{2}\omega_2u^2\omega_1 + \frac{1}{2}\omega_2\omega_3v^2 + \frac{1}{2}u\omega_3\omega_4 + \frac{1}{2}u^2\omega_3 + \frac{1}{2}\omega_2u\omega_1 + \frac{1}{2}c_s^2u\omega_3v + \frac{1}{2}\omega_2u\omega_3 + \frac{1}{2}u^2\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_2v\omega_1 + \frac{1}{2}v^2\omega_4 - \frac{1}{2}c_s^2\omega_3 + \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2\omega_1 - \omega_2u\omega_3v^2 - \frac{1}{4}\omega_2\omega_3v + \frac{1}{2}c_s^2u\omega_4\omega_1 + \frac{1}{2}v\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_3\omega_4 - \frac{1}{4}\omega_3v^2\omega_4 + \frac{1}{2}u^2\omega_3v\omega_4 - \omega_2v^2 + \frac{1}{2}\omega_3v\omega_4 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{4}c_s^2\omega_4\omega_1 + \frac{1}{2}\omega_3 - u^2v\omega_4\omega_1 - \frac{1}{2}c_s^2u\omega_3\omega_4 + \omega_2uv^2\omega_1 - \frac{1}{2}c_s^2\omega_4 - \frac{1}{4}v^2\omega_4\omega_1 + \omega_2u^2v\omega_1 - u^2\omega_1 - \frac{1}{2}uv^2\omega_4\omega_1 + \frac{1}{4}c_s^2\omega_2\omega_3 - \frac{1}{4}\omega_2u^2\omega_3 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{2}\omega_2v^2\omega_1 - \frac{1}{4}u^2\omega_3\omega_4 - v\omega_4 - \frac{1}{4}u\omega_4\omega_1 - u\omega_3v\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3v - \frac{1}{2}\omega_2u^2\omega_3v + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2v - \frac{1}{4}\omega_2u\omega_1 + \frac{1}{2}\omega_1 - u\omega_3,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_t}^{[\mu_1],t-\delta_t} &= -1 + c_s^2\omega_3v\omega_4 + \frac{1}{2}\omega_2v\omega_4 - \omega_2u^2\omega_1 - u^2\omega_3 - u^2\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_2\omega_4 - \frac{1}{2}v^2\omega_4 + c_s^2\omega_3 + \frac{1}{2}\omega_2 - \frac{1}{2}c_s^2\omega_3\omega_4 - u^2\omega_3v\omega_4 + \omega_2v^2 + 2u^2v\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_4 - 2\omega_2u^2v\omega_1 + 2u^2\omega_1 - \frac{1}{2}c_s^2\omega_2\omega_3 + \frac{1}{2}\omega_2u^2\omega_3 + \frac{1}{2}u^2\omega_3\omega_4 - v\omega_4 - c_s^2\omega_2\omega_3v + \omega_2u^2\omega_3v + \frac{1}{2}\omega_4 - \frac{1}{2}\omega_2v^2\omega_4 + \frac{1}{2}\omega_2v,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_t,y-\delta_t}^{[\mu_1],t-\delta_t} &= -1 - \frac{1}{2}uv\omega_4\omega_1 - \frac{1}{2}u\omega_3v^2\omega_4 - \frac{1}{2}c_s^2\omega_3v\omega_4 + \frac{1}{2}\omega_2u^2\omega_1 + \frac{1}{2}\omega_2\omega_3v^2 - \frac{1}{2}u\omega_3\omega_4 + \frac{1}{2}u^2\omega_3 - \frac{1}{2}\omega_2u\omega_1 - \frac{1}{2}c_s^2u\omega_3v - \frac{1}{2}\omega_2u\omega_3 + \frac{1}{2}u^2\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_2v\omega_1 + \frac{1}{2}v^2\omega_4 - \frac{1}{2}c_s^2\omega_3 + \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2\omega_1 + \omega_2u\omega_3v^2 - \frac{1}{4}\omega_2\omega_3v + \frac{1}{2}c_s^2u\omega_4\omega_1 + \frac{1}{2}v\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_3\omega_4 - \frac{1}{4}\omega_3v^2\omega_4 + \frac{1}{2}u^2\omega_3v\omega_4 - \omega_2v^2 + \frac{1}{2}\omega_3v\omega_4 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{4}c_s^2\omega_4\omega_1 + \frac{1}{2}\omega_3 - u^2v\omega_4\omega_1 + \frac{1}{2}c_s^2u\omega_3\omega_4 - \omega_2uv^2\omega_1 - \frac{1}{2}c_s^2\omega_4 - \frac{1}{4}v^2\omega_4\omega_1 + \omega_2u^2v\omega_1 - u^2\omega_1 + \frac{1}{2}uv^2\omega_4\omega_1 + \frac{1}{4}c_s^2\omega_2\omega_3 - \frac{1}{4}\omega_2u^2\omega_3 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{2}\omega_2v^2\omega_1 - \frac{1}{4}u^2\omega_3\omega_4 - v\omega_4 + \frac{1}{4}u\omega_4\omega_1 + u\omega_3v\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3v - \frac{1}{2}\omega_2u^2\omega_3v + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2v + \frac{1}{4}\omega_2u\omega_1 + \frac{1}{2}\omega_1 + u\omega_3,
\end{aligned}$$

$$\alpha_{x-\delta_1,y}^{[\mu_1],t-\delta_t} = -1 - uw_3v^2w_4 - w_2w_3v^2 - \frac{1}{2}u^2w_3 + \frac{1}{2}uw_1 + \frac{1}{2}uw_3w_1 - v^2w_4 + \frac{1}{2}c_s^2w_3 - \frac{1}{2}c_s^2w_3w_1 + 2w_2uw_3v^2 - c_s^2uw_4w_1 - \frac{1}{2}c_s^2w_3w_4 + \frac{1}{2}w_3v^2w_4 + 2w_2v^2 - \frac{1}{2}c_s^2w_4w_1 + \frac{1}{2}w_3 + c_s^2uw_3w_4 - 2w_2uv^2w_1 + c_s^2w_4 + \frac{1}{2}v^2w_4w_1 + u^2w_1 + uv^2w_4w_1 - w_2v^2w_1 - \frac{1}{2}u^2w_3w_1 + \frac{1}{2}w_1 - uw_3,$$

$$\alpha_{x,y}^{[\mu_1],t-\delta_t} = -2 - \omega_3\omega_1 + u^2\omega_3 + c_s^2\omega_2\omega_4 + v^2\omega_4 - c_s^2\omega_3 + \omega_2 + c_s^2\omega_3\omega_1 - \omega_2\omega_4 - 2\omega_2v^2 + \omega_3 - c_s^2\omega_4 - 2u^2\omega_1 + \omega_4 + u^2\omega_3\omega_1 + \omega_2v^2\omega_4 + \omega_1,$$

$$\alpha_{x+\delta_1 y}^{|\mu_1|, t-\delta_t} = -1 + uw_3v^2\omega_4 - \omega_2w_3v^2 - \frac{1}{2}u^2w_3 - \frac{1}{2}uw_1 - \frac{1}{2}uw_3\omega_1 - v^2\omega_4 + \frac{1}{2}c_s^2\omega_3 - \frac{1}{2}c_s^2\omega_3\omega_1 - 2\omega_2uw_3v^2 + c_s^2uw_4\omega_1 - \frac{1}{2}c_s^2\omega_3\omega_4 + \frac{1}{2}\omega_3v^2\omega_4 + 2\omega_2v^2 - \frac{1}{2}c_s^2w_4\omega_1 + \frac{1}{2}\omega_3 - c_s^2uw_3\omega_4 + 2\omega_2uv^2\omega_1 + c_s^2\omega_4 + \frac{1}{2}v^2\omega_4\omega_1 + u^2\omega_1 - uv^2\omega_4\omega_1 - \omega_2v^2\omega_1 - \frac{1}{2}u^2w_3\omega_1 + \frac{1}{2}\omega_1 + uw_3,$$

$$\alpha_{x-\delta_1, y+\delta_1}^{|\mu_1|, t-\delta_t} = -1 - \frac{1}{2}uvw_4w_1 + \frac{1}{2}uw_3v^2w_4 + \frac{1}{2}c_s^2w_3vw_4 + \frac{1}{2}\omega_2u^2w_1 + \frac{1}{2}\omega_2w_3v^2 + \frac{1}{2}uw_3w_4 + \frac{1}{2}u^2w_3 + \frac{1}{2}\omega_1 - \frac{1}{2}\omega_2w_3v + \frac{1}{2}u^2w_4w_1 - \frac{1}{4}w_3w_4 + \frac{1}{4}\omega_2vw_1 + \frac{1}{2}v^2w_4 - \frac{1}{2}c_s^2w_3 + \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2w_1 - \omega_2uw_3v^2 + \frac{1}{4}\omega_2w_3v + \frac{1}{2}c_s^2uw_4w_1 - \frac{1}{2}vw_4w_1 + \frac{1}{2}c_s^2w_3w_4 - \frac{1}{4}w_3v^2w_4 - \frac{1}{2}u^2w_3vw_4 - \omega_2v^2 - \frac{1}{2}w_3vw_4 - \frac{1}{4}\omega_2w_3 + \frac{1}{2}c_s^2w_4w_1 + \frac{1}{2}\omega_3 + u^2vw_4w_1 - \frac{1}{2}c_s^2uw_3w_4 + w_2uv^2w_1 - \frac{1}{2}c_s^2w_4 - \frac{1}{4}v^2w_4w_1 - \omega_2u^2vw_1 - u^2w_1 - \frac{1}{2}uv^2w_4w_1 + \frac{1}{4}c_s^2w_2w_3 - \frac{1}{4}\omega_2u^2w_3 - \frac{1}{4}\omega_4w_1 + \frac{1}{2}\omega_2v^2w_1 - \frac{1}{4}u^2w_3w_4 + vw_4 - \frac{1}{4}uw_4w_1 + uw_3vw_4 - \frac{1}{2}c_s^2w_2w_3v + \frac{1}{2}\omega_2u^2w_3v + \frac{1}{2}w_4 - \frac{1}{2}w_2v - \frac{1}{4}\omega_2w_1 + \frac{1}{2}\omega_1 - uw_3,$$

$$\begin{aligned} \alpha_{x,y+\delta_1}^{[\mu_1],t-\delta_t} = & -1 - c_s^2 \omega_3 v \omega_4 - \frac{1}{2} \omega_2 v \omega_4 - \omega_2 u^2 \omega_1 - u^2 \omega_3 - u^2 \omega_4 \omega_1 - \frac{1}{2} c_s^2 \omega_2 \omega_4 - \frac{1}{2} v^2 \omega_4 + c_s^2 \omega_3 + \frac{1}{2} \omega_2 - \\ & \frac{1}{2} c_s^2 \omega_3 \omega_4 + u^2 \omega_3 v \omega_4 + \omega_2 v^2 - 2 u^2 v \omega_4 \omega_1 + \frac{1}{2} c_s^2 \omega_4 + 2 \omega_2 u^2 v \omega_1 + 2 u^2 \omega_1 - \frac{1}{2} c_s^2 \omega_2 \omega_3 + \frac{1}{2} \omega_2 u^2 \omega_3 + \\ & \frac{1}{2} u^2 \omega_3 \omega_4 + v \omega_4 + c_s^2 \omega_2 \omega_3 v - \omega_2 u^2 \omega_3 v + \frac{1}{2} \omega_4 - \frac{1}{2} \omega_2 v^2 \omega_4 - \frac{1}{2} \omega_2 v, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_i, y+\delta_i}^{[\mu_1], t-\delta_t} = & -1 + \frac{1}{2}uvw_4w_1 - \frac{1}{2}uw_3v^2w_4 + \frac{1}{2}c_s^2w_3vw_4 + \frac{1}{2}\omega_2u^2w_1 + \frac{1}{2}\omega_2w_3v^2 - \frac{1}{2}uw_3w_4 + \frac{1}{2}u^2w_3 - \frac{1}{2}uw_1 + \frac{1}{2}\omega_2uw_3v - \\ & \frac{1}{2}\omega_2uw_3 + \frac{1}{2}u^2w_4w_1 - \frac{1}{4}w_3w_4 + \frac{1}{4}\omega_2vw_1 + \frac{1}{2}v^2w_4 - \frac{1}{2}c_s^2w_3 + \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2w_1 + \omega_2uw_3v^2 + \frac{1}{4}\omega_2w_3v - \frac{1}{2}c_s^2uw_4w_1 - \\ & \frac{1}{2}vw_4w_1 + \frac{1}{2}c_s^2w_3w_4 - \frac{1}{4}w_3v^2w_4 - \frac{1}{2}u^2w_3vw_4 - \omega_2v^2 - \frac{1}{2}w_3vw_4 - \frac{1}{4}\omega_2w_3 + \frac{1}{4}c_s^2w_4w_1 + \frac{1}{2}w_3 + u^2vw_4w_1 + \\ & \frac{1}{2}c_s^2uw_3w_4 - \omega_2uv^2w_1 - \frac{1}{2}c_s^2w_4 - \frac{1}{4}v^2w_4w_1 - \omega_2u^2vw_1 - u^2w_1 + \frac{1}{2}uv^2w_4w_1 + \frac{1}{4}c_s^2w_2w_3 - \frac{1}{4}\omega_2u^2w_3 - \frac{1}{4}\omega_4w_1 + \\ & \frac{1}{2}\omega_2v^2w_1 - \frac{1}{4}u^2w_3w_4 + vw_4 + \frac{1}{4}uw_4w_1 - uw_3vw_4 - \frac{1}{2}c_s^2w_2w_3v + \frac{1}{2}\omega_2u^2w_3v + \frac{1}{2}w_4 - \frac{1}{2}w_2v + \frac{1}{4}\omega_2uw_1 + \frac{1}{2}w_1 + uw_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_1, y-\delta_1}^{[\mu_1], t-2\delta_t} = & 1 - \frac{1}{2}uvw_4w_1 - \frac{1}{4}c_s^2w_3w_4w_1 + \frac{1}{2}uw_3v^2w_4 - \frac{1}{2}c_s^2w_3vw_4 - \frac{1}{4}w_2v^2w_4w_1 - \frac{1}{2}w_2vw_4 + \frac{1}{2}w_2u^2w_1 + \frac{1}{2}w_2w_3v^2 - \\ & \frac{1}{2}w_2u^2w_3vw_1 - \frac{1}{2}uw_3w_4 - \frac{1}{2}c_s^2w_2w_3vw_1 + \frac{1}{2}u^2w_3 - \frac{1}{2}uw_3vw_4w_1 + \frac{1}{4}w_2w_3vw_4 - \frac{1}{2}uw_1 - \frac{1}{2}uw_3w_1 - \frac{1}{2}w_2uw_3v - \\ & \frac{1}{2}w_2uw_3 + \frac{1}{2}u^2w_3vw_4w_1 + \frac{1}{2}u^2w_4w_1 + \frac{1}{4}w_3w_4 + \frac{1}{2}c_s^2w_2w_4 + \frac{1}{4}w_2vw_1 + \frac{1}{2}v^2w_4 - \frac{1}{4}w_2u^2w_3w_1 - \frac{1}{2}c_s^2w_3 - \\ & \frac{1}{4}c_s^2w_2w_3w_1 - \frac{1}{2}w_2 - \frac{1}{2}c_s^2w_2uw_4w_1 + \frac{1}{2}c_s^2w_3w_1 + \frac{1}{2}w_2uvw_4w_1 + \frac{1}{4}w_2w_1 + \frac{1}{2}w_2uw_3v^2w_4 - w_2uw_3v^2 + \frac{1}{4}w_2w_3v + \\ & \frac{1}{2}c_s^2uw_4w_1 - \frac{1}{2}vw_4w_1 + \frac{1}{2}c_s^2w_3w_4 - \frac{1}{4}w_3v^2w_4 - \frac{1}{4}u^2w_3w_4w_1 + \frac{1}{2}u^2w_3vw_4 - \frac{1}{4}c_s^2w_2w_3w_4 - \frac{1}{4}c_s^2w_2w_4w_1 - w_2v^2 - \\ & \frac{1}{2}w_3vw_4 + \frac{1}{4}w_2uw_3w_1 + \frac{1}{2}w_2w_3 + \frac{1}{2}w_2uw_3vw_1 + \frac{1}{4}c_s^2w_4w_1 - \frac{1}{2}w_3 - u^2vw_4w_1 - \frac{1}{2}c_s^2uw_3w_4 - \frac{1}{2}w_2uv^2w_4w_1 + \\ & w_2uv^2w_1 - \frac{1}{2}c_s^2w_4 - \frac{1}{4}v^2w_4w_1 - \frac{1}{2}w_2uw_3vw_4 + \frac{1}{2}c_s^2w_2uw_3w_4 + w_2u^2vw_1 + \frac{1}{4}w_2vvw_4w_1 - u^2w_1 - \frac{1}{4}w_2w_3v^2w_4 + \\ & \frac{1}{2}c_s^2w_3vw_4w_1 - \frac{1}{2}uv^2w_4w_1 + \frac{1}{4}c_s^2w_2w_3 - \frac{1}{4}w_2u^2w_3 + \frac{1}{4}w_4w_1 + \frac{1}{2}w_2v^2w_1 - \frac{1}{4}u^2w_3w_4 + vw_4 + \frac{1}{4}uw_4w_1 + \\ & uw_3vw_4 + \frac{1}{2}c_s^2w_2w_3v - \frac{1}{2}w_2u^2w_3v - \frac{1}{2}w_4 + \frac{1}{2}u^2w_3w_1 + \frac{1}{2}w_2v^2w_4 + \frac{1}{4}uw_3w_4w_1 - \frac{1}{2}w_2v + \frac{1}{4}w_2uw_1 - \frac{1}{2}w_1 + uw_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y-\delta_1}^{[\mu_1],t-2\delta_t} = & 1 - \frac{1}{2}w_3v^2w_4w_1 + c_s^2w_3w_4w_1 + c_s^2w_3vw_4 + w_3w_1 - w_2u^2w_1 - w_2w_3v^2 + w_2u^2w_3vw_1 + c_s^2w_2w_3vw_1 - \\ & u^2w_3 - \frac{1}{2}w_2w_3vw_1 - u^2w_3vw_4w_1 - u^2w_4w_1 + \frac{1}{2}w_3w_4 + \frac{1}{2}w_2vw_1 - \frac{1}{2}v^2w_4 + \frac{1}{2}w_2u^2w_3w_1 + c_s^2w_3 + \\ & \frac{1}{2}c_s^2w_2w_3w_1 - \frac{1}{2}w_2 - c_s^2w_3w_1 + \frac{1}{2}w_2w_1 + \frac{1}{2}w_2w_3v - vw_4w_1 - c_s^2w_3w_4 + \frac{1}{2}w_3v^2w_4 + \frac{1}{2}u^2w_3w_4w_1 - \\ & u^2w_3vw_4 + w_2v^2 - \frac{1}{2}w_3w_4w_1 - w_3vw_4 + \frac{1}{2}w_2w_3 - \frac{1}{2}c_s^2w_4w_1 - w_3 + 2u^2vw_4w_1 + \frac{1}{2}c_s^2w_4 + \frac{1}{2}v^2w_4w_1 - \\ & 2w_2u^2vw_1 - \frac{1}{2}w_2w_3w_1 + 2u^2w_1 - c_s^2w_3vw_4w_1 - \frac{1}{2}c_s^2w_2w_3 + w_3vw_4w_1 + \frac{1}{2}w_2u^2w_3 + \frac{1}{2}w_4w_1 - w_2v^2w_1 + \\ & \frac{1}{2}u^2w_3w_4 + vw_4 - c_s^2w_2w_3v + w_2u^2w_3v - \frac{1}{2}w_4 - u^2w_3w_1 - \frac{1}{2}w_2v - w_1 + w_2w_3v^2w_1, \end{aligned}$$

$$\alpha_{x+\delta_t, y-\delta_t}^{[\mu], t-2\delta_t} = 1 + \frac{1}{2}uvw_4w_1 - \frac{1}{4}c_s^2w_3w_4w_1 - \frac{1}{2}uw_3v^2w_4 - \frac{1}{2}c_s^2w_3vw_4 - \frac{1}{4}\omega_2v^2w_4w_1 - \frac{1}{2}\omega_2vw_4 + \frac{1}{2}\omega_2u^2w_1 + \frac{1}{2}\omega_2w_3v^2 - \frac{1}{2}\omega_2u^2w_3vw_1 + \frac{1}{2}uw_3w_4 - \frac{1}{2}c_s^2w_2w_3vw_1 + \frac{1}{2}u^2w_3 + \frac{1}{2}uw_3vw_4w_1 + \frac{1}{4}\omega_2w_3vw_4 + \frac{1}{2}uw_1 + \frac{1}{2}uw_3w_1 + \frac{1}{2}\omega_2uw_3v + \frac{1}{2}\omega_2uw_3 + \frac{1}{2}u^2w_3vw_4w_1 + \frac{1}{2}u^2w_4w_1 + \frac{1}{4}\omega_3w_4 + \frac{1}{2}c_s^2w_2w_4 + \frac{1}{4}\omega_2vw_1 + \frac{1}{2}v^2w_4 - \frac{1}{4}\omega_2u^2w_3w_1 - \frac{1}{2}c_s^2w_3 - \frac{1}{4}c_s^2w_2w_3w_1 - \frac{1}{2}\omega_2 + \frac{1}{2}c_s^2w_2vw_4w_1 + \frac{1}{2}c_s^2w_3w_1 - \frac{1}{2}\omega_2vw_4w_1 + \frac{1}{4}\omega_2w_1 - \frac{1}{2}\omega_2uw_3v^2w_4 + \omega_2uw_3v^2 + \frac{1}{4}\omega_2w_3v - \frac{1}{2}c_s^2uw_4w_1 - \frac{1}{2}vw_4w_1 + \frac{1}{2}c_s^2w_3w_4 - \frac{1}{4}\omega_3v^2w_4 - \frac{1}{4}u^2w_3w_4w_1 + \frac{1}{2}u^2w_3vw_4 - \frac{1}{4}c_s^2w_2w_3w_4 - \frac{1}{4}c_s^2w_2w_4w_1 - \omega_2v^2 - \frac{1}{2}\omega_3v^2w_4 - \frac{1}{4}\omega_2uw_3w_1 + \frac{1}{4}\omega_2w_3 - \frac{1}{2}\omega_2uw_3vw_1 + \frac{1}{4}c_s^2w_4w_1 - \frac{1}{2}w_3 - u^2vw_4w_1 + \frac{1}{2}c_s^2uw_3w_4 + \frac{1}{2}\omega_2uv^2w_4w_1 - \omega_2uv^2w_1 - \frac{1}{2}c_s^2w_4 - \frac{1}{4}v^2w_4w_1 + \frac{1}{2}\omega_2uw_3vw_4 - \frac{1}{2}c_s^2w_2uw_3w_4 + \omega_2u^2vw_1 + \frac{1}{4}\omega_2vw_4w_1 - u^2w_1 - \frac{1}{4}\omega_2w_3v^2w_4 +$$

$$\begin{aligned}
& \frac{1}{2}c_s^2 w_3 v w_4 w_1 + \frac{1}{2} u v^2 w_4 w_1 + \frac{1}{4} c_s^2 w_2 w_3 - \frac{1}{4} w_2 u^2 w_3 + \frac{1}{4} w_4 w_1 + \frac{1}{2} w_2 v^2 w_1 - \frac{1}{4} u^2 w_3 w_4 + v w_4 - \frac{1}{4} u w_4 w_1 - \\
& u w_3 v w_4 + \frac{1}{2} c_s^2 w_2 w_3 v - \frac{1}{2} w_2 u^2 w_3 v - \frac{1}{2} w_4 + \frac{1}{2} u^2 w_3 w_1 + \frac{1}{2} w_2 v^2 w_4 - \frac{1}{4} u w_3 w_4 w_1 - \frac{1}{2} w_2 v - \frac{1}{4} w_2 u w_1 - \frac{1}{2} w_1 - u w_3, \\
\alpha_{x-\delta_1,y}^{[\mu_1],t-2\delta_t} &= 1 - \frac{1}{2} w_2 w_4 w_1 - u w_3 v^2 w_4 + \frac{1}{2} w_2 v^2 w_4 w_1 - w_2 u^2 w_1 - w_2 w_3 v^2 - u w_3 w_4 - \frac{1}{2} u^2 w_3 - \frac{1}{2} u w_1 - w_2 u w_3 - \\
& u^2 w_4 w_1 + \frac{1}{2} w_3 w_4 - c_s^2 w_2 w_4 - v^2 w_4 + \frac{1}{2} c_s^2 w_3 - w_2 - \frac{1}{2} w_2 u w_4 w_1 + c_s^2 w_2 u w_4 w_1 + \frac{1}{2} w_2 w_1 - w_2 u w_3 v^2 w_4 + \\
& 2 w_2 u w_3 v^2 - c_s^2 u w_4 w_1 - c_s^2 w_3 w_4 + w_2 w_4 + \frac{1}{2} w_3 v^2 w_4 + c_s^2 w_2 w_3 w_4 - \frac{1}{2} w_2 u^2 w_3 w_4 + \frac{1}{2} c_s^2 w_2 w_4 w_1 + \\
& w_2 u^2 w_4 w_1 + 2 w_2 v^2 + \frac{1}{2} w_2 w_3 - \frac{1}{2} c_s^2 w_4 w_1 - \frac{1}{2} w_3 + c_s^2 u w_3 w_4 + w_2 u v^2 w_4 w_1 - 2 w_2 u v^2 w_1 + c_s^2 w_4 + \\
& \frac{1}{2} v^2 w_4 w_1 + w_2 u w_3 w_4 - c_s^2 w_2 u w_3 w_4 + u^2 w_1 + \frac{1}{2} w_2 w_3 v^2 w_4 + u v^2 w_4 w_1 - \frac{1}{2} c_s^2 w_2 w_3 + \frac{1}{2} w_2 u^2 w_3 + \frac{1}{2} w_4 w_1 - \\
& w_2 v^2 w_1 + \frac{1}{2} u^2 w_3 w_4 + \frac{1}{2} u w_4 w_1 - w_4 - w_2 v^2 w_4 + \frac{1}{2} w_2 u w_1 - \frac{1}{2} w_1 - \frac{1}{2} w_2 w_3 w_4 + u w_3, \\
\alpha_{x,y}^{[\mu_1],t-2\delta_t} &= 2 + w_3 v^2 w_4 w_1 - c_s^2 w_3 w_4 w_1 + w_3 w_1 + 2 w_2 u^2 w_1 + 2 w_2 w_3 v^2 + u^2 w_3 + 2 u^2 w_4 w_1 + v^2 w_4 - c_s^2 w_3 - w_2 + \\
& 2 c_s^2 w_3 w_4 + w_2 w_4 - w_3 v^2 w_4 - c_s^2 w_2 w_3 w_4 + w_2 u^2 w_3 w_4 - 2 w_2 u^2 w_4 w_1 - 2 w_2 v^2 + c_s^2 w_4 w_1 - w_3 - c_s^2 w_4 - \\
& v^2 w_4 w_1 - 2 u^2 w_1 + c_s^2 w_2 w_3 - w_2 u^2 w_3 + 2 w_2 v^2 w_1 - u^2 w_3 w_4 - w_4 - w_1 - 2 w_2 w_3 v^2 w_1, \\
\alpha_{x+\delta_1,y}^{[\mu_1],t-2\delta_t} &= 1 - \frac{1}{2} w_2 w_4 w_1 + u w_3 v^2 w_4 + \frac{1}{2} w_2 v^2 w_4 w_1 - w_2 u^2 w_1 - w_2 w_3 v^2 + u w_3 w_4 - \frac{1}{2} u^2 w_3 + \frac{1}{2} u w_1 + w_2 u w_3 - \\
& u^2 w_4 w_1 + \frac{1}{2} w_3 w_4 - c_s^2 w_2 w_4 - v^2 w_4 + \frac{1}{2} c_s^2 w_3 - w_2 + \frac{1}{2} w_2 u w_4 w_1 - c_s^2 w_2 u w_4 w_1 + \frac{1}{2} w_2 w_1 + w_2 u w_3 v^2 w_4 - \\
& 2 w_2 u w_3 v^2 + c_s^2 u w_4 w_1 - c_s^2 w_3 w_4 + w_2 w_4 + \frac{1}{2} w_3 v^2 w_4 + c_s^2 w_2 w_3 w_4 - \frac{1}{2} w_2 u^2 w_3 w_4 + \frac{1}{2} c_s^2 w_2 w_4 w_1 + \\
& w_2 u^2 w_4 w_1 + 2 w_2 v^2 + \frac{1}{2} w_2 w_3 - \frac{1}{2} c_s^2 w_4 w_1 - \frac{1}{2} w_3 - c_s^2 u w_3 w_4 - w_2 u v^2 w_4 w_1 + 2 w_2 u v^2 w_1 + c_s^2 w_4 + \\
& \frac{1}{2} v^2 w_4 w_1 - w_2 u w_3 w_4 + c_s^2 w_2 u w_3 w_4 + u^2 w_1 + \frac{1}{2} w_2 w_3 v^2 w_4 - u v^2 w_4 w_1 - \frac{1}{2} c_s^2 w_2 w_3 + \frac{1}{2} w_2 u^2 w_3 + \frac{1}{2} w_4 w_1 - \\
& w_2 v^2 w_1 + \frac{1}{2} u^2 w_3 w_4 - \frac{1}{2} u w_4 w_1 - w_4 - w_2 v^2 w_4 - \frac{1}{2} w_2 u w_1 - \frac{1}{2} w_1 - \frac{1}{2} w_2 w_3 w_4 - u w_3, \\
\alpha_{x-\delta_1,y+\delta_1}^{[\mu_1],t-2\delta_t} &= 1 + \frac{1}{2} u v w_4 w_1 - \frac{1}{4} c_s^2 w_3 w_4 w_1 + \frac{1}{2} u w_3 v^2 w_4 + \frac{1}{2} c_s^2 w_3 v w_4 - \frac{1}{4} w_2 v^2 w_4 w_1 + \frac{1}{2} w_2 v w_4 + \frac{1}{2} w_2 w_3 v^2 + \\
& \frac{1}{2} w_2 u^2 w_3 v w_1 - \frac{1}{2} u w_3 w_4 + \frac{1}{2} c_s^2 w_2 w_3 v w_1 + \frac{1}{2} u^2 w_3 + \frac{1}{2} u w_3 v w_4 w_1 - \frac{1}{4} w_2 w_3 v w_4 - \frac{1}{2} u w_1 - \frac{1}{2} u w_3 w_1 + \frac{1}{2} w_2 u w_3 v - \\
& \frac{1}{2} w_2 u w_3 - \frac{1}{2} u^2 w_3 v w_4 w_1 + \frac{1}{2} u^2 w_4 w_1 + \frac{1}{4} w_3 w_4 + \frac{1}{2} c_s^2 w_2 w_4 - \frac{1}{4} w_2 v w_1 + \frac{1}{2} v^2 w_4 - \frac{1}{4} w_2 u^2 w_3 w_1 - \frac{1}{2} c_s^2 w_3 - \\
& \frac{1}{2} c_s^2 w_2 w_3 w_1 - \frac{1}{2} w_2 - \frac{1}{2} c_s^2 w_2 u w_4 w_1 + \frac{1}{2} c_s^2 w_3 w_1 - \frac{1}{2} w_2 u v w_4 w_1 + \frac{1}{4} w_2 w_1 + \frac{1}{2} w_2 u w_3 v^2 w_4 - w_2 u w_3 v^2 - \frac{1}{4} w_2 w_3 v + \\
& \frac{1}{2} c_s^2 u w_4 w_1 + \frac{1}{2} v w_4 w_1 + \frac{1}{2} c_s^2 w_3 w_4 - \frac{1}{4} w_3 v^2 w_4 - \frac{1}{4} u^2 w_3 w_4 w_1 - \frac{1}{2} u^2 w_3 v w_4 - \frac{1}{4} c_s^2 w_2 w_3 w_4 - \frac{1}{4} c_s^2 w_2 w_4 w_1 - w_2 v^2 + \\
& \frac{1}{2} w_3 v w_4 + \frac{1}{2} w_2 u w_3 w_1 + \frac{1}{4} w_2 w_3 - \frac{1}{2} w_2 u w_3 v w_1 + \frac{1}{4} c_s^2 w_4 w_1 - \frac{1}{2} w_3 + u^2 w v w_4 w_1 - \frac{1}{2} c_s^2 u w_3 w_4 - \frac{1}{2} w_2 u v^2 w_4 w_1 + \\
& w_2 u v^2 w_1 - \frac{1}{2} c_s^2 w_4 - \frac{1}{4} v^2 w_4 w_1 + \frac{1}{2} w_2 u w_3 v w_4 + \frac{1}{2} c_s^2 w_2 u w_3 w_4 - w_2 u^2 v w_1 - \frac{1}{4} w_2 v w_4 w_1 - u^2 w_1 - \frac{1}{4} w_2 w_3 v^2 w_4 - \\
& \frac{1}{2} c_s^2 w_3 v w_4 w_1 - \frac{1}{2} w_2 v^2 w_4 w_1 + \frac{1}{4} c_s^2 w_2 w_3 - \frac{1}{4} w_2 u^2 w_3 + \frac{1}{4} w_4 w_1 + \frac{1}{2} w_2 v^2 w_1 - \frac{1}{4} u^2 w_3 w_4 - v w_4 + \frac{1}{4} u w_4 w_1 - \\
& u w_3 v w_4 - \frac{1}{2} c_s^2 w_2 w_3 v + \frac{1}{2} w_2 u^2 w_3 v - \frac{1}{2} w_4 + \frac{1}{2} u^2 w_3 w_1 + \frac{1}{2} w_2 v^2 w_4 + \frac{1}{4} u w_3 w_4 w_1 + \frac{1}{2} w_2 v + \frac{1}{4} w_2 u w_1 - \frac{1}{2} w_1 + u w_3, \\
\alpha_{x,y+\delta_1}^{[\mu_1],t-2\delta_t} &= 1 - \frac{1}{2} w_3 v^2 w_4 w_1 + c_s^2 w_3 w_4 w_1 - c_s^2 w_3 v w_4 + w_3 w_1 - w_2 u^2 w_1 - w_2 w_3 v^2 - w_2 u^2 w_3 v w_1 - c_s^2 w_2 w_3 v w_1 - \\
& u^2 w_3 + \frac{1}{2} w_2 w_3 v w_1 + u^2 w_3 v w_4 w_1 - u^2 w_4 w_1 + \frac{1}{2} w_3 w_4 - \frac{1}{2} w_2 w_1 - \frac{1}{2} v^2 w_4 + \frac{1}{2} w_2 u^2 w_3 w_1 + c_s^2 w_3 + \\
& \frac{1}{2} c_s^2 w_2 w_3 w_1 - \frac{1}{2} w_2 - c_s^2 w_3 w_1 + \frac{1}{2} w_2 w_1 - \frac{1}{2} w_2 w_3 v + v w_4 w_1 - c_s^2 w_3 w_4 + \frac{1}{2} w_3 v^2 w_4 + \frac{1}{2} u^2 w_3 w_4 w_1 + \\
& u^2 w_3 v w_4 + w_2 v^2 - \frac{1}{2} w_3 w_4 w_1 + w_3 v w_4 + \frac{1}{2} w_2 w_3 - \frac{1}{2} c_s^2 w_4 w_1 - w_3 - 2 u^2 w v w_4 w_1 + \frac{1}{2} c_s^2 w_2 w_4 + \frac{1}{2} v^2 w_4 w_1 + \\
& 2 w_2 u^2 v w_1 - \frac{1}{2} w_2 w_3 w_1 + 2 u^2 w_1 + c_s^2 w_3 v w_4 w_1 - \frac{1}{2} c_s^2 w_2 w_3 - w_3 v w_4 w_1 + \frac{1}{2} w_2 u^2 w_3 + \frac{1}{2} w_4 w_1 - w_2 v^2 w_1 + \\
& \frac{1}{2} u^2 w_3 w_4 - w_4 + c_s^2 w_2 w_3 v - w_2 u^2 w_3 v - \frac{1}{2} w_4 - u^2 w_3 w_1 + \frac{1}{2} w_2 v - w_1 + w_2 w_3 v^2 w_1, \\
\alpha_{x+\delta_1,y+\delta_1}^{[\mu_1],t-2\delta_t} &= 1 - \frac{1}{2} u v w_4 w_1 - \frac{1}{4} c_s^2 w_3 w_4 w_1 - \frac{1}{2} u w_3 v^2 w_4 + \frac{1}{2} c_s^2 w_3 v w_4 - \frac{1}{4} w_2 v^2 w_4 w_1 + \frac{1}{2} w_2 v w_4 + \frac{1}{2} w_2 w_3 v^2 + \\
& \frac{1}{2} w_2 u^2 w_3 v w_1 + \frac{1}{2} u w_3 w_4 + \frac{1}{2} c_s^2 w_2 w_3 v w_1 + \frac{1}{2} u^2 w_3 - \frac{1}{2} u w_3 v w_4 w_1 - \frac{1}{4} w_2 w_3 v w_4 + \frac{1}{2} u w_1 + \frac{1}{2} u w_3 w_1 - \frac{1}{2} w_2 u w_3 v + \\
& \frac{1}{2} w_2 u w_3 - \frac{1}{2} u^2 w_3 v w_4 w_1 + \frac{1}{2} u^2 w_4 w_1 + \frac{1}{4} w_3 w_4 + \frac{1}{2} c_s^2 w_2 w_4 - \frac{1}{4} w_2 v w_1 + \frac{1}{2} v^2 w_4 - \frac{1}{4} w_2 u^2 w_3 w_1 - \frac{1}{2} c_s^2 w_3 - \\
& \frac{1}{2} c_s^2 w_2 w_3 w_1 - \frac{1}{2} w_2 + \frac{1}{2} c_s^2 w_2 u w_4 w_1 + \frac{1}{2} c_s^2 w_3 w_1 + \frac{1}{2} w_2 u v w_4 w_1 + \frac{1}{4} w_2 w_1 - \frac{1}{2} w_2 u w_3 v^2 w_4 + w_2 u w_3 v^2 - \frac{1}{4} w_2 w_3 v + \\
& \frac{1}{2} c_s^2 u w_4 w_1 + \frac{1}{2} v w_4 w_1 + \frac{1}{2} c_s^2 w_3 w_4 - \frac{1}{4} w_3 v^2 w_4 - \frac{1}{4} u^2 w_3 w_4 w_1 - \frac{1}{2} u^2 w_3 v w_4 - \frac{1}{4} c_s^2 w_2 w_3 w_4 - \frac{1}{4} c_s^2 w_2 w_4 w_1 - w_2 v^2 + \\
& \frac{1}{2} w_3 v w_4 - \frac{1}{4} w_2 u w_3 w_1 + \frac{1}{4} w_2 w_3 + \frac{1}{2} w_2 u w_3 v w_1 + \frac{1}{4} c_s^2 w_4 w_1 - \frac{1}{2} w_3 + u^2 w v w_4 w_1 + \frac{1}{2} c_s^2 u w_3 w_4 + \frac{1}{2} w_2 u v^2 w_4 w_1 - \\
& w_2 u v^2 w_1 - \frac{1}{2} c_s^2 w_4 - \frac{1}{4} v^2 w_4 w_1 - \frac{1}{2} w_2 u w_3 v w_4 - \frac{1}{2} c_s^2 w_2 u w_3 w_4 - w_2 u^2 v w_1 - \frac{1}{4} w_2 v w_4 w_1 - u^2 w_1 - \frac{1}{4} w_2 w_3 v^2 w_4 - \\
& \frac{1}{2} c_s^2 w_3 v w_4 w_1 + \frac{1}{2} w_2 v^2 w_4 w_1 + \frac{1}{4} c_s^2 w_2 w_3 - \frac{1}{4} w_2 u^2 w_3 + \frac{1}{4} w_4 w_1 + \frac{1}{2} w_2 v^2 w_1 - \frac{1}{4} u^2 w_3 w_4 - v w_4 + \frac{1}{4} u w_4 w_1 + \\
& u w_3 v w_4 - \frac{1}{2} c_s^2 w_2 w_3 v + \frac{1}{2} w_2 u^2 w_3 v - \frac{1}{2} w_4 + \frac{1}{2} u^2 w_3 w_1 + \frac{1}{2} w_2 v^2 w_4 - \frac{1}{4} u w_3 w_4 w_1 + \frac{1}{2} w_2 v + \frac{1}{4} w_2 u w_1 - \frac{1}{2} w_1 - u w_3, \\
\alpha_{x,y-\delta_1}^{[\mu_1],t-3\delta_t} &= -1 - \frac{1}{2} w_3 v^2 w_4 w_1 + \frac{1}{2} c_s^2 w_3 w_4 w_1 + \frac{1}{2} w_2 v^2 w_4 w_1 + \frac{1}{2} w_2 v w_4 - w_3 w_1 - w_2 w_3 v^2 + \frac{1}{2} w_2 w_3 v w_1 - \\
& \frac{1}{2} w_2 w_3 v w_4 - \frac{1}{2} c_s^2 w_2 w_3 w_4 w_1 - \frac{1}{2} w_3 w_4 - \frac{1}{2} c_s^2 w_2 w_4 - \frac{1}{2} w_2 v w_1 - \frac{1}{2} v^2 w_4 + \frac{1}{2} w_2 - \frac{1}{2} w_2 w_1 - \frac{1}{2} w_2 w_3 v^2 w_4 w_1 - \\
& \frac{1}{2} w_2 w_3 v + v w_4 w_1 - \frac{1}{2} c_s^2 w_3 w_4 + \frac{1}{2} w_3 v^2 w_4 + \frac{1}{2} c_s^2 w_2 w_3 w_4 + \frac{1}{2} c_s^2 w_2 w_4 w_1 + w_2 v^2 + \frac{1}{2} w_3 w_4 w_1 + w_3 v w_4 - 
\end{aligned}$$

$$\begin{aligned}
& \frac{1}{2}\omega_2\omega_3 - \frac{1}{2}c_s^2\omega_4\omega_1 + \omega_3 + \frac{1}{2}\omega_2\omega_3v\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_4 + \frac{1}{2}v^2\omega_4\omega_1 - \frac{1}{2}\omega_2v\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_3\omega_1 + \frac{1}{2}\omega_2\omega_3v^2\omega_4 - \\
& \omega_3v\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_1 - \omega_2v^2\omega_1 - v\omega_4 + \frac{1}{2}\omega_4 - \frac{1}{2}\omega_2v^2\omega_4 + \frac{1}{2}\omega_2v + \omega_1 + \omega_2\omega_3v^2\omega_1, \\
\alpha_{x-\delta_l,y}^{[\mu_1],t-3\delta_t} &= -1 + \frac{1}{2}\omega_2\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_3\omega_4\omega_1 - \omega_2u^2\omega_1 + u\omega_3\omega_4 - \frac{1}{2}u^2\omega_3 + \frac{1}{2}u\omega_1 + \frac{1}{2}u\omega_3\omega_1 - \frac{1}{2}\omega_2u^2\omega_3\omega_4\omega_1 + \\
& \omega_2u\omega_3 - \frac{1}{2}c_s^2\omega_2\omega_3\omega_4\omega_1 - u^2\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4 + \frac{1}{2}\omega_2u^2\omega_3\omega_1 + \frac{1}{2}c_s^2\omega_3 + \frac{1}{2}c_s^2\omega_2\omega_3\omega_1 + \omega_2 + \frac{1}{2}\omega_2u\omega_4\omega_1 - \\
& \frac{1}{2}c_s^2\omega_3\omega_1 - \frac{1}{2}\omega_2\omega_1 - \frac{1}{2}c_s^2\omega_3\omega_4 - \omega_2\omega_4 + \frac{1}{2}u^2\omega_3\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 - \frac{1}{2}\omega_2u^2\omega_3\omega_4 + \omega_2u^2\omega_4\omega_1 - \\
& \frac{1}{2}u^2\omega_3\omega_1 - \frac{1}{2}\omega_2\omega_3 + \frac{1}{2}\omega_3 - \omega_2u\omega_3\omega_4 + \frac{1}{2}\omega_2u\omega_3\omega_4\omega_1 + u^2\omega_1 - \frac{1}{2}c_s^2\omega_2\omega_3 + \frac{1}{2}\omega_2u^2\omega_3 - \frac{1}{2}\omega_4\omega_1 + \\
& \frac{1}{2}u^2\omega_3\omega_4 - \frac{1}{2}u\omega_4\omega_1 + \omega_4 - \frac{1}{2}u^2\omega_3\omega_1 - \frac{1}{2}u\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_2u\omega_1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_2\omega_3\omega_4 - u\omega_3, \\
\alpha_{x,y}^{[\mu_1],t-3\delta_t} &= -1 + \omega_2\omega_4\omega_1 + \omega_3v^2\omega_4\omega_1 - 2c_s^2\omega_3\omega_4\omega_1 - \omega_2v^2\omega_4\omega_1 - \omega_3\omega_1 + 2\omega_2u^2\omega_1 + 2\omega_2\omega_3v^2 + u^2\omega_3 + \omega_2u^2\omega_3\omega_4\omega_1 + \\
& 2c_s^2\omega_2\omega_3\omega_4\omega_1 + 2u^2\omega_4\omega_1 - \omega_3\omega_4 + c_s^2\omega_2\omega_4 - \omega_2\omega_3\omega_4\omega_1 + v^2\omega_4 - \omega_2u^2\omega_3\omega_1 - c_s^2\omega_2\omega_3\omega_1 + \omega_2 + \\
& c_s^2\omega_3\omega_1 - \omega_2\omega_1 + \omega_2\omega_3v^2\omega_4\omega_1 + 2c_s^2\omega_3\omega_4 - \omega_2\omega_4 - \omega_3v^2\omega_4 - u^2\omega_3\omega_4\omega_1 - 2c_s^2\omega_2\omega_3\omega_4 + \omega_2u^2\omega_3\omega_4 - \\
& c_s^2\omega_2\omega_4\omega_1 - 2\omega_2u^2\omega_4\omega_1 - 2\omega_2v^2 + \omega_3\omega_4\omega_1 - \omega_2\omega_3 + c_s^2\omega_4\omega_1 + \omega_3 - c_s^2\omega_4 - v^2\omega_4\omega_1 + \omega_2\omega_3\omega_1 - 2u^2\omega_1 - \\
& \omega_2\omega_3v^2\omega_4 + c_s^2\omega_2\omega_3 - \omega_2u^2\omega_3 - \omega_4\omega_1 + 2\omega_2v^2\omega_1 - u^2\omega_3\omega_4 + \omega_4 + u^2\omega_3\omega_1 + \omega_2v^2\omega_4 + \omega_1 + \omega_2\omega_3\omega_4 - 2\omega_2\omega_3v^2\omega_1, \\
\alpha_{x+\delta_l,y}^{[\mu_1],t-3\delta_t} &= -1 + \frac{1}{2}\omega_2\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_3\omega_4\omega_1 - \omega_2u^2\omega_1 - u\omega_3\omega_4 - \frac{1}{2}u^2\omega_3 - \frac{1}{2}u\omega_1 - \frac{1}{2}u\omega_3\omega_1 - \frac{1}{2}\omega_2u^2\omega_3\omega_4\omega_1 - \\
& \omega_2u\omega_3 - \frac{1}{2}c_s^2\omega_2\omega_3\omega_4\omega_1 - u^2\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4 + \frac{1}{2}\omega_2u^2\omega_3\omega_1 + \frac{1}{2}c_s^2\omega_3 + \frac{1}{2}c_s^2\omega_2\omega_3\omega_1 + \omega_2 - \frac{1}{2}\omega_2u\omega_4\omega_1 - \\
& \frac{1}{2}c_s^2\omega_3\omega_1 - \frac{1}{2}\omega_2\omega_1 - \frac{1}{2}c_s^2\omega_3\omega_4 - \omega_2\omega_4 + \frac{1}{2}u^2\omega_3\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 - \frac{1}{2}\omega_2u^2\omega_3\omega_4 + \omega_2u^2\omega_4\omega_1 + \\
& \frac{1}{2}u^2\omega_3\omega_1 - \frac{1}{2}\omega_2\omega_3 + \frac{1}{2}\omega_3 + \omega_2u\omega_3\omega_4 - \frac{1}{2}\omega_2u\omega_3\omega_4\omega_1 + u^2\omega_1 - \frac{1}{2}c_s^2\omega_2\omega_3 + \frac{1}{2}\omega_2u^2\omega_3 - \frac{1}{2}\omega_4\omega_1 + \\
& \frac{1}{2}u^2\omega_3\omega_4 + \frac{1}{2}u\omega_4\omega_1 + \omega_4 - \frac{1}{2}u^2\omega_3\omega_1 + \frac{1}{2}u\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_2u\omega_1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_2\omega_3\omega_4 + u\omega_3, \\
\alpha_{x,y+\delta_l}^{[\mu_1],t-3\delta_t} &= -1 - \frac{1}{2}\omega_3v^2\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_2v^2\omega_4\omega_1 - \frac{1}{2}\omega_2v\omega_4 - \omega_3\omega_1 - \omega_2\omega_3v^2 - \frac{1}{2}\omega_2\omega_3v\omega_1 + \\
& \frac{1}{2}\omega_2\omega_3vv\omega_4 - \frac{1}{2}c_s^2\omega_2\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4 - \frac{1}{2}c_s^2\omega_2\omega_4 + \frac{1}{2}\omega_2v\omega_1 - \frac{1}{2}v^2\omega_4 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_3v^2\omega_4\omega_1 + \\
& \frac{1}{2}\omega_2\omega_3v - v\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_3\omega_4 + \frac{1}{2}\omega_3v^2\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_4\omega_1 + \omega_2v^2 + \frac{1}{2}\omega_3\omega_4\omega_1 - \omega_3v\omega_4 - \\
& \frac{1}{2}\omega_2\omega_3 - \frac{1}{2}c_s^2\omega_4\omega_1 + \omega_3 - \frac{1}{2}\omega_2\omega_3v\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_4 + \frac{1}{2}v^2\omega_4\omega_1 + \frac{1}{2}\omega_2v\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_3\omega_1 + \frac{1}{2}\omega_2\omega_3v^2\omega_4 + \\
& \omega_3v\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_1 - \omega_2v^2\omega_1 + v\omega_4 + \frac{1}{2}\omega_4 - \frac{1}{2}\omega_2v^2\omega_4 - \frac{1}{2}\omega_2v + \omega_1 + \omega_2\omega_3v^2\omega_1, \\
\alpha_{x,y}^{[\mu_1],t-4\delta_t} &= 1 - \omega_2\omega_4\omega_1 + \omega_3\omega_1 + \omega_3\omega_4 + \omega_2\omega_3\omega_4\omega_1 - \omega_2 + \omega_2\omega_1 + \omega_2\omega_4 - \omega_3\omega_4\omega_1 + \omega_2\omega_3 - \omega_3 - \omega_2\omega_3\omega_1 + \\
& \omega_4\omega_1 - \omega_4 - \omega_1 - \omega_2\omega_3\omega_4,
\end{aligned}$$

### 7.3 EFDE for $\mu_2$

$$\mu_{2,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_2],t-\ell\delta_t} \mu_{2,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x-\delta_l,y}^{[\mu_1],t} = 1 - \frac{1}{2}u^2\omega_3 - \frac{1}{2}u\omega_1 + \frac{1}{2}c_s^2\omega_3 - \frac{1}{2}\omega_3 + u^2\omega_1 - \frac{1}{2}\omega_1 + u\omega_3.$$

$$\alpha_{x+\delta_l,y}^{[\mu_1],t} = -1 + \frac{1}{2}u^2\omega_3 - \frac{1}{2}u\omega_1 - \frac{1}{2}c_s^2\omega_3 + \frac{1}{2}\omega_3 - u^2\omega_1 + \frac{1}{2}\omega_1 + u\omega_3.$$

$$\begin{aligned}
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + uv\omega_4\omega_1 + \frac{1}{2}u\omega_3v^2\omega_4 + \frac{1}{2}\omega_2\omega_3v^2 + \frac{1}{2}u\omega_3\omega_4 + u\omega_1 + \frac{1}{2}\omega_2u\omega_3v + \frac{1}{2}\omega_2\omega_3\omega_4 - \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_2vv\omega_1 + \\
& \frac{1}{2}v^2\omega_4 + \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2\omega_1 - \omega_2u\omega_3v^2 - \frac{1}{4}\omega_2\omega_3v + \frac{1}{2}c_s^2u\omega_4\omega_1 + \frac{1}{2}v\omega_4\omega_1 + \frac{1}{4}c_s^2\omega_3\omega_4 - \frac{1}{4}\omega_3v^2\omega_4 - \frac{1}{2}\omega_2uv\omega_1 - \\
& \omega_2v^2 + \frac{1}{2}\omega_3v\omega_4 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{4}c_s^2\omega_4\omega_1 + \frac{1}{2}\omega_3 - \frac{1}{2}c_s^2u\omega_3\omega_4 + \omega_2uv^2\omega_1 - \frac{1}{2}c_s^2\omega_4 - \frac{1}{4}v^2\omega_4\omega_1 - \frac{1}{2}uv^2\omega_4\omega_1 - \\
& \frac{1}{4}\omega_4\omega_1 + \frac{1}{2}\omega_2v^2\omega_1 - v\omega_4 - \frac{1}{2}u\omega_4\omega_1 - u\omega_3v\omega_4 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2v + \frac{1}{2}\omega_2u\omega_1 + \frac{1}{2}\omega_1 - u\omega_3,
\end{aligned}$$

$$\begin{aligned}
& \alpha_{x-\delta_1, y-\delta_1}^{[\mu_2], t-\delta_t} = 1 - uvw_4 w_1 - \frac{1}{2} uw_3 w_4 - uw_1 - w_2 uw_3 v - \frac{1}{2} w_2 uw_3 + \frac{1}{4} w_3 w_4 + \frac{1}{2} w_2 v w_1 - \frac{1}{2} w_2 + \frac{1}{4} w_2 w_1 + \frac{1}{2} w_2 w_3 v - \frac{1}{2} v w_4 w_1 + \\ & \quad w_2 uv w_1 - \frac{1}{2} w_3 v w_4 + \frac{1}{4} w_2 w_3 - \frac{1}{2} w_3 + \frac{1}{4} w_4 w_1 + v w_4 + \frac{1}{2} u w_4 w_1 + u w_3 v w_4 - \frac{1}{2} w_4 - w_2 v + \frac{1}{2} w_2 u w_1 - \frac{1}{2} w_1 + u w_3, \\
& \alpha_{x, y-\delta_t}^{[\mu_2], t-\delta_t} = 1 + \frac{1}{2} w_4^2 + w_2 v w_4 + w_2^2 v - \frac{1}{2} w_2 + 2 v^2 w_4^2 + 2 w_2^2 v^2 + \frac{1}{2} w_2 w_4 - 2 v w_4^2 + 3 v w_4 - \frac{3}{2} w_4 - 4 w_2 v^2 w_4 - 3 w_2 v, \\
& \alpha_{x+\delta_1, y-\delta_1}^{[\mu_1], t-\delta_t} = 1 + u v w_4 w_1 + \frac{1}{2} u w_3 v^2 w_4 - \frac{1}{2} w_2 w_3 v^2 + \frac{1}{2} u w_3 w_4 + u w_1 + \frac{1}{2} w_2 u w_3 v + \frac{1}{2} w_2 u w_3 + \frac{1}{4} w_3 w_4 + \frac{1}{4} w_2 v w_1 - \\ & \quad \frac{1}{2} v^2 w_4 - \frac{1}{2} w_2 + \frac{1}{4} w_2 w_1 - w_2 u w_3 v^2 + \frac{1}{4} w_2 w_3 v + \frac{1}{2} c_s^2 u w_4 w_1 - \frac{1}{2} v w_4 w_1 - \frac{1}{4} c_s^2 w_3 w_4 + \frac{1}{4} w_3 v^2 w_4 - \frac{1}{2} w_2 u v w_1 + \\ & \quad w_2 v^2 - \frac{1}{2} w_3 v w_4 + \frac{1}{4} w_2 w_3 - \frac{1}{4} c_s^2 w_4 w_1 - \frac{1}{2} w_3 - \frac{1}{2} c_s^2 u w_3 w_4 + w_2 u v^2 w_1 + \frac{1}{2} c_s^2 w_4 + \frac{1}{4} v^2 w_4 w_1 - \frac{1}{2} u v^2 w_4 w_1 + \\ & \quad \frac{1}{4} w_4 w_1 - \frac{1}{2} w_2 v^2 w_1 + v w_4 - \frac{1}{2} u w_4 w_1 - u w_3 v w_4 - \frac{1}{2} w_4 - \frac{1}{2} w_2 v - \frac{1}{2} w_2 u w_1 - \frac{1}{2} w_1 - u w_3, \\
& \alpha_{x+\delta_1, y-\delta_1}^{[\mu_2], t-\delta_t} = 1 + u v w_4 w_1 + \frac{1}{2} u w_3 w_4 + u w_1 + w_2 u w_3 v + \frac{1}{2} w_2 u w_3 + \frac{1}{4} w_3 w_4 + \frac{1}{2} w_2 v w_1 - \frac{1}{2} w_2 + \frac{1}{4} w_2 w_1 + \frac{1}{2} w_2 w_3 v - \frac{1}{2} v w_4 w_1 - \\ & \quad w_2 u v w_1 - \frac{1}{2} w_3 v w_4 + \frac{1}{4} w_2 w_3 - \frac{1}{2} w_3 + \frac{1}{4} w_4 w_1 + v w_4 - \frac{1}{2} u w_4 w_1 - u w_3 v w_4 - \frac{1}{2} w_4 - w_2 v - \frac{1}{2} w_2 u w_1 - \frac{1}{2} w_1 - u w_3, \\
& \alpha_{x-\delta_1, y}^{[\mu_1], t-\delta_t} = -1 - u w_3 v^2 w_4 - w_2 w_3 v^2 - u^2 w_3 + u w_1 - u^3 w_3^2 - \frac{1}{2} c_s^2 w_3^2 - v^2 w_4 + c_s^2 w_3 - \frac{1}{2} c_s^2 w_3 w_1 + 2 w_2 u w_3 v^2 + \\ & \quad 3 u^3 w_3 w_1 - c_s^2 u w_4 w_1 + \frac{1}{2} u^2 w_3^2 - \frac{1}{2} c_s^2 w_3 w_4 + \frac{1}{2} w_3 v^2 w_4 + 2 w_2 v^2 - \frac{1}{2} c_s^2 w_4 w_1 + \frac{1}{2} w_3 + c_s^2 u w_3 w_4 - 2 w_2 u v^2 w_1 + \\ & \quad c_s^2 w_4 + \frac{1}{2} v^2 w_4 w_1 - c_s^2 u w_3 w_1 - u^2 w_1^2 + 2 u^2 w_1 + u v^2 w_4 w_1 + c_s^2 u w_3^2 - w_2 v^2 w_1 - \frac{1}{2} u^2 w_3 w_1 - 2 u^3 w_1^2 + \frac{1}{2} w_1 - u w_3, \\
& \alpha_{x-\delta_1, y}^{[\mu_2], t-\delta_t} = 1 + \frac{1}{2} w_3 w_1 - 3 u w_1 + u w_3 w_1 + u w_1^2 + 2 u^2 w_3^2 - 2 u w_3 - \frac{3}{2} w_3 + 2 u^2 w_1^2 + \frac{1}{2} w_3^2 - 4 u^2 w_3 w_1 - \frac{1}{2} w_1 + 3 u w_3, \\
& \alpha_{x, y}^{[\mu_1], t-\delta_t} = 3 u w_1 - 2 u w_3 w_1 + 2 u^3 w_3^2 - u w_1^2 - 6 u^3 w_3 w_1 + 2 u w_3^2 + 2 c_s^2 u w_3 w_1 - 2 c_s^2 u w_3^2 + 4 u^3 w_1^2 - 2 u w_3, \\
& \alpha_{x, y}^{[\mu_2], t-\delta_t} = 2 + w_1^2 + w_2^2 - 2 w_2 - 4 v^2 w_4^2 - 4 w_2^2 v^2 - 4 u^2 w_3^2 - 4 u^2 w_1^2 + 8 u^2 w_3 w_1 + 8 w_2 v^2 w_4 - 2 w_1, \\
& \alpha_{x+\delta_1, y}^{[\mu_1], t-\delta_t} = 1 - u w_3 v^2 w_4 + w_2 w_3 v^2 + u^2 w_3 + u w_1 - u^3 w_3^2 + \frac{1}{2} c_s^2 w_3^2 + v^2 w_4 - c_s^2 w_3 + \frac{1}{2} c_s^2 w_3 w_1 + 2 w_2 u w_3 v^2 + \\ & \quad 3 u^3 w_3 w_1 - c_s^2 u w_4 w_1 - \frac{1}{2} u^2 w_3^2 + \frac{1}{2} c_s^2 w_3 w_4 - \frac{1}{2} w_3 v^2 w_4 - 2 w_2 v^2 + \frac{1}{2} c_s^2 w_4 w_1 - \frac{1}{2} w_3 + c_s^2 u w_3 w_4 - 2 w_2 u v^2 w_1 - \\ & \quad c_s^2 w_4 - \frac{1}{2} v^2 w_4 w_1 - c_s^2 u w_3 w_1 + u^2 w_1^2 - 2 u^2 w_1 + u v^2 w_4 w_1 + c_s^2 u w_3^2 + w_2 v^2 w_1 + \frac{1}{2} u^2 w_3 w_1 - 2 u^3 w_1^2 - \frac{1}{2} w_1 - u w_3, \\
& \alpha_{x+\delta_1, y}^{[\mu_2], t-\delta_t} = 1 + \frac{1}{2} w_3 w_1 + 3 u w_1 - u w_3 w_1 - u w_1^2 + 2 u^2 w_3^2 + 2 u w_3 - \frac{3}{2} w_3 + 2 u^2 w_1^2 + \frac{1}{2} w_3^2 - 4 u^2 w_3 w_1 - \frac{1}{2} w_1 - 3 u w_3, \\
& \alpha_{x-\delta_1, y+\delta_1}^{[\mu_1], t-\delta_t} = -1 - u v w_4 w_1 + \frac{1}{2} u w_3 v^2 w_4 + \frac{1}{2} w_2 w_3 v^2 + \frac{1}{2} u w_3 w_4 + u w_1 - \frac{1}{2} w_2 u w_3 v + \frac{1}{2} w_2 u w_3 - \frac{1}{4} w_3 w_4 + \frac{1}{4} w_2 v w_1 + \\ & \quad \frac{1}{2} v^2 w_4 + \frac{1}{2} w_2 - \frac{1}{4} w_2 w_1 - w_2 u w_3 v^2 + \frac{1}{4} w_2 w_3 v + \frac{1}{2} c_s^2 u w_4 w_1 - \frac{1}{2} v w_4 w_1 + \frac{1}{4} c_s^2 w_3 w_4 - \frac{1}{4} w_3 v^2 w_4 + \frac{1}{2} w_2 u v w_1 - \\ & \quad w_2 v^2 - \frac{1}{2} w_3 v w_4 - \frac{1}{4} w_2 w_3 + \frac{1}{4} c_s^2 w_4 w_1 + \frac{1}{2} w_3 - \frac{1}{2} c_s^2 u w_3 w_4 + w_2 u v^2 w_1 - \frac{1}{2} c_s^2 w_4 - \frac{1}{4} v^2 w_4 w_1 - \frac{1}{2} u v^2 w_4 w_1 - \\ & \quad \frac{1}{4} w_4 w_1 + \frac{1}{2} w_2 v^2 w_1 + v w_4 - \frac{1}{2} u w_4 w_1 + u w_3 v w_4 + \frac{1}{2} w_4 - \frac{1}{2} w_2 v - \frac{1}{2} w_2 u w_1 + \frac{1}{2} w_1 - u w_3, \\
& \alpha_{x-\delta_1, y+\delta_1}^{[\mu_2], t-\delta_t} = 1 + u v w_4 w_1 - \frac{1}{2} u w_3 w_4 - u w_1 + w_2 u w_3 v - \frac{1}{2} w_2 u w_3 + \frac{1}{4} w_3 w_4 - \frac{1}{2} w_2 v w_1 - \frac{1}{2} w_2 + \frac{1}{4} w_2 w_1 - \frac{1}{2} w_2 w_3 v + \frac{1}{2} v w_4 w_1 - \\ & \quad w_2 u v w_1 + \frac{1}{2} w_3 v w_4 + \frac{1}{4} w_2 w_3 - \frac{1}{2} w_3 + \frac{1}{4} w_4 w_1 - v w_4 + \frac{1}{2} u w_4 w_1 - u w_3 v w_4 - \frac{1}{2} w_4 + w_2 v + \frac{1}{2} w_2 u w_1 - \frac{1}{2} w_1 + u w_3, \\
& \alpha_{x, y+\delta_1}^{[\mu_2], t-\delta_t} = 1 + \frac{1}{2} w_4^2 - w_2 v w_4 - w_2^2 v - \frac{1}{2} w_2 + 2 v^2 w_4^2 + 2 w_2^2 v^2 + \frac{1}{2} w_2 w_4 + 2 v w_4^2 - 3 v w_4 - \frac{3}{2} w_4 - 4 w_2 v^2 w_4 + 3 w_2 v, \\
& \alpha_{x+\delta_1, y+\delta_1}^{[\mu_1], t-\delta_t} = 1 - u v w_4 w_1 + \frac{1}{2} u w_3 v^2 w_4 - \frac{1}{2} w_2 w_3 v^2 + \frac{1}{2} u w_3 w_4 + u w_1 - \frac{1}{2} w_2 u w_3 v + \frac{1}{2} w_2 u w_3 + \frac{1}{4} w_3 w_4 - \frac{1}{4} w_2 v w_1 - \\ & \quad \frac{1}{2} v^2 w_4 - \frac{1}{2} w_2 + \frac{1}{4} w_2 w_1 - w_2 u w_3 v^2 - \frac{1}{4} w_2 w_3 v + \frac{1}{2} c_s^2 u w_4 w_1 + \frac{1}{2} v w_4 w_1 - \frac{1}{4} c_s^2 w_3 w_4 + \frac{1}{4} w_3 v^2 w_4 + \frac{1}{2} w_2 u v w_1 + \\ & \quad w_2 v^2 + \frac{1}{2} w_3 v w_4 + \frac{1}{4} w_2 w_3 - \frac{1}{4} c_s^2 w_4 w_1 - \frac{1}{2} w_3 - \frac{1}{2} c_s^2 u w_3 w_4 + w_2 u v^2 w_1 + \frac{1}{2} c_s^2 w_4 - \frac{1}{4} v^2 w_4 w_1 - \frac{1}{2} u v^2 w_4 w_1 + \\ & \quad \frac{1}{4} w_4 w_1 - \frac{1}{2} w_2 v^2 w_1 - v w_4 - \frac{1}{2} u w_4 w_1 + u w_3 v w_4 - \frac{1}{2} w_4 + \frac{1}{2} w_2 v - \frac{1}{2} w_2 u w_1 - \frac{1}{2} w_1 - u w_3, \\
& \alpha_{x+\delta_1, y+\delta_1}^{[\mu_2], t-\delta_t} = 1 - u v w_4 w_1 + \frac{1}{2} u w_3 w_4 + u w_1 - w_2 u w_3 v + \frac{1}{2} w_2 u w_3 + \frac{1}{4} w_3 w_4 - \frac{1}{2} w_2 v w_1 - \frac{1}{2} w_2 + \frac{1}{4} w_2 w_1 - \frac{1}{2} w_2 w_3 v + \frac{1}{2} v w_4 w_1 + \\ & \quad w_2 u v w_1 + \frac{1}{2} w_3 v w_4 + \frac{1}{4} w_2 w_3 - \frac{1}{2} w_3 + \frac{1}{4} w_4 w_1 - v w_4 - \frac{1}{2} u w_4 w_1 + u w_3 v w_4 - \frac{1}{2} w_4 + w_2 v - \frac{1}{2} w_2 u w_1 - \frac{1}{2} w_1 - u w_3, \\
& \alpha_{x-\delta_1, y-\delta_1}^{[\mu_1], t-2\delta_t} = 1 - \frac{5}{2} u v w_4 w_1 + \frac{1}{2} w_2 u^2 w_3^2 v - \frac{1}{4} c_s^2 w_3 w_4 w_1 + 4 w_2 u^2 v^2 w_4 w_1 - w_2^2 u v^2 w_1 - \frac{1}{2} c_s^2 w_2 w_3^2 v - \frac{1}{4} u w_4^2 w_1 + \\ & \quad \frac{1}{2} w_3 w_4 v^2 w_4 - \frac{5}{2} c_s^2 w_3 w_4 w_1 - u^2 w_3 v w_4^2 - \frac{1}{4} w_2 v^2 w_4 w_1 + w_2^2 u^2 w_3 v^2 - \frac{1}{2} w_2 v w_4 + \frac{3}{2} w_2 u^2 w_1 + c_s^2 u w_3 v w_4 w_1 + \\ & \quad \frac{1}{2} w_2 w_3 v^2 w_4 - \frac{5}{2} w_2 u^2 w_3 v w_1 - \frac{1}{2} u w_3 w_4 - \frac{1}{2} c_s^2 w_2 w_3 v w_1 + \frac{3}{2} u^2 w_3 + \frac{3}{2} u^3 w_3 w_4 w_1 - \frac{1}{4} c_s^2 w_3 w_4^2 + \frac{1}{4} w_2 w_3 v w_4 - \\ & \quad \frac{3}{2} u w_1 - \frac{1}{2} c_s^2 w_2 w_3 v w_4 - \frac{1}{2} w_2 u w_3 v - \frac{1}{2} w_2 u w_3 + \frac{1}{2} w_2 u^2 w_3 v w_4 - u v^2 w_4^2 w_1 - c_s^2 u w_3^2 v w_4 + \frac{1}{2} u^2 w_3 v w_4 w_1 + \\ & \quad \frac{5}{2} w_2^2 w_4 w_1 + \frac{1}{4} w_3 w_4 - w_2^2 u^2 v w_1 - \frac{1}{2} c_s^2 w_2^2 w_3 v + \frac{1}{2} c_s^2 w_2 w_4 + u^3 w_3^2 + \frac{1}{4} w_2 v w_1 + \frac{1}{4} u^2 w_3^2 w_4 + \frac{1}{2} c_s^2 w_3^2 - w_2 u^3 w_1^2 +
\end{aligned}$$

$$\begin{aligned}
& \frac{1}{2}v^2\omega_4 - \frac{1}{4}\omega_2u^2\omega_3\omega_1 - \frac{3}{2}c_s^2\omega_3 - \frac{1}{4}c_s^2\omega_2\omega_3\omega_1 - \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2u\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_2u\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_3\omega_1 + \frac{1}{4}\omega_2\omega_1 - \\
& \frac{1}{2}\omega_2u\omega_3v^2\omega_4 - \omega_2u\omega_3v^2 - c_s^2\omega_2^2\omega_3v^2 - 3u^3\omega_3\omega_1 - \frac{1}{2}u^2\omega_4\omega_1 + \frac{1}{4}\omega_2\omega_3v - \frac{1}{2}\omega_2u^2\omega_1^2 + \frac{1}{2}c_s^2u\omega_4\omega_1 - \frac{1}{2}v\omega_4\omega_1 - \\
& \frac{1}{2}u^2\omega_3^2 + \frac{3}{2}c_s^2\omega_3\omega_4 - \frac{1}{4}\omega_3v^2\omega_4 - 2\omega_2u^3v\omega_1 - \frac{1}{4}u^2\omega_3\omega_4\omega_1 + \frac{5}{2}u^2\omega_3v\omega_4 + 3\omega_2u^3\omega_3v\omega_1 + c_s^2\omega_3v\omega_4^2 - \\
& \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 + 2\omega_2u\omega_1 + \frac{1}{2}c_s^2u\omega_3^2\omega_4 + \frac{1}{4}\omega_2u^2\omega_3\omega_4 + \frac{1}{2}\omega_2^2u^2\omega_3v + 2u^2v\omega_4^2\omega_1 - c_s^2\omega_2u\omega_3v\omega_1 - \frac{1}{4}c_s^2\omega_3\omega_4\omega_1 - \\
& \frac{1}{2}\omega_2u^2\omega_4\omega_1 - \omega_2v^2 - \frac{1}{2}u^3\omega_3^2\omega_4 + 2u^3v\omega_4\omega_1^2 - \frac{1}{2}\omega_3v\omega_4 - \frac{1}{4}c_s^2\omega_3^2\omega_4 - \frac{1}{2}c_s^2\omega_2u\omega_3\omega_1 + \frac{1}{4}\omega_2\omega_3 + \frac{1}{4}c_s^2\omega_4\omega_1 - \\
& \frac{1}{2}\omega_3 - 5u^2v\omega_4\omega_1 - \frac{1}{2}c_s^2u\omega_3\omega_4 + \frac{3}{2}\omega_2u^2v\omega_4\omega_1 + \omega_2u\omega_1^2 - c_s^2\omega_3v^2\omega_4^2 - \frac{1}{2}c_s^2\omega_4 - \frac{1}{4}v^2\omega_4\omega_1 + \frac{1}{4}u^2\omega_3\omega_4^2 + \\
& c_s^2u\omega_3\omega_1 - \frac{1}{2}\omega_2u\omega_3v\omega_4 - 2u^2v^2\omega_4^2\omega_1 - \frac{1}{2}u^2\omega_3^2v\omega_4 - \omega_2u^3\omega_3^2v + u^2\omega_1^2 + \frac{1}{2}c_s^2\omega_2u\omega_3\omega_4 + 5\omega_2u^2v\omega_1 + \\
& \frac{1}{4}\omega_2u^2\omega_3^2 - \frac{1}{4}c_s^2\omega_2\omega_3^2 + \frac{1}{4}\omega_2v\omega_4\omega_1 + 2c_s^2\omega_2\omega_3v^2\omega_4 - \omega_2u^2v\omega_1^2 - 3u^2\omega_1 + \frac{1}{2}c_s^2\omega_3^2v\omega_4 - \frac{1}{4}\omega_2\omega_3v^2\omega_4 - \\
& 2\omega_2^2u^2v^2\omega_1 - \omega_2u^2v\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_3v\omega_4\omega_1 + c_s^2\omega_2u\omega_3^2v - \frac{1}{2}u^2\omega_4^2\omega_1 - \frac{1}{2}uv^2\omega_4\omega_1 + \frac{3}{4}c_s^2\omega_2\omega_3 - c_s^2\omega_3^2 - \\
& \frac{3}{4}\omega_2u^2\omega_3 - 2\omega_2u^2\omega_3v^2\omega_4 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{2}\omega_2v^2\omega_1 - \frac{5}{4}u^2\omega_3\omega_4 + \frac{1}{2}c_s^2\omega_2u\omega_3^2 + u^3\omega_3^2v\omega_4 + v\omega_4 + \frac{5}{4}u\omega_4\omega_1 + \\
& u\omega_3v\omega_4 - \frac{1}{2}\omega_2u\omega_1 + \frac{5}{2}c_s^2\omega_2\omega_3v - \frac{5}{2}\omega_2u^2\omega_3v - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_2u^3\omega_3^2 + uv\omega_4^2\omega_1 + \frac{1}{2}u^2\omega_3\omega_1 + \frac{1}{2}\omega_2v^2\omega_4 - u^3\omega_4\omega_1^2 - \\
& \frac{1}{2}c_s^2u\omega_3\omega_4\omega_1 + u^2v\omega_4\omega_1^2 + 2u^3\omega_1^2 + u^2\omega_3v^2\omega_4^2 + \frac{3}{2}\omega_2u^3\omega_3\omega_1 - \frac{1}{2}\omega_2v + \frac{3}{4}u\omega_3v\omega_4\omega_1 - \frac{1}{2}\omega_1 + u\omega_3,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_2], t-2\delta_t} = & -2 + \frac{1}{4}\omega_2\omega_4\omega_1 + 6uv\omega_4\omega_1 - \frac{1}{2}\omega_4^2 + 2\omega_2u^2\omega_3^2v + 2\omega_2uv^2\omega_1 + \frac{1}{2}u\omega_4^2\omega_1 + \omega_2uv\omega_1^2 - 2\omega_2v^2\omega_4\omega_1 - \omega_2v\omega_4 - \frac{1}{2}\omega_3\omega_1 - \\
& \omega_2^2v - 4\omega_2u^2\omega_3v\omega_1 + 3u\omega_3\omega_4 + \omega_2^2v^2\omega_1 + \frac{1}{2}\omega_2\omega_3v\omega_1 + \omega_3v^2\omega_4^2 - u\omega_3v\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_3v\omega_4 + 4u\omega_1 - u\omega_3\omega_1 + \\
& 6\omega_2u\omega_3v + 2\omega_2u\omega_3 + 2uv^2\omega_2^2\omega_1 + 4u^2\omega_3v\omega_4\omega_1 + 2u\omega_3^2v\omega_4 - \frac{3}{2}\omega_3\omega_4 + \frac{1}{4}u\omega_4^2\omega_1 - 2\omega_2v\omega_1 + u^2\omega_3^2\omega_4 - 2\omega_2u^2\omega_3\omega_1 + \\
& v^2\omega_4^2\omega_1 - \frac{1}{2}\omega_3^2v\omega_4 + \omega_2 + \frac{1}{2}\omega_2u\omega_4\omega_1 - 2v^2\omega_4^2 - u\omega_1^2 + \omega_2uv\omega_4\omega_1 - \frac{1}{2}\omega_2\omega_1 + 4\omega_2u\omega_3v^2\omega_4 - \omega_2u\omega_3^2 + \frac{1}{4}\omega_3\omega_4^2 + \\
& u^2\omega_4\omega_1^2 - 3\omega_2\omega_3v + \omega_2u^2\omega_1^2 - 2\omega_2^2v^2 + 2v\omega_4\omega_1 - 2u^2\omega_3^2 - \frac{1}{2}u\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_4 - uv\omega_4\omega_1^2 - 2u\omega_3v^2\omega_4^2 - 2u^2\omega_3\omega_4\omega_1 - \\
& 6\omega_2u\omega_1 + \frac{1}{2}\omega_2u\omega_1^2 + \frac{1}{2}\omega_2\omega_3^2v + \frac{1}{4}\omega_3\omega_4\omega_1 + 3\omega_3v\omega_4 + \frac{1}{2}\omega_2u\omega_3\omega_1 - \omega_2\omega_3 + \omega_2u\omega_3v\omega_1 - v\omega_4^2\omega_1 + 2u\omega_3^2 + \\
& 2u\omega_3v\omega_4^2 + \frac{1}{2}u\omega_4\omega_1^2 + 2\omega_3 - 4\omega_2u\omega_1^2v\omega_4\omega_1 + 2v\omega_4^2 + \frac{1}{2}\omega_2\omega_3v - \omega_2u\omega_3v\omega_4 - \omega_2^2u\omega_3v - \frac{1}{2}\omega_2u\omega_3\omega_4 - 2u^2\omega_3^2v\omega_4 - \\
& 2u^2\omega_1^2 + \omega_2u^2\omega_3^2 + \frac{1}{2}\omega_2v\omega_4\omega_1 - 2\omega_2^2u\omega_3v^2 + 2\omega_2u^2v\omega_1^2 + \frac{1}{4}\omega_2\omega_3v^2\omega_4 + \frac{1}{4}\omega_3\omega_4 - 2\omega_2u\omega_3^2v - \\
& \frac{1}{2}\omega_3v\omega_4\omega_1 - \omega_4\omega_1 - 4v\omega_4 + \omega_2^2\omega_3v^2 - 3u\omega_4\omega_1 - 6u\omega_3v\omega_4 + \omega_2^2u\omega_1 - \frac{1}{2}\omega_3^2 + 2\omega_4 - 2uv\omega_4^2\omega_1 + 4u^2\omega_3\omega_1 + \\
& 4\omega_2v^2\omega_4 - 2u^2v\omega_4\omega_1^2 + \frac{1}{2}\omega_3\omega_4\omega_1 + 4\omega_2v - 2\omega_2u\omega_1 + \omega_1 + \frac{1}{4}\omega_2\omega_3\omega_4 - \omega_3v\omega_4^2 - 4u\omega_3 - u\omega_3^2\omega_4 + \frac{1}{4}\omega_2\omega_3^2 + \frac{1}{2}\omega_2\omega_3v\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_1], t-2\delta_t} = & -4uv\omega_4\omega_1 - u\omega_3v^2\omega_4 - \omega_2uv\omega_1^2 - 2c_s^2u\omega_3v\omega_4\omega_1 - u\omega_3\omega_4 - 3u\omega_3v\omega_4\omega_1 - 4u\omega_1 + \\
& 3u\omega_3\omega_1 - \omega_2u\omega_3v - \omega_2u\omega_3 + 2c_s^2u\omega_3^2v\omega_4 - 2u\omega_3^2v\omega_4 - 2u^3\omega_3^2 + 2\omega_2u^3\omega_1^2 + u\omega_1^2 + 2\omega_2u\omega_3v^2 + \omega_2u\omega_3^2 + \\
& 6u^3\omega_3\omega_1 - c_s^2u\omega_4\omega_1 + 2\omega_2u\omega_3v^2\omega_1 + 4\omega_2u^3v\omega_1^2 + uv\omega_4\omega_1^2 - 6\omega_2u^3\omega_3v\omega_1 + 3\omega_2u\omega_1 - 2c_s^2u\omega_3^2\omega_4 + \\
& 2c_s^2\omega_2u\omega_3v\omega_1 - \frac{1}{2}\omega_2u\omega_1^2 + u^3\omega_3^2\omega_4 - 4u^3v\omega_4\omega_1^2 + c_s^2\omega_2u\omega_3\omega_1 - \frac{3}{2}\omega_2u\omega_3\omega_1 - 2\omega_2u\omega_3v\omega_1 - 2u\omega_3^2 - \\
& \frac{1}{2}u\omega_4\omega_1^2 + c_s^2u\omega_3\omega_4 - 2\omega_2u^2\omega_1^2 - 2c_s^2u\omega_3\omega_1 + 2\omega_2u^3\omega_3^2v - 2\omega_2u\omega_3^2v^2 - 2c_s^2\omega_2u\omega_3^2v + u\omega_3^2v^2\omega_4 + \\
& uv^2\omega_4\omega_1 + \omega_2u\omega_3^2v + 2c_s^2u\omega_3^2 - u\omega_3v^2\omega_4\omega_1 - c_s^2\omega_2u\omega_3^2 - 2u^3\omega_3^2v\omega_4 + 2u\omega_4\omega_1 + 2u\omega_3v\omega_4 + \omega_2u^3\omega_3^2 + \\
& 2u^3\omega_4\omega_1^2 + 2c_s^2u\omega_3\omega_4\omega_1 - 4u^3\omega_1^2 - \frac{3}{2}u\omega_3\omega_4\omega_1 - 3\omega_2u^3\omega_3\omega_1 + 2\omega_2u\omega_1 + 6u^3\omega_3v\omega_4\omega_1 + 2u\omega_3 + u\omega_3^2\omega_4,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,\delta_l, y-\delta_l}^{[\mu_2], t-2\delta_t} = & -2 - 4\omega_2u^2\omega_3^2v - \omega_3\omega_1 + 8\omega_2u^2\omega_3v\omega_1 - v\omega_4\omega_1^2 + \omega_2\omega_3v\omega_1 + \frac{1}{2}\omega_2\omega_1^2 - 8u^2\omega_3v\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4 - \\
& 3\omega_2v\omega_1 - 2u^2\omega_3^2\omega_4 - \omega_1^2 + \omega_2v\omega_1^2 + 4\omega_2u^2\omega_3\omega_1 + \omega_2 - \frac{3}{2}\omega_2\omega_1 - 2u^2\omega_4\omega_1^2 - \omega_2\omega_3v - 2\omega_2u^2\omega_1^2 + 3v\omega_4\omega_1 + \\
& 4u^2\omega_3^2 + 4u^2\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1 + w_3v\omega_4 - \frac{1}{2}\omega_2\omega_3 + \omega_3 + \frac{1}{2}\omega_4\omega_1^2 + 4u^2\omega_3^2v\omega_4 + 4u^2\omega_1^2 - 2\omega_2u^2\omega_3^2 - \\
& 4\omega_2u^2v\omega_1^2 + \frac{1}{2}\omega_2\omega_3\omega_1 - \omega_3v\omega_4\omega_1 - \frac{3}{2}\omega_4\omega_1 - 2v\omega_4 + \omega_4 - 8u^2\omega_3\omega_1 + 4u^2v\omega_4\omega_1^2 + 2\omega_2v + 3\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l, y-\delta_l}^{[\mu_1], t-2\delta_t} = & -1 - \frac{5}{2}uv\omega_4\omega_1 - \frac{1}{2}\omega_2u^2\omega_3^2v + \frac{1}{4}c_s^2\omega_3\omega_4\omega_1 - 4\omega_2u^2v^2\omega_4\omega_1 - \omega_2^2uv^2\omega_1 + \frac{1}{2}c_s^2\omega_2\omega_3^2v - \frac{1}{4}u\omega_4^2\omega_1 + \\
& \frac{1}{2}u\omega_3v^2\omega_4 + \frac{5}{2}c_s^2\omega_3v\omega_4 + u^2\omega_3v\omega_4^2 + \frac{1}{4}\omega_2v^2\omega_4\omega_1 - \omega_2^2u^2\omega_3v^2 + \frac{1}{2}\omega_2v\omega_4 - \frac{3}{2}\omega_2u^2\omega_1 + c_s^2u\omega_3v\omega_4\omega_1 - \\
& \frac{1}{2}\omega_2\omega_3v^2 + \frac{1}{2}\omega_2u^2\omega_3v\omega_1 - \frac{1}{2}u\omega_3\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3v\omega_1 - \frac{3}{2}u^2\omega_3 + \frac{3}{2}u^3\omega_3\omega_4\omega_1 + \frac{1}{4}c_s^2\omega_3\omega_4^2 - \frac{1}{4}\omega_2\omega_3v\omega_4 - \\
& \frac{3}{2}u\omega_1 + \frac{1}{2}c_s^2\omega_2\omega_3v\omega_4 - \frac{1}{2}\omega_2u\omega_3v - \frac{1}{2}\omega_2u^2\omega_3v\omega_4 - uv^2\omega_4\omega_1 - c_s^2u\omega_3^2v\omega_4 - \frac{1}{2}u\omega_3v\omega_4\omega_1 - \\
& \frac{5}{2}u^2\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4 + \omega_2^2u^2v\omega_1 + \frac{1}{2}c_s^2\omega_2\omega_3v - \frac{1}{2}c_s^2\omega_2\omega_4 + u^3\omega_3^2 - \frac{1}{4}\omega_2v\omega_1 - \frac{1}{4}u^2\omega_3^2\omega_4 - \frac{1}{2}c_s^2\omega_3^2 - \omega_2u^3\omega_1^2 - \\
& \frac{1}{2}v^2\omega_4 + \frac{1}{4}\omega_2u^2\omega_3\omega_1 + \frac{3}{2}c_s^2\omega_3 + \frac{1}{4}c_s^2\omega_2\omega_3\omega_1 + \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2u\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_2u\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_3\omega_1 - \frac{1}{4}\omega_2\omega_1 + \\
& \frac{1}{2}\omega_2u\omega_3v^2\omega_4 - \omega_2u\omega_3v^2 + c_s^2\omega_2\omega_3v^2 - 3u^3\omega_3\omega_1 + \frac{1}{2}u^2\omega_4\omega_1^2 - \frac{1}{4}\omega_2\omega_3v + \frac{1}{2}\omega_2u^2\omega_1^2 + \frac{1}{2}c_s^2u\omega_4\omega_1 + \frac{1}{4}v\omega_4\omega_1 + \\
& \frac{1}{2}u^2\omega_3^2 - \frac{3}{2}c_s^2\omega_3\omega_4 + \frac{1}{4}\omega_3v^2\omega_4 - 2\omega_2u^3v\omega_1 + \frac{1}{4}u^2\omega_3\omega_4\omega_1 - \frac{5}{2}u^2\omega_3v\omega_4 + 3\omega_2u^3\omega_3v\omega_1 - c_s^2\omega_3v\omega_4^2 + \\
& \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 + 2\omega_2u\omega_1 + \frac{1}{2}c_s^2u\omega_3^2\omega_4 - \frac{1}{4}\omega_2u^2\omega_3\omega_4 - \frac{1}{2}\omega_2^2u^2\omega_3v - 2u^2v\omega_4\omega_1 - c_s^2\omega_2u\omega_3v\omega_1 + \frac{1}{4}c_s^2\omega_2\omega_4\omega_1 + \\
& \frac{1}{2}\omega_2u^2\omega_4\omega_1 + \omega_2v^2 - \frac{1}{2}u^3\omega_3^2\omega_4 + 2u^3v\omega_4\omega_1^2 + \frac{1}{2}\omega_3v\omega_4 + \frac{1}{4}c_s^2\omega_3\omega_4^2 - \frac{1}{2}c_s^2\omega_2u\omega_3\omega_1 - \frac{1}{4}\omega_2\omega_3 - \frac{1}{4}c_s^2\omega_4\omega_1 + \\
& \frac{1}{2}\omega_3 + 5u^2v\omega_4\omega_1 - \frac{1}{2}c_s^2u\omega_3\omega_4 + \frac{3}{2}\omega_2u^2v\omega_4\omega_1 + \omega_2u\omega_1^2 + c_s^2\omega_3v^2\omega_4^2 + \frac{1}{2}c_s^2\omega_4\omega_1 + \frac{1}{4}v^2\omega_4\omega_1 - \frac{1}{4}u^2\omega_3\omega_4^2 + \\
& c_s^2u\omega_3\omega_1 - \frac{1}{2}\omega_2u\omega_3v\omega_4 + 2u^2v^2\omega_4\omega_1 + \frac{1}{2}u^2\omega_3^2v\omega_4 - \omega_2u^3\omega_3^2v - u^2\omega_1^2 + \frac{1}{2}c_s^2\omega_2u\omega_3\omega_4 - 5\omega_2u^2v\omega_1 -
\end{aligned}$$

$$\begin{aligned} & \frac{1}{4}\omega_2 u^2 \omega_3^2 + \frac{1}{4}c_s^2 \omega_2 \omega_3^2 - \frac{1}{4}\omega_2 v \omega_4 \omega_1 - 2c_s^2 \omega_2 \omega_3 v^2 \omega_4 + \omega_2 u^2 v \omega_1^2 + 3u^2 \omega_1 - \frac{1}{2}c_s^2 \omega_3^2 v \omega_4 + \frac{1}{4}\omega_2 \omega_3 v^2 \omega_4 + \\ & 2\omega_2^2 u^2 v^2 \omega_1 + \omega_2 u^2 v \omega_4 \omega_1 - \frac{1}{2}c_s^2 \omega_3 v \omega_4 \omega_1 + c_s^2 \omega_2 u \omega_3^2 v + \frac{1}{2}u^2 \omega_4^2 \omega_1 - \frac{1}{2}uv^2 \omega_4 \omega_1 - \frac{3}{4}c_s^2 \omega_2 \omega_3 - c_s^2 u \omega_3^2 + \\ & \frac{3}{4}\omega_2 u^2 \omega_3 + 2\omega_2 u^2 \omega_3 v^2 \omega_4 - \frac{1}{4}\omega_4 \omega_1 - \frac{1}{2}\omega_2 v^2 \omega_1 + \frac{5}{4}u^2 \omega_3 \omega_4 + \frac{1}{2}c_s^2 \omega_2 \omega_3^2 + u^3 \omega_3^2 v \omega_4 - v \omega_4 + \frac{5}{4}u \omega_4 \omega_1 + \\ & u \omega_3 v \omega_4 - \frac{1}{2}\omega_2^2 u v \omega_1 - \frac{5}{2}c_s^2 \omega_2 \omega_3 v + \frac{5}{2}\omega_2 u^2 \omega_3 v + \frac{1}{2}\omega_4 - \frac{1}{2}\omega_2 u^3 \omega_3^2 + u v \omega_4^2 \omega_1 - \frac{1}{2}u^2 \omega_3 \omega_1 - \frac{1}{2}\omega_2 v^2 \omega_4 - u^3 \omega_4 \omega_1^2 - \\ & \frac{1}{2}c_s^2 u \omega_3 \omega_4 \omega_1 - u^2 v \omega_4 \omega_1^2 + 2u^3 \omega_1^2 - u^2 \omega_3 v^2 \omega_4^2 + \frac{3}{2}\omega_2 u^3 \omega_3 \omega_1 + \frac{1}{2}\omega_2 v + \frac{3}{4}\omega_2 u \omega_1 - 3u^3 \omega_3 v \omega_4 \omega_1 + \frac{1}{2}\omega_1 + u \omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_t, y-\delta_t}^{[\mu_2], t-2\delta_t} = & -2 + \frac{1}{4}\omega_2 \omega_4 \omega_1 - 6u v \omega_4 \omega_1 - \frac{1}{2}\omega_4^2 + 2\omega_2 u^2 \omega_3^2 v - 2\omega_2^2 u v^2 \omega_1 - \frac{1}{2}u \omega_4^2 \omega_1 - \omega_2 u v \omega_1^2 - 2\omega_2 v^2 \omega_4 \omega_1 - \omega_2 v \omega_4 - \frac{1}{2}\omega_3 \omega_1 - \\ & \omega_2^2 v - 4\omega_2 u^2 \omega_3 v \omega_1 - 3u \omega_3 \omega_4 + \omega_2^2 v^2 \omega_1 + \frac{1}{2}\omega_2 \omega_3 v \omega_1 + \omega_3 v^2 \omega_4^2 + u \omega_3 v \omega_4 \omega_1 + \frac{1}{2}\omega_2 \omega_3 v \omega_4 - 4u \omega_1 + u \omega_3 \omega_1 - \\ & 6\omega_2 u \omega_3 v - 2\omega_2 u \omega_3 - 2u v^2 \omega_4^2 \omega_1 + 4u^2 \omega_3 v \omega_4 \omega_1 - 2u \omega_3^2 v \omega_4 - \frac{3}{2}\omega_3 \omega_4 + \frac{1}{4}\omega_4^2 \omega_1 - 2\omega_2 v \omega_1 + u^2 \omega_3^2 \omega_4 - 2\omega_2 u^2 \omega_3 \omega_1 + \\ & v^2 \omega_4^2 \omega_1 - \frac{1}{2}\omega_3^2 v \omega_4 + \omega_2 - \frac{1}{2}\omega_2 u \omega_4 \omega_1 - 2v^2 \omega_4^2 + u \omega_1^2 - \omega_2 u v \omega_4 \omega_1 - \frac{1}{2}\omega_2 \omega_1 - 4\omega_2 u \omega_3 v^2 \omega_4 + \omega_2 u \omega_3^2 + \frac{1}{4}\omega_3 \omega_4^2 + \\ & u^2 \omega_4 \omega_1^2 - 3\omega_2 \omega_3 v + \omega_2 u^2 \omega_3^2 - 2\omega_2^2 v^2 + 2v \omega_4 \omega_1 - 2u^2 \omega_3^2 + \frac{1}{2}u \omega_3 \omega_4^2 - \frac{1}{2}\omega_2 \omega_4 + u v \omega_4 \omega_1^2 + 2u \omega_3 v^2 \omega_4^2 - 2u^2 \omega_3 \omega_4 \omega_1 + \\ & 6\omega_2 u v \omega_1 - \frac{1}{2}\omega_2 u \omega_1^2 + \frac{1}{2}\omega_2 \omega_3^2 v + \frac{1}{4}\omega_3 \omega_4 \omega_1 + 3\omega_3 v \omega_4 - \frac{1}{2}\omega_2 u \omega_3 \omega_1 - \omega_2 \omega_3 - \omega_2 u \omega_3 v \omega_1 - v \omega_4^2 \omega_1 - 2u \omega_3^2 - \\ & 2u \omega_3 v \omega_4^2 - \frac{1}{2}u \omega_4 \omega_1^2 + 2\omega_3 + 4\omega_2 u^2 \omega_4 \omega_1 + 2v \omega_4^2 + \frac{1}{2}\omega_2 \omega_3 v + \omega_2 u \omega_3 v \omega_4 + \omega_2^2 u \omega_3 v + \frac{1}{2}\omega_2 u \omega_3 \omega_4 - 2u^2 \omega_3^2 v \omega_4 - \\ & 2u^2 \omega_1^2 + \omega_2 u^2 \omega_3^2 + \frac{1}{2}\omega_2 v \omega_4 \omega_1 + 2\omega_2^2 u \omega_3 v^2 + 2\omega_2 u^2 v \omega_1^2 + \frac{1}{4}\omega_2 \omega_3 v^2 \omega_4 + \frac{1}{4}\omega_3 \omega_4 + 2\omega_2 u \omega_3^2 v - \\ & \frac{1}{2}\omega_3 v \omega_4 \omega_1 - \omega_4 \omega_1 - 4v \omega_4 + \omega_2^2 \omega_3 v^2 + 3u \omega_4 \omega_1 + 6u \omega_3 v \omega_4 - \omega_2^2 u v \omega_1 - \frac{1}{2}\omega_3^2 + 2\omega_4 + 2u v \omega_4^2 \omega_1 + 4u^2 \omega_3 \omega_1 + \\ & 4\omega_2 v^2 \omega_4 - 2u^2 v \omega_4 \omega_1^2 - \frac{1}{2}u \omega_3 \omega_4 \omega_1 + 4\omega_2 v + 2\omega_2 u \omega_1 + \omega_1 + \frac{1}{4}\omega_2 \omega_3 \omega_4 - \omega_3 v \omega_4^2 + 4u \omega_3 + u \omega_3^2 \omega_4 + \frac{1}{4}\omega_2 \omega_3^2 + \frac{1}{2}\omega_2^2 \omega_1, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_t, y}^{[\mu_1], t-2\delta_t} = & 1 - \frac{1}{2}\omega_2 \omega_4 \omega_1 + \frac{1}{2}\omega_2^2 u^2 \omega_3 - 8\omega_2 u^2 v^2 \omega_4 \omega_1 + 2\omega_2^2 u v^2 \omega_1 - u \omega_3 v^2 \omega_4 + \frac{1}{2}\omega_2 v^2 \omega_4 \omega_1 - 2\omega_2^2 u^2 \omega_3 v^2 + \\ & 2\omega_2 u^2 \omega_1 - \omega_2 \omega_3 v^2 - u \omega_3 \omega_4 + \frac{1}{2}u^2 \omega_3 - \frac{3}{2}u \omega_1 - \omega_2 u \omega_3 + 2u v^2 \omega_4^2 \omega_1 - \frac{1}{2}c_s^2 \omega_2 \omega_3 + \frac{1}{2}\omega_3 \omega_4 - c_s^2 \omega_2 \omega_4 - \frac{1}{2}\omega_2^2 u \omega_1 - \\ & v^2 \omega_4 - \frac{1}{2}c_s^2 \omega_3 - \omega_2 - \omega_2 u \omega_4 \omega_1 + c_s^2 \omega_2 u \omega_4 \omega_1 + \frac{1}{2}\omega_2 \omega_1 - \omega_2 u \omega_3 v^2 \omega_4 + 2\omega_2 u \omega_3 v^2 + 2c_s^2 \omega_2 \omega_3 v^2 - c_s^2 u \omega_4 \omega_1 - \\ & \frac{1}{2}c_s^2 \omega_3 \omega_4 + \omega_2 \omega_4 + \frac{1}{2}\omega_3 v^2 \omega_4 + \frac{1}{2}c_s^2 \omega_2 \omega_3 \omega_4 + \frac{1}{2}c_s^2 \omega_2 \omega_4 \omega_1 + 2\omega_2 v^2 + \frac{1}{2}\omega_2 \omega_3 - \frac{1}{2}c_s^2 \omega_4 \omega_1 - \frac{1}{2}\omega_3 + c_s^2 u \omega_3 \omega_4 - \\ & 3\omega_2 u v^2 \omega_4 \omega_1 - 2\omega_2 u v^2 \omega_1 + 2c_s^2 \omega_3 v^2 \omega_4^2 + c_s^2 \omega_4 + \frac{1}{2}v^2 \omega_4 \omega_1 + \omega_2 u \omega_3 \omega_4 + 4u^2 v^2 \omega_4^2 \omega_1 - c_s^2 \omega_2 u \omega_3 \omega_4 - \\ & 4c_s^2 \omega_2 \omega_3 v^2 \omega_4 - u^2 \omega_1 + \frac{1}{2}\omega_2 \omega_3 v^2 \omega_4 + 4\omega_2^2 u^2 v^2 \omega_1 + u v^2 \omega_4 \omega_1 + c_s^2 \omega_2 \omega_3 - \omega_2 u^2 \omega_3 + 4\omega_2 u^2 \omega_3 v^2 \omega_4 + \\ & \frac{1}{2}\omega_4 \omega_1 - \omega_2 v^2 \omega_1 - \omega_2^2 u^2 \omega_1 + u \omega_4 \omega_1 - \omega_4 - \omega_2 v^2 \omega_4 - 2u^2 \omega_3 v^2 \omega_4^2 + 2\omega_2 u \omega_1 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_2 \omega_3 \omega_4 + u \omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_t, y}^{[\mu_2], t-2\delta_t} = & -2 + \frac{1}{2}\omega_2 \omega_4 \omega_1 - 4\omega_2^2 u v^2 \omega_1 + 4\omega_2 v^2 \omega_4 \omega_1 + u \omega_3 \omega_4 - 2\omega_2^2 v^2 \omega_1 - 2\omega_3 v^2 \omega_4^2 + 2u \omega_1 + 3\omega_2 u \omega_3 - \\ & 4u v^2 \omega_4^2 \omega_1 - \frac{1}{2}\omega_3 \omega_4 + \omega_2^2 u \omega_1 - 2v^2 \omega_4^2 \omega_1 - \omega_2^2 + 3\omega_2 + \omega_2 u \omega_4 \omega_1 + 4v^2 \omega_4^2 - \frac{3}{2}\omega_2 \omega_1 - 8\omega_2 u \omega_3 v^2 \omega_4 + 4\omega_2^2 v^2 + \\ & \frac{1}{2}\omega_2^2 \omega_3 - \omega_2 \omega_4 + 4u \omega_3 v^2 \omega_4^2 - \frac{3}{2}\omega_2 \omega_3 + \omega_3 + 8\omega_2 u v^2 \omega_4 \omega_1 - \omega_2 u \omega_3 \omega_4 + \frac{1}{2}\omega_2^2 \omega_1 + 4\omega_2^2 u \omega_3 v^2 + 4\omega_2 \omega_3 v^2 \omega_4 - \\ & \frac{1}{2}\omega_4 \omega_1 - 2\omega_2^2 \omega_3 v^2 - u \omega_4 \omega_1 - \omega_2^2 u \omega_3 + \omega_4 - 8\omega_2 v^2 \omega_4 - 3\omega_2 u \omega_1 + \omega_1 + \frac{1}{2}\omega_2 \omega_3 \omega_4 - 2u \omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x, y}^{[\mu_1], t-2\delta_t} = & 2u \omega_3 v^2 \omega_4 - 4u \omega_1 + 5u \omega_3 \omega_1 + u \omega_1^2 - u \omega_3 \omega_1^2 - 4\omega_2 u \omega_3 v^2 + 2c_s^2 u \omega_4 \omega_1 - 4\omega_2 u \omega_3 v^2 \omega_1 + 2c_s^2 u \omega_3^2 \omega_4 - 2u \omega_3^2 - \\ & 2c_s^2 u \omega_3 \omega_4 + 4\omega_2 u v^2 \omega_1 + 4\omega_2 u \omega_3 v^2 - u \omega_3^2 \omega_1 - 2u \omega_3^2 v^2 \omega_4 - 2u v^2 \omega_4 \omega_1 + 2u \omega_3 v^2 \omega_4 \omega_1 - 2c_s^2 u \omega_3 \omega_4 \omega_1 + 2u \omega_3, \end{aligned}$$

$$\alpha_{x, y}^{[\mu_2], t-2\delta_t} = -4 - \omega_4^2 - 4\omega_3 \omega_1 + \omega_2 \omega_4^2 - \omega_1^2 - \omega_2^2 + 3\omega_2 + \omega_3 \omega_1^2 - 4\omega_2 \omega_4 + \omega_2^2 \omega_4 + 3\omega_3 - \omega_3^2 + 3\omega_4 + \omega_3^2 \omega_1 + 3\omega_1,$$

$$\begin{aligned} \alpha_{x+\delta_t, y}^{[\mu_1], t-2\delta_t} = & -1 + \frac{1}{2}\omega_2 \omega_4 \omega_1 - \frac{1}{2}\omega_2^2 u^2 \omega_3 + 8\omega_2 u^2 v^2 \omega_4 \omega_1 + 2\omega_2^2 u v^2 \omega_1 - u \omega_3 v^2 \omega_4 - \frac{1}{2}\omega_2 v^2 \omega_4 \omega_1 + 2\omega_2^2 u^2 \omega_3 v^2 - \\ & 2\omega_2 u^2 \omega_1 + \omega_2 \omega_3 v^2 - u \omega_3 \omega_4 - \frac{1}{2}u^2 \omega_3 - \frac{3}{2}u \omega_1 - \omega_2 u \omega_3 + 2u v^2 \omega_4^2 \omega_1 + \frac{1}{2}c_s^2 \omega_2 \omega_3 + \frac{1}{2}\omega_3 \omega_4 + c_s^2 \omega_2 \omega_4 - \frac{1}{2}\omega_2^2 u \omega_1 + \\ & v^2 \omega_4 + \frac{1}{2}c_s^2 \omega_3 + \omega_2 - \omega_2 u \omega_4 \omega_1 + c_s^2 \omega_2 u \omega_4 \omega_1 - \frac{1}{2}\omega_2 \omega_1 - \omega_2 u \omega_3 v^2 \omega_4 + 2\omega_2 u \omega_3 v^2 - 2c_s^2 \omega_2 \omega_3 v^2 - c_s^2 u \omega_4 \omega_1 + \\ & \frac{1}{2}c_s^2 \omega_3 \omega_4 - \omega_2 \omega_4 - \frac{1}{2}\omega_3 v^2 \omega_4 - \frac{1}{2}c_s^2 \omega_2 \omega_3 \omega_4 - \frac{1}{2}c_s^2 \omega_2 \omega_4 \omega_1 - 2\omega_2 v^2 - \frac{1}{2}\omega_2 \omega_3 + \frac{1}{2}c_s^2 \omega_4 \omega_1 + \frac{1}{2}\omega_3 + c_s^2 u \omega_3 \omega_4 - \\ & 3\omega_2 u v^2 \omega_4 \omega_1 - 2\omega_2 u v^2 \omega_1 - 2c_s^2 \omega_3 v^2 \omega_4^2 - c_s^2 \omega_4 - \frac{1}{2}v^2 \omega_4 \omega_1 + \omega_2 u \omega_3 \omega_4 - 4u^2 v^2 \omega_4^2 \omega_1 - c_s^2 \omega_2 u \omega_3 \omega_4 + \\ & 4c_s^2 \omega_2 \omega_3 v^2 \omega_4 + u^2 \omega_1 - \frac{1}{2}\omega_2 \omega_3 v^2 \omega_4 - 4\omega_2^2 u^2 v^2 \omega_1 + u v^2 \omega_4 \omega_1 - c_s^2 \omega_2 \omega_3 + \omega_2 u^2 \omega_3 - 4\omega_2 u^2 \omega_3 v^2 \omega_4 - \\ & \frac{1}{2}\omega_4 \omega_1 + \omega_2 v^2 \omega_1 + \omega_2^2 u^2 \omega_1 + u \omega_4 \omega_1 + \omega_4 + \omega_2 v^2 \omega_4 + 2u^2 \omega_3 v^2 \omega_4^2 + 2\omega_2 u \omega_1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_2 \omega_3 \omega_4 + u \omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_t, y}^{[\mu_2], t-2\delta_t} = & -2 + \frac{1}{2}\omega_2 \omega_4 \omega_1 + 4\omega_2^2 u v^2 \omega_1 + 4\omega_2 v^2 \omega_4 \omega_1 - u \omega_3 \omega_4 - 2\omega_2^2 v^2 \omega_1 - 2\omega_3 v^2 \omega_4^2 - 2u \omega_1 - 3\omega_2 u \omega_3 + \\ & 4u v^2 \omega_4^2 \omega_1 - \frac{1}{2}\omega_3 \omega_4 - \omega_2^2 u \omega_1 - 2v^2 \omega_4^2 \omega_1 - \omega_2^2 + 3\omega_2 - \omega_2 u \omega_4 \omega_1 + 4v^2 \omega_4^2 - \frac{3}{2}\omega_2 \omega_1 + 8\omega_2 u \omega_3 v^2 \omega_4 + 4\omega_2^2 v^2 + \\ & \frac{1}{2}\omega_2^2 \omega_3 - \omega_2 \omega_4 - 4u \omega_3 v^2 \omega_4^2 - \frac{3}{2}\omega_2 \omega_3 + \omega_3 - 8\omega_2 u v^2 \omega_4 \omega_1 + \omega_2 u \omega_3 \omega_4 + \frac{1}{2}\omega_2^2 \omega_1 - 4\omega_2^2 u \omega_3 v^2 + 4\omega_2 \omega_3 v^2 \omega_4 - \\ & \frac{1}{2}\omega_4 \omega_1 - 2\omega_2^2 \omega_3 v^2 + u \omega_4 \omega_1 + \omega_2^2 u \omega_3 + \omega_4 - 8\omega_2 v^2 \omega_4 + 3\omega_2 u \omega_1 + \omega_1 + \frac{1}{2}\omega_2 \omega_3 \omega_4 + 2u \omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_t, y+\delta_t}^{[\mu_1], t-2\delta_t} = & 1 + \frac{5}{2}u v \omega_4 \omega_1 - \frac{1}{2}\omega_2 u^2 \omega_3^2 v - \frac{1}{4}c_s^2 \omega_3 \omega_4 \omega_1 + 4\omega_2 u^2 v^2 \omega_4 \omega_1 - \omega_2^2 u v^2 \omega_1 + \frac{1}{2}c_s^2 \omega_2 \omega_3^2 v - \frac{1}{4}u \omega_4^2 \omega_1 + \\ & \frac{1}{2}u \omega_3 v^2 \omega_4 + \frac{5}{2}c_s^2 \omega_3 v \omega_4 + u^2 \omega_3 v \omega_4^2 - \frac{1}{4}\omega_2 v^2 \omega_4 \omega_1 + \omega_2^2 u^2 \omega_3 v^2 + \frac{1}{2}\omega_2 v \omega_4 + \frac{3}{2}\omega_2 u^2 \omega_1 - c_s^2 u \omega_3 v \omega_4 \omega_1 + \end{aligned}$$

$$\begin{aligned}
& \frac{1}{2}\omega_2\omega_3v^2 + \frac{1}{2}\omega_2u^2\omega_3vw_1 - \frac{1}{2}u\omega_3\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3vw_1 + \frac{3}{2}u^2\omega_3 + \frac{3}{2}u^3\omega_3\omega_4\omega_1 - \frac{1}{4}c_s^2\omega_3\omega_4^2 - \frac{1}{4}\omega_2\omega_3vw_4 - \\
& \frac{3}{2}u\omega_1 + \frac{1}{2}c_s^2\omega_2\omega_3vw_4 + \frac{1}{2}\omega_2\omega_3v - \frac{1}{2}\omega_2u\omega_3 - \frac{1}{2}\omega_2u^2\omega_3vw_4 - uv^2\omega_4^2\omega_1 + c_s^2u\omega_3^2vw_4 - \frac{1}{2}u^2\omega_3vw_4\omega_1 + \\
& \frac{5}{2}u^2\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4 + \omega_2^2u^2vw_1 + \frac{1}{2}c_s^2\omega_2\omega_3v + \frac{1}{2}c_s^2\omega_2\omega_4 + u^3\omega_3^2 - \frac{1}{4}\omega_2vw_1 + \frac{1}{4}u^2\omega_3^2\omega_4 + \frac{1}{2}c_s^2\omega_3^2 - \omega_2u^3\omega_1^2 + \\
& \frac{1}{2}v^2\omega_4 - \frac{1}{4}\omega_2u^2\omega_3\omega_1 - \frac{3}{2}c_s^2\omega_3^2 - \frac{1}{4}c_s^2\omega_2\omega_3\omega_1 - \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2u\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_2u\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_3\omega_1 + \frac{1}{4}\omega_2\omega_1 + \\
& \frac{1}{2}\omega_2u\omega_3v^2\omega_4 - \omega_2u\omega_3v^2 - c_s^2\omega_2\omega_3v^2 - 3u^3\omega_3\omega_1 - \frac{1}{2}u^2\omega_4\omega_1^2 - \frac{1}{4}\omega_2\omega_3v - \frac{1}{2}\omega_2u^2\omega_1^2 + \frac{1}{2}c_s^2u\omega_4\omega_1 + \frac{1}{2}v\omega_4\omega_1 - \\
& \frac{1}{2}u^2\omega_3^2 + \frac{3}{2}c_s^2\omega_3\omega_4 - \frac{1}{4}\omega_3v^2\omega_4 + 2\omega_2u^3vw_1^2 - \frac{1}{4}u^2\omega_3\omega_4\omega_1 - \frac{5}{2}u^2\omega_3vw_4 - 3\omega_2u^3\omega_3vw_1 - c_s^2\omega_3vw_4^2 - \\
& \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 - 2\omega_2uv\omega_1 + \frac{1}{2}c_s^2u\omega_3^2\omega_4 + \frac{1}{4}\omega_2u^2\omega_3\omega_4 - \frac{1}{2}\omega_2u^2\omega_3v - 2u^2v\omega_4^2\omega_1 + c_s^2\omega_2u\omega_3vw_1 - \frac{1}{4}c_s^2\omega_2\omega_4\omega_1 - \\
& \frac{1}{2}\omega_2u^2\omega_4\omega_1 - \omega_2v^2 - \frac{1}{2}u^3\omega_3^2\omega_4 - 2u^3v\omega_4\omega_1^2 + \frac{1}{2}\omega_3v\omega_4 - \frac{1}{4}c_s^2\omega_2\omega_3\omega_4 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{4}c_s^2\omega_4\omega_1 - \\
& \frac{1}{2}\omega_3 + 5u^2v\omega_4\omega_1 - \frac{1}{2}c_s^2u\omega_3\omega_4 + \frac{3}{2}\omega_2u^2\omega_4\omega_1 + \omega_2uv^2\omega_1 - c_s^2\omega_3v^2\omega_4^2 - \frac{1}{2}c_s^2\omega_4 - \frac{1}{4}v^2\omega_4\omega_1 + \frac{1}{4}u^2\omega_3\omega_4^2 + \\
& c_s^2u\omega_3\omega_1 + \frac{1}{2}\omega_2u\omega_3vw_4 - 2u^2v^2\omega_4\omega_1 + \frac{1}{2}u^2\omega_3^2vw_4 + \omega_2u^3\omega_3^2v + u^2\omega_1^2 + \frac{1}{2}c_s^2\omega_2u\omega_3\omega_4 - 5\omega_2u^2vw_1 + \\
& \frac{1}{4}\omega_2u^2\omega_3^2 - \frac{1}{4}c_s^2\omega_2\omega_3^2 - \frac{1}{4}\omega_2v\omega_4\omega_1 + 2c_s^2\omega_2\omega_3v^2\omega_4 + \omega_2u^2vw_1^2 - 3u^2\omega_1^2 - \frac{1}{2}c_s^2\omega_3^2vw_4 - \frac{1}{4}\omega_2\omega_3v^2\omega_4 - \\
& 2\omega_2^2u^2v^2\omega_1 + \omega_2u^2vw_4\omega_1 - \frac{1}{2}c_s^2\omega_3v\omega_4\omega_1 - c_s^2\omega_2u\omega_3^2v - \frac{1}{2}u^2\omega_4^2\omega_1 - \frac{1}{2}uv^2\omega_4\omega_1 + \frac{3}{4}c_s^2\omega_2\omega_3 - c_s^2u\omega_3^2 - \\
& \frac{3}{4}\omega_2u^2\omega_3 - 2\omega_2u^2\omega_3v^2\omega_4 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{2}\omega_2v^2\omega_1 - \frac{5}{4}u^2\omega_3\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3\omega_4^2 - u^3\omega_3^2vw_4 - vw_4 + \frac{5}{4}u\omega_4\omega_1 - \\
& u\omega_3vw_4 + \frac{1}{2}\omega_2u^2vw_1 - \frac{5}{2}c_s^2\omega_2\omega_3v + \frac{5}{2}\omega_2u^2\omega_3v - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_2u^3\omega_3^2 - uv\omega_4^2\omega_1 + \frac{1}{2}u^2\omega_3\omega_1 + \frac{1}{2}\omega_2v^2\omega_4 - u^3\omega_4\omega_1^2 - \\
& \frac{1}{2}c_s^2u\omega_3\omega_4\omega_1 - u^2v\omega_4\omega_1^2 + 2u^3\omega_1^2 + u^2\omega_3v^2\omega_4^2 + \frac{3}{2}\omega_2u^3\omega_3\omega_1 + \frac{1}{2}\omega_2v + \frac{3}{4}\omega_2u\omega_1 + 3u^3\omega_3vw_4\omega_1 - \frac{1}{2}\omega_1 + u\omega_3,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l,y+\delta_l}^{[\mu_2],t-2\delta_t} = & -2 + \frac{1}{4}\omega_2\omega_4\omega_1 - 6uv\omega_4\omega_1 - \frac{1}{2}\omega_4^2 - 2\omega_2u^2\omega_3^2v + 2\omega_2^2uv^2\omega_1 + \frac{1}{2}u\omega_4^2\omega_1 - \omega_2uv\omega_1^2 - 2\omega_2v^2\omega_4\omega_1 + \omega_2vw_4 - \frac{1}{2}\omega_3\omega_1 + \\
& \omega_2^2v + 4\omega_2u^2\omega_3vw_1 + 3u\omega_3\omega_4 + \omega_2^2v^2\omega_1 - \frac{1}{2}\omega_2\omega_3\omega_1 + \omega_3v^2\omega_4^2 + u\omega_3vw_4\omega_1 - \frac{1}{2}\omega_2\omega_3vw_4 + 4u\omega_1 - u\omega_3\omega_1 - \\
& 6\omega_2u\omega_3v + 2\omega_2u\omega_3 + 2uv^2\omega_4^2\omega_1 - 4u^2\omega_3vw_4\omega_1 - 2u\omega_3^2vw_4 - \frac{3}{2}\omega_3\omega_4 + \frac{1}{4}\omega_4^2\omega_1 + 2\omega_2v\omega_1 + u^2\omega_3^2\omega_4 - 2\omega_2u^2\omega_3\omega_1 + \\
& v^2\omega_4^2\omega_1 + \frac{1}{2}\omega_3^2vw_4 + \omega_2 + \frac{1}{2}\omega_2u\omega_4\omega_1 - 2v^2\omega_4^2 - u\omega_1^2 - \omega_2uv\omega_4\omega_1 - \frac{1}{2}\omega_2\omega_1 + 4\omega_2u\omega_3v^2\omega_4 - \omega_2u\omega_3^2 + \frac{1}{4}\omega_3\omega_4^2 + \\
& u^2\omega_4\omega_1^2 + 3\omega_2\omega_3v + \omega_2u^2\omega_1^2 - 2\omega_2^2v^2 - 2v\omega_4\omega_1 - 2u^2\omega_3^2 - \frac{1}{2}\omega_3\omega_4 - \frac{1}{2}\omega_2\omega_4 + uv\omega_4\omega_1^2 - 2u\omega_3v^2\omega_4^2 - 2u^2\omega_3\omega_4\omega_1 + \\
& 6\omega_2uv\omega_1 + \frac{1}{2}\omega_2u\omega_1^2 - \frac{1}{2}\omega_2\omega_3^2v + \frac{1}{4}\omega_3\omega_4\omega_1 - 3\omega_3vw_4 + \frac{1}{2}\omega_2u\omega_3\omega_1 - \omega_2\omega_3 - \omega_2u\omega_3vw_1 + v\omega_4^2\omega_1 + 2u\omega_3^2 - \\
& 2u\omega_3vw_4^2 + \frac{1}{2}u\omega_4\omega_1^2 + 2\omega_3 - 4\omega_2uv^2\omega_4\omega_1 - 2v\omega_4^2 - \frac{1}{2}\omega_2\omega_3v + \omega_2u\omega_3vw_4 + \omega_2^2u\omega_3v - \frac{1}{2}\omega_2u\omega_3\omega_4 + 2u^2\omega_3^2vw_4 - \\
& 2u^2\omega_1^2 + \omega_2u^2\omega_3^2 - \frac{1}{2}\omega_2v\omega_4\omega_1 - 2\omega_2^2u\omega_3v^2 - 2\omega_2u^2v\omega_1^2 + \frac{1}{4}\omega_2\omega_3\omega_1 - 2\omega_2\omega_3v^2\omega_4 + \frac{1}{4}\omega_3\omega_4 + 2\omega_2u\omega_3^2v + \\
& \frac{1}{2}\omega_3v\omega_4\omega_1 - \omega_4\omega_1 + 4v\omega_4 + \omega_2^2\omega_3v^2 - 3u\omega_4\omega_1 + 6u\omega_3vw_4 - \omega_2^2uv\omega_1 - \frac{1}{2}\omega_3^2 + 2\omega_4 + 2uv\omega_4^2\omega_1 + 4u^2\omega_3\omega_1 + \\
& 4\omega_2v^2\omega_4 + 2u^2v\omega_4\omega_1^2 + \frac{1}{2}u\omega_3\omega_4\omega_1 - 4\omega_2v - 2\omega_2u\omega_1 + \omega_1 + \frac{1}{4}\omega_2\omega_3\omega_4 + w_3v\omega_4^2 - 4u\omega_3 - u\omega_3^2\omega_4 + \frac{1}{4}\omega_2\omega_3^2 - \frac{1}{2}\omega_2^2\omega_3\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y+\delta_l}^{[\mu_1],t-2\delta_t} = & 4uv\omega_4\omega_1 - u\omega_3v^2\omega_4 + \omega_2uv\omega_1^2 + 2c_s^2u\omega_3vw_4\omega_1 - u\omega_3\omega_4 - 3u^3\omega_3\omega_4\omega_1 - 3u\omega_3vw_4\omega_1 - 4u\omega_1 + \\
& 3u\omega_3\omega_1 + \omega_2u\omega_3v - \omega_2u\omega_3 - 2c_s^2u\omega_3^2vw_4 + 2u\omega_3^2vw_4 - 2u^3\omega_3^2 + 2\omega_2u^3\omega_1^2 + u\omega_1^2 + 2\omega_2u\omega_3v^2 + \omega_2u\omega_3^2 + \\
& 6u^3\omega_3\omega_1 - c_s^2u\omega_4\omega_1 + 2\omega_2u\omega_3v^2\omega_1 - 4\omega_2u^3vw_1^2 - uv\omega_4\omega_1^2 + 6\omega_2u^3\omega_3vw_1 - 3\omega_2uv\omega_1 - 2c_s^2u\omega_3\omega_4 - \\
& 2c_s^2\omega_2u\omega_3vw_1 - \frac{1}{2}\omega_2u\omega_1^2 + u^3\omega_3^2\omega_4 + 4u^3vw_4\omega_1^2 + c_s^2\omega_2u\omega_3\omega_1 - \frac{3}{2}\omega_2u\omega_3\omega_1 + 2\omega_2u\omega_3vw_1 - 2u\omega_3^2 - \\
& \frac{1}{2}u\omega_4\omega_1^2 + c_s^2u\omega_3\omega_4 - 2\omega_2uv^2\omega_1 - 2c_s^2u\omega_3\omega_1 - 2\omega_2u^3\omega_3^2v - 2\omega_2u\omega_3^2v^2 + 2c_s^2\omega_2u\omega_3\omega_1 + u\omega_3^2v^2\omega_4 + \\
& uv^2\omega_4\omega_1 - \omega_2u\omega_3^2v + 2c_s^2u\omega_3^2 - u\omega_3v^2\omega_4\omega_1 - c_s^2\omega_2u\omega_3^2 + 2u^3\omega_3^2vw_4 + 2u\omega_4\omega_1 - 2u\omega_3vw_4 + \omega_2u^3\omega_3^2 + \\
& 2u^3\omega_4\omega_1^2 + 2c_s^2u\omega_3\omega_4\omega_1 - 4u^3\omega_1^2 - \frac{3}{2}\omega_3\omega_4\omega_1 - 3\omega_2u^3\omega_3\omega_1 + 2\omega_2u\omega_1 - 6u^3\omega_3vw_4\omega_1 + 2u\omega_3 + u\omega_3^2\omega_4,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y+\delta_l}^{[\mu_2],t-2\delta_t} = & -2 + 4\omega_2u^2\omega_3^2v - \omega_3\omega_1 - 8\omega_2u^2\omega_3vw_1 + v\omega_4\omega_1^2 - \omega_2\omega_3vw_1 + \frac{1}{2}\omega_2\omega_1^2 + 8u^2\omega_3vw_4\omega_1 - \frac{1}{2}\omega_3\omega_4 + \\
& 3\omega_2v\omega_1 - 2u^2\omega_3^2\omega_4 - \omega_1^2 - \omega_2v\omega_1^2 + 4\omega_2u^2\omega_3\omega_1 + \omega_2 - \frac{3}{2}\omega_2\omega_1 - 2u^2\omega_4\omega_1^2 + \omega_2\omega_3v - 2\omega_2u^2\omega_1^2 - 3v\omega_4\omega_1 + \\
& 4u^2\omega_3^2 + 4u^2\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1 - \omega_3vw_4 - \frac{1}{2}\omega_2\omega_3 + \omega_3 + \frac{1}{2}\omega_4\omega_1^2 - 4u^2\omega_3^2vw_4 + 4u^2\omega_1^2 - 2\omega_2u^2\omega_3^2 + \\
& 4\omega_2u^2v\omega_1^2 + \frac{1}{2}\omega_2\omega_3\omega_1 + \omega_3vw_4\omega_1 - \frac{3}{2}\omega_4\omega_1 + 2vw_4 + \omega_4 - 8u^2\omega_3\omega_1 - 4u^2v\omega_4\omega_1^2 - 2\omega_2v + 3\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l,y+\delta_l}^{[\mu_1],t-2\delta_t} = & -1 + \frac{5}{2}uv\omega_4\omega_1 + \frac{1}{2}\omega_2u^2\omega_3^2v + \frac{1}{4}c_s^2\omega_3\omega_4\omega_1 - 4\omega_2u^2v^2\omega_4\omega_1 - \omega_2^2uv^2\omega_1 - \frac{1}{2}c_s^2\omega_2\omega_3^2v - \frac{1}{4}u\omega_4^2\omega_1 + \\
& \frac{1}{2}u\omega_3v^2\omega_4 - \frac{5}{2}c_s^2\omega_3vw_4 - u^2\omega_3vw_4^2 + \frac{1}{4}\omega_2v^2\omega_4\omega_1 - \omega_2^2u^2\omega_3v^2 - \frac{1}{2}\omega_2v\omega_4\omega_1 - c_s^2u\omega_3vw_4\omega_1 - \\
& \frac{1}{2}\omega_2\omega_3v^2 - \frac{1}{2}\omega_2u^2\omega_3vw_1 - \frac{1}{2}\omega_3\omega_4 - \frac{1}{2}c_s^2\omega_2\omega_3vw_1 - \frac{3}{2}u^2\omega_3 + \frac{3}{2}u^3\omega_3\omega_4\omega_1 + \frac{1}{4}c_s^2\omega_3\omega_4^2 + \frac{1}{4}\omega_2\omega_3vw_4 - \\
& \frac{3}{2}u\omega_1 - \frac{1}{2}c_s^2\omega_2\omega_3vw_4 + \frac{1}{2}\omega_2u\omega_3v - \frac{1}{2}\omega_2u^2\omega_3vw_4 - uv^2\omega_4\omega_1 + c_s^2u\omega_3^2vw_4 + \frac{1}{4}u^2\omega_3vw_4\omega_1 - \\
& \frac{5}{2}u^2\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4 - \omega_2^2u^2vw_1 - \frac{1}{2}c_s^2\omega_2\omega_3v - \frac{1}{2}c_s^2\omega_2\omega_3v - \frac{1}{2}c_s^2\omega_2\omega_3v + u\omega_3^2 + \\
& \frac{1}{2}v^2\omega_4 + \frac{1}{4}\omega_2u^2\omega_3\omega_1 + \frac{3}{2}c_s^2\omega_3^2 + \frac{1}{4}c_s^2\omega_2\omega_3\omega_1 + \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2u\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_2\omega_3\omega_1 - \frac{1}{2}c_s^2\omega_3\omega_1 - \frac{1}{4}\omega_2\omega_1 + \\
& \frac{1}{2}\omega_2u\omega_3v^2\omega_4 - \omega_2u\omega_3v^2 + c_s^2\omega_2\omega_3v^2 - 3u^3\omega_3\omega_1 + \frac{1}{2}u^2\omega_4\omega_1^2 + \frac{1}{4}\omega_2\omega_3\omega_1 + \frac{1}{2}\omega_2u^2\omega_1^2 + \frac{1}{2}c_s^2u\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4\omega_1 + \\
& \frac{1}{2}u^2\omega_3^2 - \frac{3}{2}c_s^2\omega_3\omega_4 + \frac{1}{4}\omega_3v^2\omega_4 + 2\omega_2u^3vw_1^2 + \frac{1}{4}u^2\omega_3\omega_4\omega_1 + \frac{5}{2}u^2\omega_3vw_4 - 3\omega_2u^3\omega_3\omega_1 + c_s^2\omega_3vw_4 + \\
& \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 - 2\omega_2uv\omega_1 + \frac{1}{2}c_s^2u\omega_3\omega_4 - \frac{1}{4}\omega_2u^2\omega_3\omega_4 + \frac{1}{2}\omega_2u^2\omega_3\omega_4 + \frac{1}{2}u^2v\omega_4\omega_1 + c_s^2\omega_2\omega_3\omega_4 + \frac{1}{4}c_s^2\omega_2\omega_4\omega_1 +
\end{aligned}$$

$$\begin{aligned}
& \frac{1}{2}\omega_2 u^2 \omega_4 \omega_1 + \omega_2 v^2 - \frac{1}{2}u^3 \omega_3^2 \omega_4 - 2u^3 v \omega_4 \omega_1^2 - \frac{1}{2}w_3 v \omega_4 + \frac{1}{4}c_s^2 \omega_3^2 \omega_4 - \frac{1}{4}c_s^2 \omega_2 u \omega_3 \omega_1 - \frac{1}{4}c_s^2 \omega_4 \omega_1 + \\
& \frac{1}{2}w_3 - 5u^2 v \omega_4 \omega_1 - \frac{1}{2}c_s^2 u \omega_3 \omega_4 + \frac{3}{2}\omega_2 u v^2 \omega_4 \omega_1 + \omega_2 u v^2 \omega_1 + c_s^2 \omega_3 v^2 \omega_4^2 + \frac{1}{2}c_s^2 \omega_4 + \frac{1}{4}v^2 \omega_4 \omega_1 - \frac{1}{4}u^2 \omega_3 \omega_4^2 + \\
& c_s^2 u \omega_3 \omega_1 + \frac{1}{2}\omega_2 u \omega_3 v \omega_4 + 2u^2 v^2 \omega_4^2 \omega_1 - \frac{1}{2}u^2 \omega_3^2 v \omega_4 + \omega_2 u^3 \omega_3^2 v - u^2 \omega_1^2 + \frac{1}{2}c_s^2 \omega_2 u \omega_3 \omega_4 + 5\omega_2 u^2 v \omega_1 - \\
& \frac{1}{4}\omega_2 u^2 \omega_3^2 + \frac{1}{4}c_s^2 \omega_2 \omega_3^2 + \frac{1}{4}\omega_2 v \omega_4 \omega_1 - 2c_s^2 \omega_2 \omega_3 v^2 \omega_4 - \omega_2 u^2 v \omega_1^2 + 3u^2 \omega_1 + \frac{1}{2}c_s^2 \omega_3^2 v \omega_4 + \frac{1}{4}\omega_2 \omega_3 v^2 \omega_4 + \\
& 2\omega_2^2 u^2 v^2 \omega_1 - \omega_2 u^2 v \omega_4 \omega_1 + \frac{1}{2}c_s^2 \omega_3 v \omega_4 \omega_1 - c_s^2 \omega_2 u \omega_3^2 v + \frac{1}{2}u^2 \omega_4^2 \omega_1 - \frac{1}{2}u^2 v \omega_4 \omega_1 - \frac{3}{4}c_s^2 \omega_2 \omega_3 - c_s^2 u \omega_3^2 + \\
& \frac{3}{4}\omega_2 u^2 \omega_3 + 2\omega_2 u^2 \omega_3 v^2 \omega_4 - \frac{1}{4}\omega_4 \omega_1 - \frac{1}{2}\omega_2 v^2 \omega_1 + \frac{5}{4}u^2 \omega_3 \omega_4 + \frac{1}{2}c_s^2 \omega_2 u \omega_3^2 - u^3 \omega_3^2 v \omega_4 + v \omega_4 + \frac{5}{4}u \omega_4 \omega_1 - \\
& u \omega_3 v \omega_4 + \frac{1}{2}w_2^2 u v \omega_1 + \frac{5}{2}c_s^2 \omega_2 \omega_3 v - \frac{5}{2}\omega_2 u^2 \omega_3 v + \frac{1}{2}\omega_4 - \frac{1}{2}\omega_2 u^3 \omega_3^2 - u v \omega_4^2 \omega_1 - \frac{1}{2}u^2 \omega_3 \omega_1 - \frac{1}{2}\omega_2 v^2 \omega_4 - u^3 \omega_4 \omega_1^2 - \\
& \frac{1}{2}c_s^2 u \omega_3 \omega_4 \omega_1 + u^2 v \omega_4 \omega_1^2 + 2u^3 \omega_1^2 - u^2 \omega_3 v^2 \omega_4^2 + \frac{3}{2}\omega_2 u^3 \omega_3 \omega_1 - \frac{1}{2}\omega_2 v + \frac{3}{4}\omega_2 u \omega_1 + 3u^3 \omega_3 v \omega_4 \omega_1 + \frac{1}{2}\omega_1 + u \omega_3,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_2], t-2\delta_t} = & -2 + \frac{1}{4}\omega_2 \omega_4 \omega_1 + 6u v \omega_4 \omega_1 - \frac{1}{2}\omega_4^2 - 2\omega_2 u^2 \omega_3^2 v - 2\omega_2^2 u v^2 \omega_1 - \frac{1}{2}u \omega_4^2 \omega_1 + \omega_2 u v \omega_1 + \omega_2 v \omega_4 - \frac{1}{2}w_3 \omega_1 + \\
& \omega_2^2 v + 4\omega_2 u^2 \omega_3 v \omega_1 - 3u \omega_3 \omega_4 + \omega_2^2 v^2 \omega_1 - \frac{1}{2}\omega_2 \omega_3 v \omega_1 + \omega_3 v^2 \omega_4^2 - u \omega_3 v \omega_4 \omega_1 - \frac{1}{2}\omega_2 \omega_3 v \omega_4 - 4u \omega_1 + u \omega_3 \omega_1 + \\
& 6\omega_2 u \omega_3 v - 2\omega_2 u \omega_3 - 2u v^2 \omega_4^2 \omega_1 - 4u^2 \omega_3 v \omega_4 \omega_1 + 2u \omega_3^2 v \omega_4 - \frac{3}{2}\omega_3 \omega_4 + \frac{1}{4}\omega_4^2 \omega_1 + 2\omega_2 v \omega_1 + u^2 \omega_3^2 \omega_4 - 2\omega_2 u^2 \omega_3 \omega_1 + \\
& v^2 \omega_4^2 \omega_1 + \frac{1}{2}\omega_3^2 v \omega_4 + \omega_2 - \frac{1}{2}\omega_2 u \omega_4 \omega_1 - 2v^2 \omega_4^2 + u \omega_1^2 + \omega_2 u v \omega_4 \omega_1 - \frac{1}{2}\omega_2 \omega_1 - 4\omega_2 u \omega_3 v^2 \omega_4 + \omega_2 u \omega_3^2 + \frac{1}{4}\omega_3 \omega_4^2 + \\
& u^2 \omega_4 \omega_1^2 + 3\omega_2 \omega_3 v + \omega_2 u^2 \omega_1^2 - 2\omega_2^2 v^2 - 2v \omega_4 \omega_1 - 2u^2 \omega_3^2 + \frac{1}{2}\omega_3 \omega_4 - \frac{1}{2}\omega_2 \omega_4 - u v \omega_4 \omega_1^2 + 2u \omega_3 v^2 \omega_4^2 - 2u^2 \omega_3 \omega_4 \omega_1 - \\
& 6\omega_2 u v \omega_1 - \frac{1}{2}\omega_2 u \omega_1^2 - \frac{1}{2}\omega_2 \omega_3^2 v + \frac{1}{4}\omega_3 \omega_4 \omega_1 - 3\omega_3 v \omega_4 - \frac{1}{2}\omega_2 u \omega_3 \omega_1 - \omega_2 \omega_3 + \omega_2 u \omega_3 v \omega_1 + v \omega_4^2 \omega_1 - 2u \omega_3^2 + \\
& 2u \omega_3 v \omega_4^2 - \frac{1}{2}\omega_2 u \omega_1^2 + 2\omega_3 + 4\omega_2 u v^2 \omega_4 \omega_1 - 2v \omega_4^2 - \frac{1}{2}\omega_2 \omega_3 v - \omega_2 u \omega_3 v \omega_4 - \omega_2^2 u \omega_3 v + \frac{1}{2}\omega_2 u \omega_3 \omega_4 + 2u^2 \omega_3^2 v \omega_4 - \\
& 2u^2 \omega_1^2 + \omega_2 u^2 \omega_3^2 - \frac{1}{2}\omega_2 v \omega_4 \omega_1 + 2\omega_2^2 u \omega_3 v^2 - 2\omega_2 u^2 v \omega_1^2 + \frac{1}{4}\omega_2 \omega_3 \omega_1 - 2\omega_2 u \omega_3 v^2 \omega_4 + \frac{1}{4}\omega_3 \omega_4 - 2\omega_2 u \omega_3^2 v + \\
& \frac{1}{2}\omega_3 v \omega_4 \omega_1 - \omega_4 \omega_1 + 4v \omega_4 + \omega_2^2 \omega_3 v^2 + 3u \omega_4 \omega_1 - 6u \omega_3 v \omega_4 + \omega_2^2 u v \omega_1 - \frac{1}{2}\omega_3^2 + 2\omega_4 - 2u v \omega_4^2 \omega_1 + 4u^2 \omega_3 \omega_1 + \\
& 4\omega_2 v^2 \omega_4 + 2u^2 v \omega_4 \omega_1^2 - \frac{1}{2}\omega_2 u \omega_3 \omega_4 \omega_1 - 4\omega_2 v + 2\omega_2 u \omega_1 + \omega_1 + \frac{1}{4}\omega_2 \omega_3 \omega_4 + \omega_3 v \omega_4^2 + 4u \omega_3 + u \omega_3^2 \omega_4 + \frac{1}{4}\omega_2 \omega_3^2 - \frac{1}{2}\omega_2^2 v \omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_1], t-3\delta_t} = & 7u v \omega_4 \omega_1 + 2\omega_2^2 u v^2 \omega_1 + \frac{1}{2}u \omega_4^2 \omega_1 - u \omega_3 v^2 \omega_4 + \omega_2 u v \omega_1^2 - \frac{1}{2}u \omega_3 \omega_4^2 \omega_1 + u \omega_3 \omega_4 - 8u \omega_3 v \omega_4 \omega_1 + 5u \omega_1 - \\
& \frac{1}{2}u \omega_3^2 \omega_4 \omega_1 - 6u \omega_3 \omega_1 + \omega_2 u \omega_3 v + \omega_2 u \omega_3 + 2u v^2 \omega_4^2 \omega_1 + 2u \omega_3^2 v \omega_4 - 2u \omega_3 v^2 \omega_4^2 \omega_1 - \omega_2 u \omega_3^2 v \omega_1 + \frac{1}{2}\omega_2 u \omega_4 \omega_1 + \\
& c_s^2 \omega_2 u \omega_4 \omega_1 - u \omega_1^2 + c_s^2 \omega_2 u \omega_3^2 \omega_4 - \omega_2 u \omega_3 v^2 \omega_4 + u \omega_3 \omega_1^2 - 2\omega_2^2 u \omega_3 v^2 \omega_1 + 2\omega_2 u \omega_3 v^2 - \omega_2 u \omega_3^2 - c_s^2 u \omega_4 \omega_1 - \\
& \frac{1}{2}\omega_2 u \omega_3^2 \omega_1 + 2\omega_2 u \omega_3 v^2 \omega_1 + u \omega_3 v \omega_4 \omega_1^2 + 3\omega_2 u \omega_3 v^2 \omega_4 \omega_1 - u v \omega_4 \omega_1^2 - 6\omega_2 u v \omega_1 - c_s^2 u \omega_3^2 \omega_4 - \omega_2 u \omega_3^2 v \omega_4 + \\
& \frac{1}{2}\omega_2 u \omega_1^2 + u \omega_3^2 v \omega_4 \omega_1 + 3\omega_2 u \omega_3 \omega_1 + 7\omega_2 u \omega_3 v \omega_1 + 2u \omega_3^2 + \frac{1}{2}u \omega_4 \omega_1^2 + c_s^2 u \omega_3 \omega_4 + \omega_2 u \omega_3^2 v^2 \omega_4 - \frac{1}{2}u \omega_3 \omega_4 \omega_1^2 - \\
& 3\omega_2 u v^2 \omega_4 \omega_1 - 2\omega_2 u v^2 \omega_1 + \omega_2 u \omega_3 v \omega_4 - c_s^2 \omega_2 u \omega_3 \omega_4 \omega_1 - c_s^2 \omega_2 u \omega_3 \omega_4 - 2\omega_2 u \omega_3^2 v^2 - \frac{1}{2}\omega_2 u \omega_3 \omega_4 \omega_1 - \\
& \omega_2^2 u \omega_3 v \omega_1 + u \omega_3^2 \omega_1 + u \omega_3^2 v^2 \omega_4 + u v^2 \omega_4 \omega_1 - \omega_2 u \omega_3^2 v - u \omega_3 v^2 \omega_4 \omega_1 - \frac{7}{2}u \omega_4 \omega_1 - 2u \omega_3 v \omega_4 + \omega_2^2 u v \omega_1 - \\
& 2u v \omega_4^2 \omega_1 + c_s^2 u \omega_3 \omega_4 \omega_1 + 4u \omega_3 \omega_4 \omega_1 - \frac{5}{2}\omega_2 u \omega_1 + 2u \omega_3 v \omega_4 \omega_1^2 - u \omega_3 \omega_3 - \omega_2 u \omega_3 v \omega_1^2 - u \omega_3^2 \omega_4 - \frac{1}{2}\omega_2 u \omega_3 \omega_1^2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_2], t-3\delta_t} = & 3 - \frac{1}{2}\omega_2 \omega_4 \omega_1 + \frac{1}{2}\omega_4^2 + 4\omega_2 v^2 \omega_4 \omega_1 + \omega_2 v \omega_4 + 5\omega_3 \omega_1 + \omega_2^2 v - 2\omega_2^2 v^2 \omega_1 + v \omega_4 \omega_1^2 - 7\omega_2 \omega_3 v \omega_1 - \\
& 2\omega_3 v^2 \omega_4^2 - \frac{1}{2}\omega_2 \omega_1^2 - \omega_2 \omega_3 v \omega_4 + \frac{1}{2}\omega_2 \omega_3^2 \omega_1 - 2\omega_3 v \omega_4 \omega_1^2 + 3\omega_3 \omega_4 + \frac{1}{2}\omega_2 \omega_3 \omega_4 \omega_1 - \frac{1}{2}\omega_4^2 \omega_1 + 6\omega_2 v \omega_1 + \omega_1^2 - \\
& \omega_2 v \omega_1^2 - 2v^2 \omega_4^2 \omega_1 + \omega_3^2 v \omega_4 - \frac{3}{2}\omega_2 + \frac{1}{2}\omega_3 \omega_4 \omega_1 + 2v^2 \omega_4^2 + 2\omega_2 \omega_1 - 4\omega_2 \omega_3 v^2 \omega_4 \omega_1 - \omega_3 v \omega_4 \omega_1 - \frac{1}{2}\omega_3 \omega_4^2 + \\
& 6\omega_2 \omega_3 v + \frac{1}{2}\omega_3 \omega_4^2 \omega_1 + 2\omega_2^2 v^2 + 2\omega_2^2 \omega_3 v^2 \omega_1 - \omega_3 \omega_1^2 - 6v \omega_4 \omega_1 + \frac{1}{2}\omega_2 \omega_4 + \omega_2 \omega_3 v \omega_1 + \omega_2^2 \omega_3 v \omega_1 - \omega_2 \omega_3^2 v - \\
& \frac{7}{2}\omega_3 \omega_4 \omega_1 - 6\omega_3 v \omega_4 + 2\omega_2 \omega_3 + 2v \omega_4^2 \omega_1 - 4\omega_3 + \omega_2 \omega_3 v \omega_4 \omega_1 - \frac{1}{2}\omega_4 \omega_1^2 - 2v \omega_4^2 - \omega_2^2 \omega_3 v + \frac{1}{2}\omega_2 \omega_3 \omega_1^2 - \\
& \omega_3 v \omega_4 \omega_1^2 - \omega_2 v \omega_4 \omega_1 - \frac{5}{2}\omega_2 \omega_3 \omega_1 + 4\omega_2 \omega_3 v^2 \omega_4 - \frac{1}{2}\omega_3^2 \omega_4 + 7\omega_3 v \omega_4 \omega_1 + \omega_2 \omega_3^2 v \omega_1 + 3\omega_4 \omega_1 + 5v \omega_4 - 2\omega_2 \omega_3 v^2 + \\
& \omega_3^2 + 2\omega_3 v^2 \omega_4 \omega_1 - \frac{5}{2}\omega_4 - 4\omega_2 v^2 \omega_4 + \frac{1}{2}\omega_3 \omega_4 \omega_1^2 - \omega_3^2 \omega_1 - 5\omega_2 v - 4\omega_1 - \frac{1}{2}\omega_2 \omega_3 \omega_4 + 2\omega_3 v \omega_4^2 - \frac{1}{2}\omega_2 \omega_3^2 - \omega_2^2 v \omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l, y}^{[\mu_1], t-3\delta_t} = & -1 + \frac{1}{2}\omega_2 \omega_4 \omega_1 - \frac{1}{2}\omega_2^2 \omega_3^2 \omega_1 + \frac{1}{2}c_s^2 \omega_3 \omega_4 \omega_1 + \frac{1}{2}u \omega_4^2 \omega_1 - \frac{1}{2}c_s^2 \omega_2 \omega_3 \omega_4^2 + \frac{1}{2}\omega_2 u^2 \omega_3 \omega_4^2 - 5\omega_2 u^2 \omega_1 + \\
& u \omega_3 \omega_4 - 2u^2 \omega_3 - 3u^3 \omega_3 \omega_4 \omega_1 - \omega_2^2 u^2 \omega_4 \omega_1 + \frac{1}{2}c_s^2 \omega_3 \omega_4^2 + 2u \omega_1 - \frac{1}{2}\omega_2 u^2 \omega_3 \omega_4 \omega_1 + \omega_2 u \omega_3 - \frac{1}{2}c_s^2 \omega_2 \omega_3 \omega_4 \omega_1 + \\
& \frac{1}{2}c_s^2 \omega_2^2 \omega_3 - 5u^2 \omega_4 \omega_1 - \frac{1}{2}\omega_3 \omega_4 - \omega_2 u^3 \omega_3^2 \omega_4 - u^3 \omega_3^2 - \frac{1}{2}u^2 \omega_3^2 \omega_4 - \frac{1}{2}c_s^2 \omega_3^2 + 2\omega_2 u^3 \omega_1^2 + \frac{1}{2}\omega_2^2 u \omega_1 + \\
& \frac{1}{2}\omega_2 u^2 \omega_3 \omega_1 - 2\omega_2 u^3 \omega_4 \omega_1 + 2c_s^2 \omega_3 + \frac{1}{2}c_s^2 \omega_2 \omega_3 \omega_1 + \omega_2 + 3\omega_2 u \omega_4 \omega_1 + 3\omega_2 u^3 \omega_3 \omega_4 \omega_1 - \frac{1}{2}\omega_3 \omega_1 + \\
& c_s^2 \omega_2 u \omega_3^2 \omega_4 - \frac{1}{2}\omega_2 \omega_1 + 3u^3 \omega_3 \omega_1 + u^2 \omega_4 \omega_1^2 + \omega_2 u^2 \omega_1^2 - \omega_2 u^2 \omega_4 \omega_1 + \frac{1}{2}u^2 \omega_3^2 - \frac{5}{2}c_s^2 \omega_3 \omega_4 - \omega_2 \omega_4 + \\
& \frac{1}{2}u^2 \omega_3 \omega_4 \omega_1 + 3c_s^2 \omega_2 \omega_3 \omega_4 - c_s^2 \omega_2 \omega_3^2 \omega_4 - 3\omega_2 u^2 \omega_3 \omega_4 + 6\omega_2 u^2 \omega_4 \omega_1 + u^3 \omega_3^2 \omega_4 + \frac{1}{2}c_s^2 \omega_3^2 \omega_4 + c_s^2 \omega_2 u \omega_3 \omega_1 - \\
& \frac{1}{2}\omega_2 \omega_3 + \frac{1}{2}\omega_3 + \frac{1}{2}\omega_2 u^2 \omega_3^2 \omega_4 - \frac{1}{2}c_s^2 \omega_2 \omega_3^2 \omega_4 - \frac{1}{2}u^2 \omega_3 \omega_4^2 - c_s^2 \omega_3 \omega_1 - \frac{1}{2}\omega_2 u \omega_4 \omega_1 - \omega_2 u \omega_3 \omega_4 - \\
& c_s^2 \omega_2 u \omega_3 \omega_4 \omega_1 - u^2 \omega_1^2 - \frac{1}{2}c_s^2 \omega_2 \omega_3 \omega_4 - \frac{1}{2}\omega_2 u^2 \omega_3^2 + \frac{1}{2}c_s^2 \omega_2 \omega_3^2 + 4u^2 \omega_1 + u^2 \omega_4 \omega_1 - \frac{5}{2}c_s^2 \omega_2 \omega_3 + c_s^2 u \omega_3^2 + \\
& \frac{5}{2}\omega_2 u^2 \omega_3 - \frac{1}{2}\omega_2^2 u \omega_4 \omega_1 - \frac{1}{2}\omega_4 \omega_1 + \frac{5}{2}u^2 \omega_3 \omega_4 - c_s^2 \omega_2 \omega_3 \omega_3 + \omega_2^2 u^2 \omega_1 - \frac{5}{2}u \omega_4 \omega_1 + \frac{1}{2}\omega_2^2 u^2 \omega_3 \omega_4 + \omega_4 + \omega_2 u^3 \omega_3^2 - \\
& \frac{1}{2}u^2 \omega_3 \omega_1 + 2u^3 \omega_4 \omega_1^2 + c_s^2 u \omega_3 \omega_4 \omega_1 - 2u^3 \omega_1^2 - 3\omega_2 u^3 \omega_3 \omega_1 - \omega_2 u^2 \omega_4 \omega_1^2 - \frac{5}{2}\omega_2 u \omega_1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_2 \omega_3 \omega_4 - u \omega_3,
\end{aligned}$$

$$\alpha_{x-\delta_l, y}^{[\mu_2], t-3\delta_t} = 3 - \frac{5}{2}\omega_2 \omega_4 \omega_1 + \omega_4^2 - u \omega_4^2 \omega_1 + \frac{1}{2}\omega_3 \omega_1 - 6u \omega_3 \omega_4 - \omega_2 \omega_4^2 + \frac{1}{2}\omega_2 \omega_3^2 \omega_4 - 5u \omega_1 + u \omega_3 \omega_1 - 4\omega_2 u^2 \omega_3 \omega_4 \omega_1 -$$

$$\begin{aligned}
& \omega_2^2 u \omega_3 \omega_4 - 6 \omega_2 u \omega_3 + 3 \omega_3 \omega_4 + \frac{1}{2} \omega_2 \omega_3 \omega_4 \omega_1 - \frac{1}{2} \omega_4^2 \omega_1 - 2 u^2 \omega_3^2 \omega_4 + \frac{1}{2} \omega_2^2 \omega_3 \omega_4 + \omega_2 u \omega_4 \omega_1^2 - \omega_2^2 u \omega_1 + \\
& 4 \omega_2 u^2 \omega_3 \omega_1 + \omega_2^2 - 4 \omega_2 - 7 \omega_2 u \omega_4 \omega_1 + \omega_1^2 + 2 \omega_2 \omega_1 - 2 \omega_2 u \omega_3^2 \omega_4 + 2 \omega_2 u \omega_3^2 - \frac{1}{2} \omega_3 \omega_4^2 - 2 u^2 \omega_4 \omega_1^2 - 2 \omega_2 u^2 \omega_1^2 + \\
& 2 u^2 \omega_3^2 + u \omega_3 \omega_4^2 - \frac{1}{2} \omega_2^2 \omega_3 + 5 \omega_2 \omega_4 + 4 u^2 \omega_3 \omega_4 \omega_1 - \omega_2 u \omega_1^2 - \frac{1}{2} \omega_3 \omega_4 \omega_1 - \omega_2^2 \omega_4 + \frac{1}{2} \omega_2 \omega_3 \omega_4^2 - \omega_2 u \omega_3 \omega_1 + \\
& 3 \omega_2 \omega_3 - 2 u \omega_3^2 - u \omega_4 \omega_1^2 - \frac{5}{2} \omega_3 + 2 \omega_2 u^2 \omega_3^2 \omega_4 + \omega_2 u \omega_4^2 \omega_1 + 7 \omega_2 u \omega_3 \omega_4 - \frac{1}{2} \omega_2^2 \omega_1 + 2 u^2 \omega_1^2 - 2 \omega_2 u^2 \omega_3^2 + \\
& \omega_2 u \omega_3 \omega_4 \omega_1 - \omega_2 u \omega_3 \omega_4^2 - \frac{1}{2} \omega_2 \omega_3 \omega_1 - \frac{1}{2} \omega_3^2 \omega_4 + \frac{1}{2} \omega_2^2 \omega_4 \omega_1 + \omega_2^2 u \omega_4 \omega_1 + 2 \omega_4 \omega_1 + 6 u \omega_4 \omega_1 + \frac{1}{2} \omega_3^2 + \omega_2^2 u \omega_3 + \\
& \frac{1}{2} \omega_2 \omega_4^2 \omega_1 - 4 \omega_4 - 4 u^2 \omega_3 \omega_1 - u \omega_3 \omega_4 \omega_1 + 2 \omega_2 u^2 \omega_4 \omega_1^2 + 6 \omega_2 u \omega_1 - \frac{3}{2} \omega_1 - \frac{7}{2} \omega_2 u \omega_3 \omega_4 + 5 u \omega_3 + 2 u \omega_3^2 \omega_4 - \frac{1}{2} \omega_2 \omega_3^2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_1], t-3\delta_t} = & -4 \omega_2^2 u v^2 \omega_1 + 2 u \omega_3 v^2 \omega_4 - \omega_2^2 u \omega_3 \omega_1 + 2 u \omega_3 \omega_4 + 6 u^3 \omega_3 \omega_4 \omega_1 + 5 u \omega_1 - 4 u \omega_3 \omega_1 + 2 \omega_2 u \omega_3 - \\
& 4 u v^2 \omega_2^2 \omega_1 + 2 \omega_2 u^3 \omega_3^2 \omega_4 + 2 u^3 \omega_3^2 + 4 u \omega_3 v^2 \omega_4^2 \omega_1 - 4 \omega_2 u^3 \omega_1^2 - \omega_2 u \omega_4 \omega_1^2 + \omega_2^2 u \omega_1 + 4 \omega_2 u^3 \omega_4 \omega_1^2 + \\
& 4 \omega_2 u \omega_4 \omega_1 - 6 \omega_2 u^3 \omega_3 \omega_4 \omega_1 - 2 c_s^2 \omega_2 u \omega_4 \omega_1 - u \omega_1^2 - 4 c_s^2 \omega_2 u \omega_3^2 \omega_4 + 2 \omega_2 u \omega_3 v^2 \omega_4 + 2 \omega_2 u \omega_3^2 \omega_4 + \\
& 4 \omega_2^2 u \omega_3 v^2 \omega_1 - 4 \omega_2 u \omega_3 v^2 - 2 \omega_2 u \omega_3^2 - 6 u^3 \omega_3 \omega_1 + 2 c_s^2 u \omega_4 \omega_1 - 4 \omega_2 u \omega_3 v^2 \omega_1 - 6 \omega_2 u \omega_3 v^2 \omega_4 \omega_1 + \\
& 4 c_s^2 u \omega_3^2 \omega_4 + \omega_2 u \omega_1^2 - 2 u^3 \omega_3^2 \omega_4 - 2 c_s^2 \omega_2 u \omega_3 \omega_1 + 5 \omega_2 u \omega_3 \omega_1 + 2 u \omega_3^2 + u \omega_4 \omega_1^2 - 2 c_s^2 u \omega_3 \omega_4 - \\
& 2 \omega_2 u \omega_3^2 v^2 \omega_4 + 6 \omega_2 u v^2 \omega_4 \omega_1 + 4 \omega_2 u v^2 \omega_1 + 2 c_s^2 u \omega_3 \omega_1 - 2 \omega_2 u \omega_3 \omega_4 + 4 c_s^2 \omega_2 u \omega_3 \omega_4 \omega_1 + 2 c_s^2 \omega_2 u \omega_3 \omega_4 + \\
& 4 \omega_2 u \omega_3^2 v^2 - 3 \omega_2 u \omega_3 \omega_4 \omega_1 - 2 u \omega_3^2 v^2 \omega_4 - 2 u v^2 \omega_4 \omega_1 - 2 c_s^2 u \omega_3^2 + 2 u \omega_3 v^2 \omega_4 \omega_1 + 2 c_s^2 \omega_2 u \omega_3^2 - 4 u \omega_4 \omega_1 - \\
& 2 \omega_2 u^3 \omega_3^2 - 4 u^3 \omega_4 \omega_1^2 - 4 c_s^2 u \omega_3 \omega_4 \omega_1 + 4 u^3 \omega_1^2 + 3 u \omega_3 \omega_4 \omega_1 + 6 \omega_2 u^3 \omega_3 \omega_1 - 6 \omega_2 u \omega_1 - 2 u \omega_3 - 2 u \omega_3^2 \omega_4,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_2], t-3\delta_t} = & 3 - 3 \omega_2 \omega_4 \omega_1 + \omega_2^2 \omega_3 \omega_1 - 8 \omega_2 v^2 \omega_4 \omega_1 + 2 \omega_3 \omega_1 + 4 \omega_3^2 v^2 \omega_1 + 4 \omega_3 v^2 \omega_4^2 - \omega_2 \omega_1^2 + 8 \omega_2 u^2 \omega_3 \omega_4 \omega_1 + \\
& \omega_3 \omega_4 + \omega_2 \omega_3 \omega_4 \omega_1 + 4 u^2 \omega_3^2 \omega_4 + \omega_1^2 - 8 \omega_2 u^2 \omega_3 \omega_1 + 4 v^2 \omega_4^2 \omega_1 + \omega_2^2 - 4 \omega_2 - 4 v^2 \omega_4^2 + 5 \omega_2 \omega_1 + \\
& 8 \omega_2 \omega_3 v^2 \omega_4 \omega_1 + 4 u^2 \omega_4 \omega_1^2 + 4 \omega_2 u^2 \omega_1^2 - 4 \omega_2^2 v^2 - 4 \omega_2^2 \omega_3 v^2 \omega_1 - 4 u^2 \omega_2^2 - \omega_2^2 \omega_3 + 2 \omega_2 \omega_4 + \omega_2 \omega_4 \omega_1^2 - \\
& 8 u^2 \omega_3 \omega_4 \omega_1 - \omega_3 \omega_4 \omega_1 + 3 \omega_2 \omega_3 - 2 \omega_3 - 4 \omega_2 u^2 \omega_3 \omega_4 - \omega_4 \omega_1^2 - \omega_2 \omega_1 - 4 u^2 \omega_1^2 + 4 \omega_2 u^2 \omega_3^2 - 3 \omega_2 \omega_3 \omega_1 - \\
& 8 \omega_2 \omega_3 v^2 \omega_4 + 3 \omega_4 \omega_1 + 4 \omega_2^2 \omega_3 v^2 - 4 \omega_3 v^2 \omega_4 \omega_1 - 2 \omega_4 + 8 u^2 \omega_3 \omega_1 + 8 \omega_2 v^2 \omega_4 - 4 \omega_2 u^2 \omega_4 \omega_1^2 - 4 \omega_1 - \omega_2 \omega_3 \omega_4,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l, y}^{[\mu_1], t-3\delta_t} = & 1 - \frac{1}{2} \omega_2 \omega_4 \omega_1 + \frac{1}{2} \omega_2^2 u^2 \omega_3 - \frac{1}{2} c_s^2 \omega_3 \omega_4 \omega_1 + \frac{1}{2} u \omega_4^2 \omega_1 + \frac{1}{2} c_s^2 \omega_2 \omega_3 \omega_4^2 - \frac{1}{2} \omega_2 u^2 \omega_3 \omega_4^2 + 5 \omega_2 u^2 \omega_1 + \\
& u \omega_3 \omega_4 + 2 u^2 \omega_3 - 3 u^3 \omega_3 \omega_4 \omega_1 + \omega_2^2 u^2 \omega_4 \omega_1 - \frac{1}{2} c_s^2 \omega_3 \omega_4^2 + 2 u \omega_1 + \frac{1}{2} \omega_2 u^2 \omega_3 \omega_4 \omega_1 + \omega_2 u \omega_3 + \frac{1}{2} c_s^2 \omega_2 \omega_3 \omega_4 \omega_1 - \\
& \frac{1}{2} c_s^2 \omega_2^2 \omega_3 + 5 u^2 \omega_4 \omega_1 + \frac{1}{2} \omega_3 \omega_4 - \omega_2 u^3 \omega_3^2 \omega_4 - u^3 \omega_3^2 + \frac{1}{2} u^2 \omega_3^2 \omega_4 + \frac{1}{2} c_s^2 \omega_3^2 + 2 \omega_2 u^3 \omega_1^2 + \frac{1}{2} \omega_2^2 u \omega_1 - \\
& \frac{1}{2} \omega_2 u^2 \omega_3 \omega_1 - 2 \omega_2 u^3 \omega_4 \omega_1^2 - 2 c_s^2 \omega_3 - \frac{1}{2} c_s^2 \omega_2 \omega_3 \omega_1 - \omega_2 + 3 \omega_2 u \omega_4 \omega_1 + 3 \omega_2 u^3 \omega_3 \omega_4 \omega_1 + \frac{1}{2} c_s^2 \omega_3 \omega_1 + \\
& c_s^2 \omega_2 u \omega_3^2 \omega_4 + \frac{1}{2} \omega_2 \omega_1 + 3 u^3 \omega_3 \omega_1 - u^2 \omega_4 \omega_1^2 - \omega_2 u^2 \omega_1^2 + \omega_2 u^2 \omega_4 \omega_1^2 - \frac{1}{2} u^2 \omega_3^2 + \frac{5}{2} c_s^2 \omega_3 \omega_4 + \omega_2 \omega_4 - \\
& \frac{1}{2} u^2 \omega_3 \omega_4 \omega_1 - 3 c_s^2 \omega_2 \omega_3 \omega_4 - c_s^2 u \omega_3^2 \omega_4 + 3 \omega_2 u^2 \omega_3 \omega_4 - 6 \omega_2 u^2 \omega_4 \omega_1 + u^3 \omega_3^2 \omega_4 - \frac{1}{2} c_s^2 \omega_3^2 \omega_4 + c_s^2 \omega_2 u \omega_3 \omega_1 + \\
& \frac{1}{2} \omega_2 \omega_3 - \frac{1}{2} \omega_3 - \frac{1}{2} \omega_2 u^2 \omega_3^2 \omega_4 + \frac{1}{2} c_s^2 \omega_2 \omega_3^2 \omega_4 + \frac{1}{2} u^2 \omega_3 \omega_4^2 - c_s^2 u \omega_3 \omega_1 - \frac{1}{2} \omega_2 u \omega_3^2 \omega_1 - \omega_2 u \omega_3 \omega_4 - \\
& c_s^2 \omega_2 u \omega_3 \omega_4 \omega_1 + u^2 \omega_1^2 + \frac{1}{2} c_s^2 \omega_2^2 \omega_3 \omega_4 + \frac{1}{2} \omega_2 u^2 \omega_3^2 - \frac{1}{2} c_s^2 \omega_2 \omega_3^2 - 4 u^2 \omega_1 - u^2 \omega_4 \omega_1 + \frac{5}{2} c_s^2 \omega_2 \omega_3 + c_s^2 u \omega_3^2 - \\
& \frac{5}{2} \omega_2 u^2 \omega_3 - \frac{1}{2} \omega_2^2 u \omega_4 \omega_1 + \frac{1}{2} \omega_4 \omega_1 - \frac{5}{2} u^2 \omega_3 \omega_4 - c_s^2 \omega_2 u \omega_3^2 - \omega_2^2 u \omega_1^2 - \frac{5}{2} u \omega_4 \omega_1 - \frac{1}{2} \omega_2 u^2 \omega_3 \omega_4 - \omega_4 + \omega_2 u^3 \omega_3^2 + \\
& \frac{1}{2} u^2 \omega_3 \omega_1 + 2 u^3 \omega_4 \omega_1^2 + c_s^2 u \omega_3 \omega_4 \omega_1 - 2 u^3 \omega_1^2 - 3 \omega_2 u^3 \omega_3 \omega_1 + \omega_2 u^2 \omega_4 \omega_1^2 - \frac{5}{2} \omega_2 u \omega_1 - \frac{1}{2} \omega_2 \omega_3 \omega_4 - u \omega_3,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l, y}^{[\mu_2], t-3\delta_t} = & 3 - \frac{5}{2} \omega_2 \omega_4 \omega_1 + \omega_4^2 + u \omega_4^2 \omega_1 + \frac{1}{2} \omega_3 \omega_1 + 6 u \omega_3 \omega_4 - \omega_2 \omega_4^2 + \frac{1}{2} \omega_2 \omega_3^2 \omega_4 + 5 u \omega_1 - u \omega_3 \omega_1 - 4 \omega_2 u^2 \omega_3 \omega_4 \omega_1 + \\
& \omega_2^2 u \omega_3 \omega_4 + 6 \omega_2 u \omega_3 + 3 \omega_3 \omega_4 + \frac{1}{2} \omega_2 \omega_3 \omega_4 \omega_1 - \frac{1}{2} \omega_4^2 \omega_1 - 2 u^2 \omega_3^2 \omega_4 + \frac{1}{2} \omega_2^2 \omega_3 \omega_4 - \omega_2 u \omega_4 \omega_1^2 + \omega_2^2 u \omega_1 + \\
& 4 \omega_2 u^2 \omega_3 \omega_1 + \omega_2^2 - 4 \omega_2 + 7 \omega_2 u \omega_4 \omega_1 - u \omega_1^2 + 2 \omega_2 \omega_1 + 2 \omega_2 u \omega_3^2 \omega_4 - 2 \omega_2 u \omega_3^2 - \frac{1}{2} \omega_3 \omega_4^2 - 2 u^2 \omega_4 \omega_1^2 - 2 \omega_2 u^2 \omega_1^2 + \\
& 2 u^2 \omega_3^2 - u \omega_3 \omega_4^2 - \frac{1}{2} \omega_2^2 \omega_3 + 5 \omega_2 \omega_4 + 4 u^2 \omega_3 \omega_4 \omega_1 + \omega_2 u \omega_1^2 - \frac{1}{2} \omega_3 \omega_4 \omega_1 - \omega_2^2 \omega_4 + \frac{1}{2} \omega_2 \omega_3 \omega_4^2 + \omega_2 u \omega_3 \omega_1 + \\
& 3 \omega_2 \omega_3 + 2 u \omega_3^2 + u \omega_4 \omega_1^2 - \frac{5}{2} \omega_3 + 2 \omega_2 u^2 \omega_3^2 \omega_4 - \omega_2 u \omega_4 \omega_1^2 - 7 \omega_2 u \omega_3 \omega_4 - \frac{1}{2} \omega_2^2 \omega_1 + 2 u^2 \omega_1^2 - 2 \omega_2 u^2 \omega_3^2 - \\
& \omega_2 u \omega_3 \omega_4 \omega_1 + \omega_2 u \omega_3 \omega_4^2 - \frac{1}{2} \omega_2 \omega_3 \omega_1 - \frac{1}{2} \omega_3^2 \omega_4 + \frac{1}{2} \omega_2^2 \omega_4 \omega_1 - \omega_2^2 u \omega_4 \omega_1 + 2 \omega_4 \omega_1 - 6 u \omega_4 \omega_1 + \frac{1}{2} \omega_3^2 - \omega_2^2 u \omega_3 + \\
& \frac{1}{2} \omega_2 \omega_4^2 \omega_1 - 4 \omega_4 - 4 u^2 \omega_3 \omega_1 + u \omega_3 \omega_4 \omega_1 + 2 \omega_2 u^2 \omega_4 \omega_1^2 - 6 \omega_2 u \omega_1 - \frac{3}{2} \omega_1 - \frac{7}{2} \omega_2 u \omega_3 \omega_4 - 5 u \omega_3 - 2 u \omega_3^2 \omega_4 - \frac{1}{2} \omega_2 \omega_3^2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x, y+\delta_l}^{[\mu_1], t-3\delta_t} = & -7 u v \omega_4 \omega_1 + 2 \omega_2^2 u v^2 \omega_1 + \frac{1}{2} u \omega_4^2 \omega_1 - u \omega_3 v^2 \omega_4 - \omega_2 u v \omega_1^2 - \frac{1}{2} u \omega_3 \omega_4^2 \omega_1 + u \omega_3 \omega_4 + 8 u \omega_3 v \omega_4 \omega_1 + 5 u \omega_1 - \\
& \frac{1}{2} u \omega_3^2 \omega_4 \omega_1 - 6 u \omega_3 \omega_1 - \omega_2 u \omega_3 v + \omega_2 u \omega_3 + 2 u v^2 \omega_4^2 \omega_1 - 2 u \omega_3^2 v \omega_4 - 2 u \omega_3 v^2 \omega_4^2 \omega_1 + \omega_2 u \omega_3^2 v \omega_1 + \frac{1}{2} \omega_2 u \omega_4 \omega_1 + \\
& c_s^2 \omega_2 u \omega_4 \omega_1 - u \omega_1^2 + c_s^2 \omega_2 \omega_3 \omega_4^2 \omega_1 - \omega_2 u \omega_3 v^2 \omega_4 + u \omega_3 \omega_1^2 - 2 \omega_2^2 u \omega_3 v^2 \omega_1 + 2 \omega_2 u \omega_3 v^2 - \omega_2 u \omega_3^2 - c_s^2 u \omega_4 \omega_1 - \\
& \frac{1}{2} \omega_2 u \omega_3^2 \omega_1 + 2 \omega_2 u \omega_3 v^2 \omega_1 - u \omega_3 v \omega_4 \omega_1^2 + 3 \omega_2 u \omega_3 v^2 \omega_4 \omega_1 + u v \omega_4 \omega_1^2 + 6 \omega_2 u v \omega_1 - c_s^2 u \omega_3 \omega_4 + \omega_2 u \omega_3^2 v \omega_4 + \\
& \frac{1}{2} \omega_2 u \omega_1^2 - u \omega_3^2 v \omega_4 \omega_1 + 3 \omega_2 u \omega_3 \omega_1 - 7 \omega_2 u \omega_3 v \omega_1 + 2 u \omega_3^2 + \frac{1}{2} u \omega_4 \omega_1^2 + c_s^2 u \omega_3 \omega_4 + \omega_2 u \omega_3^2 v^2 \omega_4 - \frac{1}{2} u \omega_3 \omega_4 \omega_1^2 - \\
& 3 \omega_2 u v^2 \omega_4 \omega_1 - 2 \omega_2 u v^2 \omega_1 - \omega_2 u \omega_3 v \omega_4 - c_s^2 \omega_2 u \omega_3 \omega_4 \omega_1 - c_s^2 \omega_2 u \omega_3 \omega_4 - 2 \omega_2 u \omega_3^2 v^2 - \frac{1}{2} \omega_2 u \omega_3 \omega_4 \omega_1 + \\
& \omega_2^2 u \omega_3 v \omega_1 + u \omega_3^2 \omega_1 + u \omega_3^2 v^2 \omega_4 + u v^2 \omega_4 \omega_1 + \omega_2 u \omega_3^2 v - u \omega_3 v^2 \omega_4 \omega_1 - \frac{7}{2} u \omega_4 \omega_1 + 2 u \omega_3 v \omega_4 - \omega_2^2 u \omega_1 + \\
& 2 u v \omega_4 \omega_1 + c_s^2 u \omega_3 \omega_4 \omega_1 + 4 u \omega_3 \omega_4 \omega_1 - \frac{5}{2} \omega_2 u \omega_1 - 2 u \omega_3 v \omega_4 \omega_1^2 - 2 u \omega_3 + \omega_2 u \omega_3 v \omega_1 - u \omega_3^2 \omega_4 - \frac{1}{2} \omega_2 u \omega_3 \omega_1^2,
\end{aligned}$$

$$\alpha_{x, y+\delta_l}^{[\mu_2], t-3\delta_t} = 3 - \frac{1}{2} \omega_2 \omega_4 \omega_1 + \frac{1}{2} \omega_4^2 + 4 \omega_2 v^2 \omega_4 \omega_1 - \omega_2 v \omega_4 + 5 \omega_3 \omega_1 - \omega_2^2 v - 2 \omega_2^2 v^2 \omega_1 - v \omega_4 \omega_1^2 + 7 \omega_2 \omega_3 v \omega_1 -$$

$$\begin{aligned}
& 2\omega_3v^2\omega_4^2 - \frac{1}{2}\omega_2\omega_1^2 + \omega_2\omega_3v\omega_4 + \frac{1}{2}\omega_2\omega_3^2\omega_1 + 2\omega_3v\omega_4^2\omega_1 + 3\omega_3\omega_4 + \frac{1}{2}\omega_2\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_4^2\omega_1 - 6\omega_2v\omega_1 + \omega_1^2 + \\
& \omega_2v\omega_1^2 - 2v^2\omega_4^2\omega_1 - \omega_3^2v\omega_4 - \frac{3}{2}\omega_2 + \frac{1}{2}\omega_3\omega_4\omega_1 + 2v^2\omega_4^2 + 2\omega_2\omega_1 - 4\omega_2\omega_3v^2\omega_4\omega_1 + \omega_3^2v\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4^2 - \\
& 6\omega_2\omega_3v + \frac{1}{2}\omega_3\omega_4^2\omega_1 + 2\omega_2^2v^2 + 2\omega_2^2\omega_3v^2\omega_1 - \omega_3\omega_1^2 + 6v\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_4 - \omega_2\omega_3v\omega_1^2 - \omega_2^2\omega_3v\omega_1 + \omega_2\omega_3^2v - \\
& \frac{7}{2}\omega_3\omega_4\omega_1 + 6\omega_3v\omega_4 + 2\omega_2\omega_3 - 2v\omega_4^2\omega_1 - 4\omega_3 - \omega_2\omega_3v\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_1^2 + 2v\omega_4^2 + \omega_2^2\omega_3v + \frac{1}{2}\omega_2\omega_3\omega_1^2 + \\
& \omega_3v\omega_4\omega_1^2 + \omega_2v\omega_4\omega_1 - \frac{5}{2}\omega_2\omega_3\omega_1 + 4\omega_2\omega_3v^2\omega_4 - \frac{1}{2}\omega_3^2\omega_4 - 7\omega_3v\omega_4\omega_1 - \omega_2\omega_3^2v\omega_1 + 3\omega_4\omega_1 - 5v\omega_4 - 2\omega_2^2\omega_3v^2 + \\
& \omega_3^2 + 2\omega_3v^2\omega_4^2\omega_1 - \frac{5}{2}\omega_4 - 4\omega_2v^2\omega_4 + \frac{1}{2}\omega_3\omega_4\omega_1^2 - \omega_3^2\omega_1 + 5\omega_2v - 4\omega_1 - \frac{1}{2}\omega_2\omega_3\omega_4 - 2\omega_3v\omega_4^2 - \frac{1}{2}\omega_2\omega_3^2 + \omega_2^2v\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_1],t-\delta_t} = & -u\omega_4^2\omega_1 + u\omega_3\omega_4^2\omega_1 + \omega_2^2u\omega_3\omega_1 - 2u\omega_3\omega_4 - 6u\omega_1 + u\omega_3^2\omega_4\omega_1 + 7u\omega_3\omega_1 - 2\omega_2u\omega_3 + \omega_2u\omega_4\omega_1^2 - \\
& \omega_2^2u\omega_1 - 8\omega_2u\omega_4\omega_1 + u\omega_1^2 - u\omega_3\omega_1^2 - 2\omega_2u\omega_3^2\omega_4 - \omega_2u\omega_3\omega_4^2\omega_1 + 2\omega_2u\omega_3^2 + \omega_2u\omega_3^2\omega_1 - \omega_2u\omega_3^2\omega_4\omega_1 - \\
& \omega_2u\omega_1^2 - 8\omega_2u\omega_3\omega_1 - \omega_2^2u\omega_3\omega_4\omega_1 - 2u\omega_3^2 - u\omega_4\omega_1^2 + u\omega_3\omega_4\omega_1^2 + \omega_2u\omega_4\omega_1 + 2\omega_2u\omega_3\omega_4 + 9\omega_2u\omega_3\omega_4\omega_1 - \\
& \omega_2\omega_1^2 - \omega_2u\omega_3\omega_4\omega_1^2 + \omega_2^2u\omega_4\omega_1 + 7u\omega_4\omega_1 - 8u\omega_3\omega_4\omega_1 + 7\omega_2u\omega_1 + 2u\omega_3 + 2u\omega_3^2\omega_4 + \omega_2u\omega_3\omega_1^2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_2],t-\delta_t} = & -4 + 7\omega_2\omega_4\omega_1 - \omega_4^2 - \omega_2^2\omega_3\omega_1 - 6\omega_3\omega_1 + \omega_2\omega_4^2 - \omega_2\omega_3^2\omega_4 + \omega_2\omega_1^2 - \omega_2\omega_3^2\omega_1 - 6\omega_3\omega_4 - 8\omega_2\omega_3\omega_4\omega_1 + \omega_4^2\omega_1 - \\
& \omega_2^2\omega_3\omega_4 - \omega_1^2 - \omega_2^2 + 5\omega_2 - \omega_3^2\omega_4\omega_1 - 6\omega_2\omega_1 + \omega_2\omega_3\omega_4\omega_1^2 + \omega_3\omega_4^2 - \omega_3\omega_4^2\omega_1 + \omega_3\omega_1^2 + \omega_2^2\omega_3 - 6\omega_2\omega_4 - \omega_2\omega_4\omega_1^2 + \\
& 7\omega_3\omega_4\omega_1 + \omega_2^2\omega_4 - \omega_2\omega_3\omega_4^2 - 6\omega_2\omega_3 + 5\omega_3 + \omega_4\omega_1^2 + \omega_2^2\omega_1 + \omega_2^2\omega_3\omega_4\omega_1 - \omega_2\omega_3\omega_1^2 + 7\omega_2\omega_3\omega_1 + \omega_2\omega_3\omega_4\omega_1 + \\
& \omega_3^2\omega_4 - \omega_2^2\omega_4\omega_1 - 6\omega_4\omega_1 - \omega_3^2 + \omega_2\omega_3^2\omega_4\omega_1 - \omega_2\omega_4\omega_1^2 + 5\omega_4 - \omega_3\omega_4\omega_1^2 + \omega_3^2\omega_1 + 5\omega_1 + 7\omega_2\omega_3\omega_4 + \omega_2\omega_3^2,
\end{aligned}$$

## 7.4 EFDE for $\mu_3$

$$\mu_{3,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_3],t-\ell\delta_t} \mu_{3,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x,y-\delta_l}^{[\mu_1],t} = 1 - \frac{1}{2}v^2\omega_4 - \frac{1}{2}\omega_2 + \omega_2v^2 + \frac{1}{2}c_s^2\omega_4 + v\omega_4 - \frac{1}{2}\omega_2v.$$

$$\alpha_{x,y+\delta_l}^{[\mu_1],t} = -1 + \frac{1}{2}v^2\omega_4 + \frac{1}{2}\omega_2 - \omega_2v^2 - \frac{1}{2}c_s^2\omega_4 + v\omega_4 + \frac{1}{2}\omega_4 - \frac{1}{2}\omega_2v.$$

$$\begin{aligned}
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} = & -1 + \frac{1}{2}uv\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_3v\omega_4 + \frac{1}{2}\omega_2u^2\omega_1 + \frac{1}{2}u\omega_3\omega_4 + \frac{1}{2}u^2\omega_3 + \frac{1}{2}u\omega_1 + \omega_2u\omega_3v + \frac{1}{2}\omega_2u\omega_3 + \\
& \frac{1}{2}u^2\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4 - \frac{1}{2}\omega_2v\omega_1 - \frac{1}{2}c_s^2\omega_3 + \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_3v + \frac{1}{2}v\omega_4\omega_1 + \frac{1}{4}c_s^2\omega_3\omega_4 + \frac{1}{2}u^2\omega_3v\omega_4 - \\
& \frac{1}{2}\omega_2uv\omega_1 + \frac{1}{2}\omega_3v\omega_4 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{2}\omega_3 - u^2v\omega_4\omega_1 + \omega_2u^2v\omega_1 - u^2\omega_1 + \frac{1}{4}c_s^2\omega_2\omega_3 - \frac{1}{4}\omega_2u^2\omega_3 - \frac{1}{4}\omega_4\omega_1 - \\
& \frac{1}{4}u^2\omega_3\omega_4 - v\omega_4 - \frac{1}{4}u\omega_4\omega_1 - u\omega_3v\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3v - \frac{1}{2}\omega_2u^2\omega_3v + \frac{1}{2}\omega_4 + \omega_2v - \frac{1}{4}\omega_2u\omega_1 + \frac{1}{2}\omega_1 - u\omega_3,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_3],t-\delta_t} = & 1 - uv\omega_4\omega_1 - \frac{1}{2}u\omega_3\omega_4 - u\omega_1 - \omega_2u\omega_3v - \frac{1}{2}\omega_2u\omega_3 + \frac{1}{4}\omega_3\omega_4 + \frac{1}{2}\omega_2v\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{2}\omega_2\omega_3v - \frac{1}{2}v\omega_4\omega_1 + \\
& \omega_2uv\omega_1 - \frac{1}{2}\omega_3v\omega_4 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_3 + \frac{1}{4}\omega_4\omega_1 + v\omega_4 + \frac{1}{2}u\omega_4\omega_1 + u\omega_3v\omega_4 - \frac{1}{2}\omega_4 - \omega_2v + \frac{1}{2}\omega_2u\omega_1 - \frac{1}{2}\omega_1 + u\omega_3,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_1],t-\delta_t} = & -1 + c_s^2\omega_3v\omega_4 - \omega_2u^2\omega_1 - v^3\omega_4^2 - u^2\omega_3 - u^2\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_2\omega_4 - v^2\omega_4 + c_s^2\omega_3 + \frac{1}{2}\omega_2 - 2\omega_2^2v^3 + \frac{1}{2}v^2\omega_4^2 - \\
& \omega_2^2v^2 - \frac{1}{2}c_s^2\omega_3\omega_4 - u^2\omega_3v\omega_4 + 2\omega_2v^2 - c_s^2\omega_2v\omega_4 + 2u^2v\omega_4\omega_1 + c_s^2\omega_4 + 3\omega_2v^3\omega_4 - 2\omega_2u^2v\omega_1 + 2u^2\omega_1 - \\
& \frac{1}{2}c_s^2\omega_2\omega_3 + \frac{1}{2}\omega_2u^2\omega_3 + \frac{1}{2}u^2\omega_3\omega_4 - \frac{1}{2}c_s^2\omega_4^2 - v\omega_4 - c_s^2\omega_2\omega_3v + \omega_2u^2\omega_3v + \frac{1}{2}\omega_4 + c_s^2v\omega_4^2 - \frac{1}{2}\omega_2v^2\omega_4 + \omega_2v,
\end{aligned}$$

$$\alpha_{x,y-\delta_l}^{[\mu_3],t-\delta_t} = 1 + \frac{1}{2}\omega_4^2 + \omega_2v\omega_4 + \omega_2^2v - \frac{1}{2}\omega_2 + 2v^2\omega_4^2 + 2\omega_2^2v^2 + \frac{1}{2}\omega_2\omega_4 - 2v\omega_4^2 + 3v\omega_4 - \frac{3}{2}\omega_4 - 4\omega_2v^2\omega_4 - 3\omega_2v,$$

$$\begin{aligned}
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} = & -1 - \frac{1}{2}uv\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_3v\omega_4 + \frac{1}{2}\omega_2u^2\omega_1 - \frac{1}{2}u\omega_3\omega_4 + \frac{1}{2}u^2\omega_3 - \frac{1}{2}u\omega_1 - \omega_2u\omega_3v - \frac{1}{2}\omega_2u\omega_3 + \\
& \frac{1}{2}u^2\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4 - \frac{1}{2}\omega_2v\omega_1 - \frac{1}{2}c_s^2\omega_3 + \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_3v + \frac{1}{2}v\omega_4\omega_1 + \frac{1}{4}c_s^2\omega_3\omega_4 + \frac{1}{2}u^2\omega_3v\omega_4 + \\
& \frac{1}{2}\omega_2uv\omega_1 + \frac{1}{2}\omega_3v\omega_4 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{2}\omega_3 - u^2v\omega_4\omega_1 + \omega_2u^2v\omega_1 - u^2\omega_1 + \frac{1}{4}c_s^2\omega_2\omega_3 - \frac{1}{4}\omega_2u^2\omega_3 - \frac{1}{4}\omega_4\omega_1 - \\
& \frac{1}{4}u^2\omega_3\omega_4 - v\omega_4 + \frac{1}{4}u\omega_4\omega_1 + u\omega_3v\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3v - \frac{1}{2}\omega_2u^2\omega_3v + \frac{1}{2}\omega_4 + \omega_2v + \frac{1}{4}\omega_2u\omega_1 + \frac{1}{2}\omega_1 + u\omega_3,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l, y-\delta_l}^{[\mu_3], t-\delta_t} &= 1 + uv\omega_4\omega_1 + \frac{1}{2}u\omega_3\omega_4 + u\omega_1 + \omega_2u\omega_3v + \frac{1}{2}\omega_2u\omega_3 + \frac{1}{4}\omega_3\omega_4 + \frac{1}{2}\omega_2v\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{2}\omega_2\omega_3v - \frac{1}{2}v\omega_4\omega_1 - \\
&\quad \omega_2uv\omega_1 - \frac{1}{2}\omega_3v\omega_4 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_3 + \frac{1}{4}\omega_4\omega_1 + v\omega_4 - \frac{1}{2}u\omega_4\omega_1 - u\omega_3v\omega_4 - \frac{1}{2}\omega_4 - \omega_2v - \frac{1}{2}\omega_2u\omega_1 - \frac{1}{2}\omega_1 - u\omega_3, \\
\alpha_{x-\delta_l, y}^{[\mu_3], t-\delta_t} &= 1 + \frac{1}{2}\omega_3\omega_1 - 3u\omega_1 + u\omega_3\omega_1 + u\omega_1^2 + 2u^2\omega_3^2 - 2u\omega_3^2 - \frac{3}{2}\omega_3 + 2u^2\omega_1^2 + \frac{1}{2}\omega_3^2 - 4u^2\omega_3\omega_1 - \frac{1}{2}\omega_1 + 3u\omega_3, \\
\alpha_{x, y}^{[\mu_1], t-\delta_t} &= -2\omega_2v\omega_4 - \omega_2^2v + 2v^3\omega_4^2 + 4\omega_2^2v^3 + 2c_s^2\omega_2v\omega_4 + 2v\omega_4^2 - 6\omega_2v^3\omega_4 - 2v\omega_4 - 2c_s^2v\omega_4^2 + 3\omega_2v, \\
\alpha_{x, y}^{[\mu_3], t-\delta_t} &= 2 + \omega_1^2 + \omega_2^2 - 2\omega_2 - 4v^2\omega_4^2 - 4\omega_2^2v^2 - 4u^2\omega_3^2 - 4u^2\omega_1^2 + 8u^2\omega_3\omega_1 + 8\omega_2v^2\omega_4 - 2\omega_1, \\
\alpha_{x+\delta_l, y}^{[\mu_3], t-\delta_t} &= 1 + \frac{1}{2}\omega_3\omega_1 + 3u\omega_1 - u\omega_3\omega_1 - u\omega_1^2 + 2u^2\omega_3^2 + 2u\omega_3^2 - \frac{3}{2}\omega_3 + 2u^2\omega_1^2 + \frac{1}{2}\omega_3^2 - 4u^2\omega_3\omega_1 - \frac{1}{2}\omega_1 - 3u\omega_3, \\
\alpha_{x-\delta_l, y+\delta_l}^{[\mu_1], t-\delta_t} &= 1 + \frac{1}{2}uv\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_3v\omega_4 - \frac{1}{2}\omega_2u^2\omega_1 - \frac{1}{2}u\omega_3\omega_4 - \frac{1}{2}u\omega_1 + \omega_2u\omega_3v - \frac{1}{2}\omega_2u\omega_3 - \\
&\quad \frac{1}{2}u^2\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{2}\omega_2v\omega_1 + \frac{1}{2}c_s^2\omega_3 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_3v + \frac{1}{2}v\omega_4\omega_1 - \frac{1}{4}c_s^2\omega_3\omega_4 + \frac{1}{2}u^2\omega_3v\omega_4 - \\
&\quad \frac{1}{2}\omega_2uv\omega_1 + \frac{1}{2}\omega_3v\omega_4 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_3 - u^2v\omega_4\omega_1 + \omega_2u^2v\omega_1 + u^2\omega_1 - \frac{1}{4}c_s^2\omega_2\omega_3 + \frac{1}{4}\omega_2u^2\omega_3 + \frac{1}{4}\omega_4\omega_1 + \\
&\quad \frac{1}{4}u^2\omega_3\omega_4 - v\omega_4 + \frac{1}{4}u\omega_4\omega_1 - u\omega_3v\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3v - \frac{1}{2}\omega_2u^2\omega_3v - \frac{1}{2}\omega_4 + \omega_2v + \frac{1}{4}\omega_2u\omega_1 - \frac{1}{2}\omega_1 + u\omega_3, \\
\alpha_{x-\delta_l, y+\delta_l}^{[\mu_3], t-\delta_t} &= 1 + uv\omega_4\omega_1 - \frac{1}{2}u\omega_3\omega_4 - u\omega_1 + \omega_2u\omega_3v - \frac{1}{2}\omega_2u\omega_3 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{2}\omega_2v\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_3v + \frac{1}{2}v\omega_4\omega_1 - \\
&\quad \omega_2uv\omega_1 + \frac{1}{2}\omega_3v\omega_4 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_3 + \frac{1}{4}\omega_4\omega_1 - v\omega_4 + \frac{1}{2}u\omega_4\omega_1 - u\omega_3v\omega_4 - \frac{1}{2}\omega_4 + \omega_2v + \frac{1}{2}\omega_2u\omega_1 - \frac{1}{2}\omega_1 + u\omega_3, \\
\alpha_{x, y+\delta_l}^{[\mu_1], t-\delta_t} &= 1 + c_s^2\omega_3v\omega_4 + \omega_2u^2\omega_1 - v^3\omega_4^2 + u^2\omega_3 + u^2\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_2\omega_4 + v^2\omega_4 - c_s^2\omega_3 - \frac{1}{2}\omega_2 - 2\omega_2^2v^3 - \frac{1}{2}v^2\omega_4^2 + \\
&\quad \omega_2^2v^2 + \frac{1}{2}c_s^2\omega_3\omega_4 - u^2\omega_3v\omega_4 - 2\omega_2v^2 - c_s^2\omega_2v\omega_4 + 2u^2v\omega_4\omega_1 - c_s^2\omega_4 + 3\omega_2v^3\omega_4 - 2\omega_2u^2v\omega_1 - 2u^2\omega_1 + \\
&\quad \frac{1}{2}c_s^2\omega_2\omega_3 - \frac{1}{2}\omega_2u^2\omega_3 - \frac{1}{2}u^2\omega_3\omega_4 + \frac{1}{2}c_s^2\omega_4^2 - v\omega_4 - c_s^2\omega_2\omega_3v + \omega_2u^2\omega_3v - \frac{1}{2}\omega_4 + c_s^2v\omega_4^2 + \frac{1}{2}\omega_2v^2\omega_4 + \omega_2v, \\
\alpha_{x, y+\delta_l}^{[\mu_3], t-\delta_t} &= 1 + \frac{1}{2}\omega_4^2 - \omega_2v\omega_4 - \omega_2^2v - \frac{1}{2}\omega_2 + 2v^2\omega_4^2 + 2\omega_2^2v^2 + \frac{1}{2}\omega_2\omega_4 + 2v\omega_4^2 - 3v\omega_4 - \frac{3}{2}\omega_4 - 4\omega_2v^2\omega_4 + 3\omega_2v, \\
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_1], t-\delta_t} &= 1 - \frac{1}{2}uv\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_3v\omega_4 - \frac{1}{2}\omega_2u^2\omega_1 + \frac{1}{2}u\omega_3\omega_4 - \frac{1}{2}u\omega_1 - \omega_2u\omega_3v + \frac{1}{2}\omega_2u\omega_3 - \\
&\quad \frac{1}{2}u^2\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{2}\omega_2v\omega_1 + \frac{1}{2}c_s^2\omega_3 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_3v + \frac{1}{2}v\omega_4\omega_1 - \frac{1}{4}c_s^2\omega_3\omega_4 + \frac{1}{2}u^2\omega_3v\omega_4 + \\
&\quad \frac{1}{2}\omega_2uv\omega_1 + \frac{1}{2}\omega_3v\omega_4 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_3 - u^2v\omega_4\omega_1 + \omega_2u^2v\omega_1 + u^2\omega_1 - \frac{1}{4}c_s^2\omega_2\omega_3 + \frac{1}{4}\omega_2u^2\omega_3 + \frac{1}{4}\omega_4\omega_1 + \\
&\quad \frac{1}{4}u^2\omega_3\omega_4 - v\omega_4 - \frac{1}{4}u\omega_4\omega_1 + u\omega_3v\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3v - \frac{1}{2}\omega_2u^2\omega_3v - \frac{1}{2}\omega_4 + \omega_2v - \frac{1}{4}\omega_2u\omega_1 - \frac{1}{2}\omega_1 - u\omega_3, \\
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_3], t-\delta_t} &= 1 - uv\omega_4\omega_1 + \frac{1}{2}u\omega_3\omega_4 + u\omega_1 - \omega_2u\omega_3v + \frac{1}{2}\omega_2u\omega_3 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{2}\omega_2v\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_3v + \frac{1}{2}v\omega_4\omega_1 + \\
&\quad \omega_2uv\omega_1 + \frac{1}{2}\omega_3v\omega_4 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_3 + \frac{1}{4}\omega_4\omega_1 - v\omega_4 - \frac{1}{2}u\omega_4\omega_1 + u\omega_3v\omega_4 - \frac{1}{2}\omega_4 + \omega_2v - \frac{1}{2}\omega_2u\omega_1 - \frac{1}{2}\omega_1 - u\omega_3, \\
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_1], t-2\delta_t} &= 1 - \frac{1}{2}uv\omega_4\omega_1 - \omega_2u^2\omega_3^2v + \frac{1}{4}\omega_3v^2\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_3\omega_4\omega_1 - \omega_2^2uv^2\omega_1 + \frac{5}{2}u\omega_3v^2\omega_4 - \frac{1}{2}\omega_2uv\omega_1^2 - \\
&\quad \frac{1}{2}c_s^2\omega_3v\omega_4 - \frac{1}{4}\omega_2v^2\omega_4\omega_1 + \frac{1}{2}c_s^2v\omega_4^2\omega_1 - 3\omega_2u\omega_3v^3\omega_4 - \frac{1}{2}c_s^2u\omega_4\omega_1^2 + \frac{1}{2}\omega_2u^2\omega_1 + \frac{5}{2}\omega_2\omega_3v^2 + \frac{3}{2}\omega_2u^2\omega_3v\omega_1 + \\
&\quad v^3\omega_4^2 - \frac{1}{2}\omega_3\omega_4 - \frac{1}{2}\omega_2v^2\omega_1 - \frac{1}{2}c_s^2\omega_2\omega_3v\omega_1 + \frac{1}{2}u^2\omega_3 - \frac{1}{4}\omega_2\omega_3v\omega_1 + \frac{1}{4}\omega_3v^2\omega_4^2 - \frac{1}{2}u\omega_3v\omega_4\omega_1 - \frac{1}{4}c_s^2\omega_3\omega_4^2 - \\
&\quad 2\omega_2u^2v^2\omega_1^2 - \frac{1}{2}u\omega_1 - \frac{1}{2}u\omega_3\omega_1 + u^2v^2\omega_4\omega_1^2 - \frac{1}{2}c_s^2\omega_2\omega_3v\omega_4 - \frac{5}{2}\omega_2u\omega_3v - \frac{1}{2}\omega_2u\omega_3 + \frac{1}{2}u\omega_2v^2\omega_4\omega_1 + \\
&\quad 3\omega_2uv^3\omega_4\omega_1 + \frac{1}{2}u^2\omega_3v\omega_4\omega_1 + \frac{1}{2}u^2\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_4 + u\omega_3v^3\omega_4^2 + \frac{3}{4}\omega_2v\omega_1 + \frac{3}{2}v^2\omega_4 - \frac{1}{4}\omega_2u^2\omega_3\omega_1 + \\
&\quad \frac{1}{4}v^2\omega_4^2\omega_1 - \omega_2v^3\omega_1 - \frac{1}{2}c_s^2\omega_3 - \frac{1}{4}c_s^2\omega_2\omega_3\omega_1 - \frac{1}{2}\omega_3v^3\omega_4^2 - \frac{1}{2}\omega_2 - \frac{1}{2}c_s^2\omega_2u\omega_4\omega_1 + 2\omega_2v^3 - \frac{1}{2}v^2\omega_4^2 + \\
&\quad \frac{1}{2}c_s^2\omega_3\omega_1 + u^2\omega_3v^2\omega_4 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{2}\omega_2u\omega_3v^2\omega_4 - 5\omega_2u\omega_3v^2 - c_s^2\omega_2uv\omega_4\omega_1 - 2\omega_2u^2v^3\omega_1 + \frac{5}{4}\omega_2\omega_3v + \omega_2^2v^2 + \\
&\quad \frac{5}{2}c_s^2u\omega_4\omega_1 - \frac{1}{2}v\omega_4\omega_1 - \omega_2u\omega_3v^2\omega_1 + \frac{3}{2}c_s^2\omega_3\omega_4 - \frac{5}{2}\omega_3v^2\omega_4 + 2c_s^2u^2\omega_3\omega_4\omega_1 - 2\omega_2u^2\omega_3v^2 - \frac{1}{4}c_s^2\omega_4^2\omega_1 - \\
&\quad \frac{1}{2}u\omega_3v^2\omega_4^2 - \frac{1}{4}u^2\omega_3\omega_4\omega_1 + \frac{1}{2}u^2\omega_3v\omega_4 + \frac{1}{2}c_s^2\omega_3v\omega_4^2 - \frac{1}{4}c_s^2\omega_2\omega_3\omega_4 + 2\omega_2uv\omega_1 + c_s^2u\omega_3^2\omega_4 - \frac{1}{4}c_s^2\omega_2\omega_4\omega_1 - \\
&\quad 3\omega_2v^2 - \frac{1}{2}c_s^2u\omega_4\omega_1 - \frac{1}{4}\omega_2\omega_3v^2 - \frac{1}{2}\omega_3v\omega_4 - \frac{1}{4}c_s^2\omega_3\omega_4 + \frac{1}{4}\omega_2u\omega_3\omega_1 + \frac{1}{4}\omega_2\omega_3 + c_s^2\omega_2v\omega_4 - c_s^2u\omega_3v\omega_4^2 + \\
&\quad \frac{3}{4}c_s^2\omega_4\omega_1 - \frac{1}{2}\omega_3 - u^2v\omega_4\omega_1 - \frac{5}{2}c_s^2u\omega_3\omega_4 + \frac{3}{2}\omega_2\omega_3v^3\omega_4 - uv^3\omega_4^2\omega_1 - \frac{1}{2}\omega_2uv^2\omega_4\omega_1 + 5\omega_2uv^2\omega_1 + \frac{1}{4}\omega_3v^2\omega_4 - \\
&\quad \frac{3}{2}c_s^2\omega_4 - \frac{3}{4}v^2\omega_4\omega_1 - c_s^2u^2\omega_3\omega_4 - 3\omega_2v^3\omega_4 + \frac{1}{2}c_s^2\omega_2u\omega_3\omega_4 + \omega_2u^2v\omega_1 + \frac{3}{2}\omega_2v^3\omega_4\omega_1 + 2\omega_2u\omega_3v^2 + \\
&\quad c_s^2\omega_2u\omega_3v\omega_4 + \frac{1}{2}uv^2\omega_4\omega_1^2 + \omega_2u\omega_3v^2 - \omega_2u^2v\omega_1^2 - u^2\omega_1 - \frac{1}{2}c_s^2\omega_2v\omega_4\omega_1 - \frac{1}{4}\omega_2\omega_3v^2\omega_4 + \frac{1}{2}c_s^2\omega_3v\omega_4\omega_1 - \\
&\quad u\omega_3v^2\omega_4 - \frac{5}{2}uv^2\omega_4\omega_1 + \frac{1}{4}c_s^2\omega_2\omega_3 + \omega_2u\omega_3v^2 - \frac{1}{4}\omega_2u^2\omega_3 + \frac{1}{2}u\omega_3v^2\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{3}{2}\omega_2v^2\omega_1 - \frac{1}{4}\omega_2\omega_3\omega_4 + \\
&\quad \frac{1}{2}c_s^2\omega_4^2 + v\omega_4 - c_s^2u^2\omega_4\omega_1^2 - \frac{1}{2}\omega_2\omega_3v^2 + \frac{1}{4}u\omega_4\omega_1 + c_s^2u\omega_4\omega_1^2 - 2u^2\omega_3v^2\omega_4\omega_1 + u\omega_3v\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 - \\
&\quad \frac{1}{2}\omega_2u^2\omega_3v^2 - \frac{1}{2}\omega_4 + \frac{1}{2}u^2\omega_3\omega_1 - c_s^2v\omega_4^2 + \frac{1}{2}\omega_2v^2\omega_4 + \frac{1}{2}c_s^2u\omega_3\omega_4^2 - \frac{1}{2}c_s^2u\omega_3\omega_4\omega_1 - \omega_2uv^2\omega_1^2 + \frac{1}{4}u\omega_3\omega_4\omega_1 + \\
&\quad 2\omega_2u\omega_3v^3 + 4\omega_2u^2\omega_3v^2\omega_1 - \omega_2\omega_3v^3 - \frac{1}{2}v^3\omega_4^2\omega_1 - \frac{1}{2}\omega_2u\omega_3v^2 - \frac{3}{2}\omega_2v - \frac{1}{4}\omega_2u\omega_1 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_2\omega_3v^2\omega_1 + u\omega_3,
\end{aligned}$$

$$\begin{aligned}
& -2 + \frac{1}{4}\omega_2\omega_4\omega_1 + 6uv\omega_4\omega_1 - \frac{1}{2}\omega_4^2 + 2\omega_2u^2\omega_3^2v + 2\omega_2^2uv^2\omega_1 + \frac{1}{2}u\omega_4^2\omega_1 + \omega_2uv\omega_1^2 - 2\omega_2v^2\omega_4\omega_1 - \omega_2v\omega_4 - \frac{1}{2}\omega_3\omega_1 - \\
& \omega_2^2v - 4\omega_2u^2\omega_3v\omega_1 + 3u\omega_3\omega_4 + \omega_2^2v^2\omega_1 + \frac{1}{2}\omega_2\omega_3v\omega_1 + \omega_3v^2\omega_4^2 - u\omega_3v\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_3v\omega_4 + 4u\omega_1 - u\omega_3\omega_1 + \\
& 6\omega_2u\omega_3v + 2\omega_2u\omega_3 + 2uv^2\omega_2^2\omega_1 + 4u^2\omega_3v\omega_4\omega_1 + 2u\omega_3^2v\omega_4 - \frac{3}{2}\omega_3\omega_4 + \frac{1}{4}\omega_4^2\omega_1 - 2\omega_2v\omega_1 + u^2\omega_3^2\omega_4 - 2\omega_2u^2\omega_3\omega_1 + \\
& v^2\omega_4^2\omega_1 - \frac{1}{2}\omega_3^2v\omega_4 + \omega_2 + \frac{1}{2}\omega_2u\omega_4\omega_1 - 2v^2\omega_4^2 - u\omega_1^2 + \omega_2uv\omega_4\omega_1 - \frac{1}{2}\omega_2\omega_1 + 4\omega_2u\omega_3v^2\omega_4 - \omega_2u\omega_3^2 + \frac{1}{4}\omega_3\omega_4^2 + \\
& u^2\omega_4\omega_1^2 - 3\omega_2\omega_3v + \omega_2u^2\omega_1^2 - 2\omega_2^2v^2 + 2v\omega_4\omega_1 - 2u^2\omega_3^2 - \frac{1}{2}u\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_4 - uv\omega_4\omega_1^2 - 2u\omega_3v^2\omega_4^2 - 2u^2\omega_3\omega_4\omega_1 - \\
& 6\omega_2uv\omega_1 + \frac{1}{2}\omega_2u\omega_1^2 + \frac{1}{2}\omega_2\omega_3^2v + \frac{1}{4}\omega_3\omega_4\omega_1 + 3u\omega_3v\omega_4 + \frac{1}{2}\omega_2u\omega_3\omega_1 - \omega_2\omega_3 + \omega_2u\omega_3v\omega_1 - v\omega_4^2\omega_1 + 2u\omega_3^2 + \\
& 2u\omega_3v\omega_4^2 + \frac{1}{2}\omega_4\omega_1^2 + 2\omega_3 - 4\omega_2uv^2\omega_4\omega_1 + 2v\omega_4^2 + \frac{1}{2}\omega_2\omega_3v\omega_4 - \omega_2u\omega_3v\omega_4 - \frac{1}{2}\omega_2u\omega_3\omega_4 - 2u^2\omega_3^2v\omega_4 - \\
& 2u^2\omega_1^2 + \omega_2u^2\omega_3^2 + \frac{1}{2}\omega_2v\omega_4\omega_1 - 2\omega_2^2u\omega_3v^2 + 2\omega_2u^2v\omega_1^2 + \frac{1}{4}\omega_2\omega_3\omega_1 - 2\omega_2v\omega_3v^2\omega_4 + \frac{1}{4}\omega_3\omega_4^2 - 2\omega_2u\omega_3^2v - \\
& \frac{1}{2}\omega_3v\omega_4\omega_1 - \omega_4\omega_1 - 4v\omega_4 + \omega_2^2\omega_3v^2 - 3u\omega_4\omega_1 - 6u\omega_3v\omega_4 + \omega_2^2uv\omega_1 - \frac{1}{2}\omega_3^2 + 2\omega_4 - 2uv\omega_4\omega_1^2 + 4u^2\omega_3\omega_1 + \\
& 4\omega_2v^2\omega_4 - 2u^2v\omega_4\omega_1^2 + \frac{1}{2}u\omega_3\omega_4\omega_1 + 4\omega_2v - 2\omega_2u\omega_1 + \omega_1 + \frac{1}{4}\omega_2\omega_3\omega_4 - \omega_3v\omega_4^2 - 4u\omega_3 - u\omega_3^2\omega_4 + \frac{1}{4}\omega_2\omega_3^2 + \frac{1}{2}\omega_2^2v\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_1],t-2\delta_t} = & 1 + 2\omega_2u^2\omega_3^2v + \frac{1}{2}c_s^2\omega_3\omega_4\omega_1 + c_s^2\omega_3v\omega_4 + \omega_3\omega_1 - \omega_2u^2\omega_1 - 3\omega_2u^2\omega_3v\omega_1 + c_s^2\omega_2\omega_3v\omega_1 - u^2\omega_3 - \\
& \omega_2\omega_3v\omega_1 + 4\omega_2u^2v^2\omega_1^2 - 2u^2v^2\omega_4\omega_1^2 - u^2\omega_3v\omega_4\omega_1 - u^2\omega_4\omega_1 + \frac{1}{2}\omega_3\omega_4 + 2\omega_2v\omega_1 + \frac{1}{2}v^2\omega_4 - \frac{1}{2}\omega_2v\omega_1^2 + \\
& \frac{1}{2}\omega_2u^2\omega_3\omega_1 + c_s^2\omega_3 + \frac{1}{2}c_s^2\omega_2\omega_3\omega_1 - \frac{1}{2}\omega_2 - c_s^2\omega_3\omega_1 - 2u^2\omega_3^2v^2\omega_4 + \frac{1}{2}\omega_2\omega_1 + \omega_2\omega_3v - v\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_3\omega_4 - \\
& 4c_s^2\omega_2\omega_3\omega_4\omega_1 + 4\omega_2u^2\omega_3^2v^2 + \frac{1}{2}u^2\omega_3\omega_4\omega_1 - u^2\omega_3v\omega_4 - \omega_2v^2 - \frac{1}{2}\omega_3\omega_4\omega_1 - \omega_3v\omega_4 + \frac{1}{2}\omega_2\omega_3 + c_s^2\omega_4\omega_1 - \\
& \omega_3 + 2u^2v\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_4 - v^2\omega_4\omega_1 - \omega_2v^2\omega_1^2 + 2c_s^2u^2\omega_3^2\omega_4 - 2\omega_2u^2v\omega_1 + 2\omega_2u^2v\omega_1^2 - \frac{1}{2}\omega_2\omega_3\omega_1 + 2u^2\omega_1 - \\
& c_s^2\omega_3v\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_2\omega_3 + \omega_3v\omega_4\omega_1 + \frac{1}{2}\omega_2u^2\omega_3 + \frac{1}{2}\omega_4\omega_1 + 2\omega_2v^2\omega_1 + \frac{1}{2}u^2\omega_3\omega_4 + \frac{1}{2}v^2\omega_4\omega_1^2 + v\omega_4 + \\
& 2c_s^2u^2\omega_4\omega_1^2 + 4u^2\omega_3v^2\omega_4\omega_1 - c_s^2\omega_2\omega_3v + \omega_2u^2\omega_3v - \frac{1}{2}\omega_4 - \frac{1}{2}c_s^2\omega_4\omega_1^2 - u^2\omega_3\omega_1 - 8\omega_2u^2\omega_3v^2\omega_1 - \frac{3}{2}\omega_2v - \omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_3],t-2\delta_t} = & -2 - 4\omega_2u^2\omega_3^2v - \omega_3\omega_1 + 8\omega_2u^2\omega_3v\omega_1 - v\omega_4\omega_1^2 + \omega_2\omega_3v\omega_1 + \frac{1}{2}\omega_2\omega_1^2 - 8u^2\omega_3v\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4 - \\
& 3\omega_2v\omega_1 - 2u^2\omega_3^2\omega_4 - \omega_1^2 + \omega_2v\omega_1^2 + 4\omega_2u^2\omega_3\omega_1 + \omega_2 - \frac{3}{2}\omega_2\omega_1 - 2u^2\omega_4\omega_1^2 - \omega_2\omega_3v - 2\omega_2u^2\omega_1^2 + 3v\omega_4\omega_1 + \\
& 4u^2\omega_3^2 + 4u^2\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1 + \omega_3v\omega_4 - \frac{1}{2}\omega_2\omega_3 + \omega_3 + \frac{1}{2}\omega_4\omega_1^2 + 4u^2\omega_3^2v\omega_4 + 4u^2\omega_1^2 - 2\omega_2u^2\omega_3^2 - \\
& 4\omega_2u^2v\omega_1^2 + \frac{1}{2}\omega_2\omega_3\omega_1 - \omega_3v\omega_4\omega_1 - \frac{3}{2}\omega_4\omega_1 - 2v\omega_4 + \omega_4 - 8u^2\omega_3\omega_1 + 4u^2v\omega_4\omega_1^2 + 2\omega_2v + 3\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-2\delta_t} = & 1 + \frac{1}{2}uv\omega_4\omega_1 - \omega_2u^2\omega_3^2v + \frac{1}{4}\omega_3v^2\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_3\omega_4\omega_1 + \omega_2^2uv\omega_1 - \frac{5}{2}u\omega_3v^2\omega_4 + \frac{1}{2}\omega_2uv\omega_1^2 - \\
& \frac{1}{2}c_s^2\omega_3v\omega_4 - \frac{1}{4}\omega_2v^2\omega_4\omega_1 + \frac{1}{2}c_s^2v\omega_4\omega_1 + 3\omega_2u\omega_3v^3\omega_4 + \frac{1}{2}c_s^2u\omega_4\omega_1^2 + \frac{1}{2}\omega_2u^2\omega_1 + \frac{5}{2}\omega_2\omega_3v^2 + \frac{3}{2}\omega_2u^2\omega_3v\omega_1 + \\
& v^3\omega_4^2 + \frac{1}{2}u\omega_3\omega_4 - \frac{1}{2}\omega_2^2v^2\omega_1 - \frac{1}{2}c_s^2\omega_2\omega_3v\omega_1 + \frac{1}{2}u^2\omega_3 - \frac{1}{4}\omega_2\omega_3v\omega_1 + \frac{1}{4}\omega_3v^2\omega_4^2 + \frac{1}{2}u\omega_3v\omega_4\omega_1 - \frac{1}{4}c_s^2\omega_3\omega_4^2 - \\
& 2\omega_2u^2v^2\omega_1^2 + \frac{1}{2}u\omega_1 + \frac{1}{2}u\omega_3\omega_1 + u^2v^2\omega_4\omega_1^2 - \frac{1}{2}c_s^2\omega_2\omega_3v\omega_4 + \frac{5}{2}\omega_2u\omega_3v + \frac{1}{2}\omega_2\omega_3\omega_1 + 2u^2v^2\omega_1 - \\
& 3\omega_2uv^3\omega_4\omega_1 + \frac{1}{2}u^2\omega_3v\omega_4\omega_1 + \frac{1}{2}u^2\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_4 - u\omega_3v^3\omega_4^2 + \frac{3}{4}\omega_2v\omega_1 + \frac{3}{2}v^2\omega_4 - \frac{1}{4}\omega_2u^2\omega_3\omega_1 + \\
& \frac{1}{4}v^2\omega_4\omega_1 - \omega_2v^3\omega_1 - \frac{1}{2}c_s^2\omega_3 - \frac{1}{4}c_s^2\omega_2\omega_3\omega_1 - \frac{1}{2}\omega_3v^3\omega_4^2 - \frac{1}{2}\omega_2 + \frac{1}{2}c_s^2\omega_2u\omega_4\omega_1 + 2\omega_2^2v^3 - \frac{1}{2}v^2\omega_4^2 + \\
& \frac{1}{4}c_s^2\omega_3\omega_1 + u^2\omega_3^2v^2\omega_4 + \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_2u\omega_3v^2\omega_4 + 5\omega_2u\omega_3v^2 + c_s^2\omega_2u\omega_4\omega_1 + 2\omega_2^2uv^3\omega_1 + \frac{5}{4}\omega_2\omega_3v + \omega_2^2v^2 - \\
& \frac{5}{2}c_s^2u\omega_4\omega_1 - \frac{1}{2}v\omega_4\omega_1 + \omega_2u\omega_3v^2\omega_1 + \frac{3}{2}c_s^2\omega_3\omega_4 - \frac{5}{4}\omega_3v^2\omega_4 + 2c_s^2u^2\omega_3\omega_4\omega_1 - 2\omega_2u^2\omega_3^2v^2 - \frac{1}{4}c_s^2\omega_4\omega_1 + \\
& \frac{1}{2}u\omega_3v^2\omega_4^2 - \frac{1}{4}u^2\omega_3\omega_4\omega_1 + \frac{1}{2}u^2\omega_3v\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3v\omega_4 - \frac{1}{4}c_s^2\omega_2\omega_3\omega_4 - 2\omega_2uv\omega_1 - c_s^2u\omega_3^2\omega_4 - \frac{1}{4}c_s^2\omega_2\omega_4\omega_1 - \\
& 3\omega_2v^2 + \frac{1}{2}c_s^2u\omega_4\omega_1 - \frac{1}{4}\omega_2\omega_3v^2 - \frac{1}{2}\omega_3v\omega_4 - \frac{1}{4}c_s^2\omega_3^2\omega_4 - \frac{1}{4}\omega_2u\omega_3\omega_1 + \frac{1}{4}\omega_2\omega_3 + c_s^2\omega_2v\omega_4 + c_s^2u\omega_3v\omega_4^2 + \\
& \frac{3}{4}c_s^2\omega_4\omega_1 - \frac{1}{2}\omega_3 - u^2v\omega_4\omega_1 + \frac{5}{2}c_s^2u\omega_3\omega_4 + \frac{3}{2}\omega_2\omega_3v^3\omega_4 + uv^3\omega_4^2\omega_1 + \frac{1}{2}\omega_2uv^2\omega_4\omega_1 - 5\omega_2uv^2\omega_1 + \frac{1}{4}\omega_3v^2\omega_4 - \\
& \frac{3}{2}c_s^2\omega_4 - \frac{3}{4}v^2\omega_4\omega_1 - c_s^2u^2\omega_3^2\omega_4 - 3\omega_2v^3\omega_4 - \frac{1}{2}c_s^2\omega_2u\omega_3\omega_4 + \omega_2u^2v\omega_1 + \frac{3}{2}\omega_2v^3\omega_4\omega_1 - 2\omega_2u\omega_3^2v^2 - \\
& c_s^2\omega_2u\omega_3v\omega_4 - \frac{1}{2}uv^2\omega_4\omega_1^2 - \omega_2u\omega_3v^2 - \omega_2u^2v\omega_1^2 - u^2\omega_1 - \frac{1}{2}c_s^2\omega_2v\omega_4\omega_1 - \frac{1}{4}\omega_2\omega_3v^2\omega_4 + \frac{1}{2}c_s^2\omega_3v\omega_4\omega_1 + \\
& u\omega_3v^2\omega_4 + \frac{5}{2}uv^2\omega_4\omega_1 + \frac{1}{4}c_s^2\omega_2\omega_3 - \omega_2u\omega_3^2v - \frac{1}{4}\omega_2u^2\omega_3 - \frac{1}{5}u\omega_3v^2\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{3}{2}\omega_2v^2\omega_1 - \frac{1}{4}u^2\omega_3\omega_4 + \\
& \frac{1}{2}c_s^2\omega_4^2 + v\omega_4 - c_s^2u^2\omega_4\omega_1^2 - \frac{1}{2}\omega_2^2\omega_3v^2 - \frac{1}{4}u\omega_4\omega_1 - c_s^2u\omega_4\omega_1^2 - 2u^2\omega_3v^2\omega_4\omega_1 - u\omega_3v\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3v - \\
& \frac{1}{2}\omega_2u^2\omega_3v - \frac{1}{2}\omega_4 + \frac{1}{2}u^2\omega_3\omega_1 - c_s^2v\omega_4^2 + \frac{1}{2}\omega_2v^2\omega_4 - \frac{1}{2}c_s^2u\omega_3\omega_4^2 + \frac{1}{2}c_s^2u\omega_3\omega_4\omega_1 + \omega_2uv^2\omega_1^2 - \frac{1}{4}\omega_3\omega_4\omega_1 - \\
& 2\omega_2u\omega_3v^3 + 4\omega_2u^2\omega_3v^2\omega_1 - \omega_2\omega_3v^3 - \frac{1}{2}v^3\omega_4^2\omega_1 - \frac{1}{2}\omega_2\omega_3^2v^2 - \frac{3}{2}\omega_2v - \frac{1}{4}\omega_2u\omega_1 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_2\omega_3v^2\omega_1 - u\omega_3,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_3],t-2\delta_t} = & -2 + \frac{1}{4}\omega_2\omega_4\omega_1 - 6uv\omega_4\omega_1 - \frac{1}{2}\omega_4^2 + 2\omega_2u^2\omega_3^2v - 2\omega_2^2uv^2\omega_1 - \frac{1}{2}u\omega_4^2\omega_1 - \omega_2uv\omega_1^2 - 2\omega_2v^2\omega_4\omega_1 - \omega_2v\omega_4 - \frac{1}{2}\omega_3\omega_1 - \\
& \omega_2^2v - 4\omega_2u^2\omega_3v\omega_1 - 3u\omega_3\omega_4 + \omega_2^2v^2\omega_1 + \frac{1}{2}\omega_2\omega_3v\omega_1 + \omega_3v^2\omega_4^2 + u\omega_3v\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_3v\omega_4 - 4u\omega_1 + u\omega_3\omega_1 - \\
& 6\omega_2u\omega_3v - 2\omega_2u\omega_3 - 2uv^2\omega_4\omega_1 + 4u^2\omega_3v\omega_4\omega_1 - 2u\omega_3^2v\omega_4 - \frac{3}{2}\omega_3\omega_4 + \frac{1}{4}\omega_4^2\omega_1 - 2\omega_2v\omega_1 + u^2\omega_3^2\omega_4 - 2\omega_2u^2\omega_3\omega_1 + \\
& v^2\omega_4^2\omega_1 - \frac{1}{2}\omega_3^2v\omega_4 + \omega_2 - \frac{1}{2}\omega_2u\omega_4\omega_1 - 2v^2\omega_4^2 + u\omega_1^2 - \omega_2uv\omega_4\omega_1 - \frac{1}{2}\omega_2\omega_1 - 4\omega_2u\omega_3v^2\omega_4 + \omega_2u\omega_3^2 + \frac{1}{4}\omega_3\omega_4^2 + \\
& u^2\omega_4\omega_1^2 - 3\omega_2\omega_3v + \omega_2u^2\omega_1^2 - 2\omega_2^2v^2 + 2v\omega_4\omega_1 - 2u^2\omega_3^2 + \frac{1}{2}u\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_4 + uv\omega_4\omega_1^2 + 2u\omega_3v^2\omega_4^2 - 2u^2\omega_3\omega_4\omega_1 + \\
& 6\omega_2uv\omega_1 - \frac{1}{2}\omega_2u\omega_1^2 + \frac{1}{2}\omega_2\omega_3^2v + \frac{1}{4}\omega_3\omega_4\omega_1 + 3u\omega_3v\omega_4 - \frac{1}{2}\omega_2u\omega_3\omega_1 - \omega_2\omega_3 - \omega_2u\omega_3v\omega_1 - v\omega_4^2\omega_1 - 2u\omega_3^2 - \\
& 2u\omega_3v\omega_4^2 - \frac{1}{2}u\omega_4\omega_1^2 + 2\omega_3 + 4\omega_2uv^2\omega_4\omega_1 + 2v\omega_4^2 + \frac{1}{2}\omega_2\omega_3v + \omega_2u\omega_3v\omega_4 + \omega_2^2u\omega_3v + \frac{1}{2}\omega_2u\omega_3\omega_4 - 2u^2\omega_3^2v\omega_4 -
\end{aligned}$$

$$\begin{aligned}
& 2u^2\omega_1^2 + \omega_2u^2\omega_3^2 + \frac{1}{2}\omega_2vw_4\omega_1 + 2\omega_2^2uw_3v^2 + 2\omega_2u^2vw_1^2 + \frac{1}{4}\omega_2\omega_3\omega_1 - 2\omega_2w_3v^2\omega_4 + \frac{1}{4}\omega_3^2\omega_4 + 2\omega_2uw_3^2v - \\
& \frac{1}{2}\omega_3vw_4\omega_1 - \omega_4\omega_1 - 4vw_4 + \omega_2^2\omega_3v^2 + 3uw_4\omega_1 + 6uw_3vw_4 - \omega_2^2uv\omega_1 - \frac{1}{2}\omega_3^2 + 2\omega_4 + 2uv\omega_2^2\omega_1 + 4u^2\omega_3\omega_1 + \\
& 4\omega_2v^2\omega_4 - 2u^2vw_4\omega_1^2 - \frac{1}{2}uw_3w_4\omega_1 + 4\omega_2v + 2w_2uw_1 + \omega_1 + \frac{1}{4}\omega_2\omega_3w_4 - \omega_3vw_4^2 + 4uw_3 + uw_3^2\omega_4 + \frac{1}{4}\omega_2\omega_3^2 + \frac{1}{2}\omega_2^2vw_1, \\
\alpha_{x-\delta_1,y}^{[\mu_1],t-2\delta_t} &= -uv\omega_4\omega_1 + c_s^2\omega_3vw_4 + u^2\omega_3vw_4^2 - c_s^2vw_4^2\omega_1 + 6\omega_2uw_3v^3\omega_4 + 3\omega_2vw_4 + \omega_2^2v - 2v^3\omega_4^2 - \\
& \frac{3}{2}\omega_2w_3vw_4 + 2c_s^2\omega_2w_3vw_4 - 4\omega_2uw_3v - \omega_2u^2w_3vw_4 - 6\omega_2uv^3\omega_4\omega_1 - 2uw_3v^3\omega_4^2 + 2\omega_2vw_1 + 2\omega_2^2v^3\omega_1 + \\
& \omega_3v^3\omega_4^2 - 4\omega_2^2v^3 - 2\omega_2uvw_4\omega_1 + 2c_s^2\omega_2uvw_4\omega_1 + 4\omega_2^2uv^3\omega_1 + 2\omega_2w_3v - \omega_4\omega_1 - u^2\omega_3vw_4 - 2c_s^2\omega_3vw_4^2 + \\
& 3\omega_2uv\omega_1 - 2u^2vw_4^2\omega_1 - \omega_3vw_4 - 2c_s^2\omega_2vw_4 + vw_4^2\omega_1 - 2uw_3vw_4^2 + 2c_s^2uw_3vw_4^2 + 2u^2vw_4\omega_1 - \\
& 3\omega_2w_3v^3\omega_4 + 2uv^3\omega_4^2\omega_1 - 2vw_4^2 - \frac{1}{2}\omega_2^2\omega_3v + 3\omega_2uw_3vw_4 + \omega_2^2uw_3v + 6\omega_2v^3\omega_4 - 2\omega_2u^2vw_1 - 3\omega_2v^3\omega_4\omega_1 - \\
& 2c_s^2\omega_2uw_3vw_4 - \frac{3}{2}\omega_2vw_4\omega_1 + c_s^2\omega_2vw_4\omega_1 + 2\omega_2u^2vw_4\omega_1 + 2vw_4 - 2c_s^2uvw_4^2\omega_1 + 2uw_3vw_4 - \omega_2^2uv\omega_1 - \\
& c_s^2\omega_2\omega_3v + \omega_2u^2\omega_3v + uvw_4^2\omega_1 + 2c_s^2vw_4^2 - 4\omega_2^2uw_3v^3 + 2\omega_2^2\omega_3v^3 + v^3\omega_4^2\omega_1 - 4\omega_2v + \omega_3vw_4^2 - \frac{1}{2}\omega_2^2vw_1, \\
\alpha_{x-\delta_1,y}^{[\mu_3],t-2\delta_t} &= -2 + \frac{1}{2}\omega_2w_4\omega_1 - 4\omega_2^2uv^2\omega_1 + 4\omega_2v^2\omega_4\omega_1 + uw_3\omega_4 - 2\omega_2^2v^2\omega_1 - 2\omega_3v^2\omega_4^2 + 2uw_1 + 3\omega_2uw_3 - \\
& 4uv^2\omega_4^2\omega_1 - \frac{1}{2}\omega_3\omega_4 + \omega_2^2uw_1 - 2v^2\omega_4^2\omega_1 - \omega_2^2 + 3\omega_2 + \omega_2uw_4\omega_1 + 4v^2\omega_4^2 - \frac{3}{2}\omega_2\omega_1 - 8\omega_2uw_3v^2\omega_4 + 4\omega_2^2v^2 + \\
& \frac{1}{2}\omega_2^2\omega_3 - \omega_2\omega_4 + 4uw_3v^2\omega_4^2 - \frac{3}{2}\omega_2\omega_3 + w_3 + 8\omega_2uv^2\omega_4\omega_1 - \omega_2uw_3\omega_4 + \frac{1}{2}\omega_2^2\omega_1 + 4\omega_2^2uw_3v^2 + 4\omega_2w_3v^2\omega_4 - \\
& \frac{1}{2}\omega_4\omega_1 - 2\omega_2^2\omega_3v^2 - uw_4\omega_1 - \omega_2^2uw_3 + w_4 - 8\omega_2v^2\omega_4 - 3\omega_2uw_1 + \omega_1 + \frac{1}{2}\omega_2w_3\omega_4 - 2uw_3, \\
\alpha_{x,y}^{[\mu_1],t-2\delta_t} &= -2c_s^2\omega_3vw_4 - 2u^2\omega_3vw_4^2 + 5\omega_2vw_4 + \omega_2^2v - 2c_s^2\omega_2w_3vw_4 + 2\omega_2u^2\omega_3vw_4 + 2c_s^2\omega_3vw_4^2 - \omega_2vw_4^2 + \\
& 4u^2vw_4^2\omega_1 - 4u^2vw_4\omega_1 - 2vw_4^2 + 4\omega_2u^2vw_1 - \omega_2^2v\omega_4 - 4\omega_2u^2vw_4\omega_1 + 2vw_4 + 2c_s^2\omega_2w_3v - 2\omega_2u^2\omega_3v - 4\omega_2v, \\
\alpha_{x,y}^{[\mu_3],t-2\delta_t} &= -4 - \omega_4^2 - 4\omega_3\omega_1 + \omega_2\omega_4^2 - \omega_1^2 - \omega_2^2 + 3\omega_2 + \omega_3\omega_1^2 - 4\omega_2\omega_4 + \omega_2^2\omega_4 + 3\omega_3 - \omega_3^2 + 3\omega_4 + \omega_3^2\omega_1 + 3\omega_1, \\
\alpha_{x+\delta_1,y}^{[\mu_1],t-2\delta_t} &= uv\omega_4\omega_1 + c_s^2\omega_3vw_4 + u^2\omega_3vw_4^2 - c_s^2vw_4^2\omega_1 - 6\omega_2uw_3v^3\omega_4 + 3\omega_2vw_4 + \omega_2^2v - 2v^3\omega_4^2 - \frac{3}{2}\omega_2w_3vw_4 + \\
& 2c_s^2\omega_2w_3vw_4 + 4\omega_2uw_3v - \omega_2u^2w_3vw_4 + 6\omega_2uv^3\omega_4\omega_1 + 2uw_3v^3\omega_4^2 + 2\omega_2vw_1 + 2\omega_2^2v^3\omega_1 + \omega_3v^3\omega_4^2 - \\
& 4\omega_2^2v^3 + 2\omega_2uvw_4\omega_1 - 2c_s^2\omega_2uvw_4\omega_1 - 4\omega_2^2uv^3\omega_1 + 2\omega_2w_3v - \omega_4\omega_1 - u^2\omega_3vw_4 - 2c_s^2\omega_3vw_4^2 - \\
& 3\omega_2uv\omega_1 - 2u^2vw_4^2\omega_1 - \omega_3vw_4 - 2c_s^2\omega_2vw_4 + vw_4^2\omega_1 + 2uw_3vw_4^2 - 2c_s^2uw_3vw_4^2 + 2u^2vw_4\omega_1 - \\
& 3\omega_2w_3v^3\omega_4 - 2uv^3\omega_4^2\omega_1 - 2vw_4^2 - \frac{1}{2}\omega_2^2\omega_3v + 3\omega_2uw_3vw_4 - \omega_2^2uw_3v + 6\omega_2v^3\omega_4 - 2\omega_2u^2vw_1 - 3\omega_2v^3\omega_4\omega_1 + \\
& 2c_s^2\omega_2uw_3vw_4 - \frac{3}{2}\omega_2vw_4\omega_1 + c_s^2\omega_2vw_4\omega_1 + 2\omega_2u^2vw_4\omega_1 + 2vw_4 + 2c_s^2uvw_4^2\omega_1 - 2uw_3vw_4 + \omega_2^2uv\omega_1 - \\
& c_s^2\omega_2\omega_3v + \omega_2u^2\omega_3v - uvw_4^2\omega_1 + 2c_s^2vw_4^2 + 4\omega_2^2uw_3v^3 + 2\omega_2^2\omega_3v^3 + v^3\omega_4^2\omega_1 - 4\omega_2v + \omega_3vw_4^2 - \frac{1}{2}\omega_2^2vw_1, \\
\alpha_{x+\delta_1,y}^{[\mu_3],t-2\delta_t} &= -2 + \frac{1}{2}\omega_2w_4\omega_1 + 4\omega_2^2uv^2\omega_1 + 4\omega_2v^2\omega_4\omega_1 - uw_3\omega_4 - 2\omega_2^2v^2\omega_1 - 2\omega_3v^2\omega_4^2 - 2uw_1 - 3\omega_2uw_3 + \\
& 4uv^2\omega_4^2\omega_1 - \frac{1}{2}\omega_3\omega_4 - \omega_2^2uw_1 - 2v^2\omega_4^2\omega_1 - \omega_2^2 + 3\omega_2 - \omega_2uw_4\omega_1 + 4v^2\omega_4^2 - \frac{3}{2}\omega_2\omega_1 + 8\omega_2uw_3v^2\omega_4 + 4\omega_2^2v^2 + \\
& \frac{1}{2}\omega_2^2\omega_3 - \omega_2\omega_4 - 4uw_3v^2\omega_4^2 - \frac{3}{2}\omega_2\omega_3 + w_3 - 8\omega_2uv^2\omega_4\omega_1 + \omega_2uw_3\omega_4 + \frac{1}{2}\omega_2^2\omega_1 - 4\omega_2^2uw_3v^2 + 4\omega_2w_3v^2\omega_4 - \\
& \frac{1}{2}\omega_4\omega_1 - 2\omega_2^2\omega_3v^2 + uw_4\omega_1 + \omega_2^2uw_3 + w_4 - 8\omega_2v^2\omega_4 + 3\omega_2uw_1 + \omega_1 + \frac{1}{2}\omega_2w_3\omega_4 + 2uw_3, \\
\alpha_{x-\delta_1,y+\delta_1}^{[\mu_1],t-2\delta_t} &= -1 - \frac{1}{2}uv\omega_4\omega_1 - \omega_2u^2\omega_3^2v - \frac{1}{4}\omega_3v^2\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_3\omega_4\omega_1 + \omega_2^2uv^2\omega_1 - \frac{5}{2}uw_3v^2\omega_4 - \frac{1}{2}\omega_2uv\omega_1^2 - \\
& \frac{1}{2}c_s^2\omega_3vw_4 + \frac{1}{4}\omega_2v^2\omega_4\omega_1 + \frac{1}{2}c_s^2vw_4^2\omega_1 - 3\omega_2uw_3v^3\omega_4 + \frac{1}{2}c_s^2uw_4\omega_1^2 - \frac{1}{2}\omega_2u^2\omega_1 - \frac{5}{2}\omega_2w_3v^2 + \frac{3}{2}\omega_2u^2w_3vw_1 + \\
& v^3\omega_4^2 + \frac{1}{2}uw_3\omega_4 + \frac{1}{2}\omega_2^2v^2\omega_1 - \frac{1}{2}c_s^2\omega_2w_3vw_1 - \frac{1}{2}u^2\omega_3 - \frac{1}{4}\omega_2w_3vw_1 - \frac{1}{4}\omega_3v^2\omega_4^2 - \frac{1}{2}uw_3vw_4\omega_1 + \frac{1}{4}c_s^2\omega_3\omega_4^2 + \\
& 2\omega_2u^2v^2\omega_1^2 + \frac{1}{2}uw_1 + \frac{1}{2}uw_3\omega_1 - u^2v^2\omega_4\omega_1^2 - \frac{1}{2}c_s^2\omega_2w_3vw_4 - \frac{5}{2}\omega_2uw_3v + \frac{1}{2}\omega_2uw_3 - \frac{1}{2}uv^2\omega_4^2\omega_1 + \\
& 3\omega_2uv^3\omega_4\omega_1 + \frac{1}{2}u^2\omega_3vw_4\omega_1 - \frac{1}{2}u^2\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4 - \frac{1}{2}c_s^2\omega_2\omega_4 + uw_3v^3\omega_4^2 + \frac{3}{4}\omega_2vw_1 - \frac{3}{2}v^2\omega_4 + \frac{1}{4}\omega_2u^2\omega_3\omega_1 - \\
& \frac{1}{4}v^2\omega_4^2\omega_1 - \omega_2^2v^3\omega_1 + \frac{1}{2}c_s^2\omega_3 + \frac{1}{4}c_s^2\omega_2w_3\omega_1 - \frac{1}{2}uw_3v^3\omega_4^2 + \frac{1}{2}\omega_2 + \frac{1}{2}c_s^2\omega_2\omega_4\omega_1 + 2\omega_2^2v^3 + \frac{1}{2}v^2\omega_4^2 - \\
& \frac{1}{2}c_s^2\omega_3\omega_1 - u^2\omega_3^2v^2\omega_4 - \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_2uvw_3v^2\omega_4 + 5\omega_2uw_3v^2 - c_s^2\omega_2uvw_4\omega_1 - 2\omega_2^2uv^3\omega_1 + \frac{5}{4}\omega_2w_3v - \omega_2^2v^2 - \\
& \frac{5}{2}c_s^2\omega_4\omega_1 - \frac{1}{2}vw_4\omega_1 + \omega_2uw_3v^2\omega_1 - \frac{3}{2}c_s^2\omega_3\omega_4 + \frac{5}{4}\omega_3v^2\omega_4 - 2c_s^2u^2\omega_3\omega_4\omega_1 + 2\omega_2u^2\omega_3^2v^2 + \frac{1}{4}c_s^2\omega_4^2\omega_1 + \\
& \frac{1}{2}uw_3v^2\omega_4^2 + \frac{1}{4}u^2\omega_3\omega_4\omega_1 + \frac{1}{2}u^2\omega_3vw_4 + \frac{1}{2}c_s^2\omega_3vw_4^2 + \frac{1}{4}c_s^2\omega_2\omega_3\omega_4 + 2\omega_2uv\omega_1 - c_s^2\omega_3\omega_4^2 + \frac{1}{4}c_s^2\omega_2\omega_4\omega_1 + \\
& 3\omega_2v^2 + \frac{1}{2}c_s^2\omega_2\omega_4\omega_1 - \frac{1}{4}\omega_2\omega_3\omega_1 - \frac{1}{2}uw_3v\omega_4 + \frac{1}{4}c_s^2\omega_3\omega_4 - \frac{1}{4}\omega_2\omega_3\omega_1 - \frac{1}{4}\omega_2\omega_3 + c_s^2\omega_2vw_4 - c_s^2\omega_3vw_4^2 - \\
& \frac{3}{4}c_s^2\omega_4\omega_1 + \frac{1}{2}\omega_3 - u^2vw_4\omega_1 + \frac{5}{2}c_s^2\omega_3\omega_4 + \frac{3}{2}\omega_2w_3v^3\omega_4 - uv^3\omega_4^2\omega_1 + \frac{1}{2}\omega_2uv^2\omega_4\omega_1 - 5\omega_2uv^2\omega_1 - \frac{1}{4}\omega_3v^2\omega_4 + \\
& \frac{5}{2}c_s^2\omega_4\omega_1 + \frac{3}{4}\omega_2\omega_4\omega_1 + c_s^2u^2\omega_3\omega_4 - 3\omega_2v^3\omega_4 - \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 + \omega_2u^2vw_1 + \frac{3}{2}\omega_2vw_3\omega_4\omega_1 - 2\omega_2\omega_3\omega_4^2 + \\
& c_s^2\omega_2\omega_3vw_4 - \frac{1}{2}uv^2\omega_4\omega_1^2 - \omega_2^2uw_3v^2 - \omega_2u^2vw_1^2 + u^2\omega_1 - \frac{1}{2}c_s^2\omega_2\omega_4\omega_1 + \frac{1}{4}\omega_2\omega_3v^2\omega_4 + \frac{1}{2}c_s^2\omega_3\omega_4\omega_1 + \\
& uw_3^2\omega_4^2 + \frac{5}{2}uv^2\omega_4\omega_1 - \frac{1}{4}c_s^2\omega_2\omega_3 + \omega_2\omega_3\omega_1^2 + \frac{1}{4}\omega_2u^2\omega_3 - \frac{1}{2}uw_3v^2\omega_4\omega_1 - \frac{1}{4}\omega_4\omega_1 - \frac{3}{2}\omega_2v^2\omega_1 + \frac{1}{4}u^2\omega_3\omega_4 - \\
& \frac{1}{2}c_s^2\omega_4^2 + v\omega_4 + c_s^2u^2\omega_4\omega_1^2 + \frac{1}{2}\omega_2\omega_3\omega_4^2 - \frac{1}{4}u\omega_4\omega_1 + c_s^2uv\omega_4\omega_1 + 2u^2\omega_3v^2\omega_4\omega_1 + uw_3\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3\omega_4
\end{aligned}$$

$$\begin{aligned} & \frac{1}{2}\omega_2 u^2 \omega_3 v + \frac{1}{2}\omega_4 - \frac{1}{2}u^2 \omega_3 \omega_1 - c_s^2 v \omega_4^2 - \frac{1}{2}\omega_2 v^2 \omega_4 - \frac{1}{2}c_s^2 u \omega_3 \omega_4^2 + \frac{1}{2}c_s^2 u \omega_3 \omega_4 \omega_1 + \omega_2 u v^2 \omega_1^2 - \frac{1}{4}u \omega_3 \omega_4 \omega_1 + \\ & 2\omega_2^2 u \omega_3 v^3 - 4\omega_2 u^2 \omega_3 v^2 \omega_1 - \omega_2^2 \omega_3 v^3 - \frac{1}{2}v^3 \omega_4^2 \omega_1 + \frac{1}{2}\omega_2 \omega_3^2 v^2 - \frac{3}{2}\omega_2 v - \frac{1}{4}\omega_2 u \omega_1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_2 \omega_3 v^2 \omega_1 - u \omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_l, y+\delta_l}^{[\mu_3], t-2\delta_t} = & -2 + \frac{1}{4}\omega_2 \omega_4 \omega_1 - 6u v \omega_4 \omega_1 - \frac{1}{2}\omega_4^2 - 2\omega_2 u^2 \omega_3^2 v + 2\omega_2^2 u v^2 \omega_1 + \frac{1}{2}u \omega_4^2 \omega_1 - \omega_2 u v \omega_1^2 - 2\omega_2 v^2 \omega_4 \omega_1 + \omega_2 v \omega_4 - \frac{1}{2}\omega_3 \omega_1 + \\ & \omega_2^2 v + 4\omega_2 u^2 \omega_3 v \omega_1 + 3u \omega_3 \omega_4 + \omega_2^2 v^2 \omega_1 - \frac{1}{2}\omega_2 \omega_3 v \omega_1 + \omega_3 v^2 \omega_4^2 + u \omega_3 v \omega_4 \omega_1 - \frac{1}{2}\omega_2 \omega_3 v \omega_4 + 4u \omega_1 - u \omega_3 \omega_1 - \\ & 6\omega_2 u \omega_3 v + 2\omega_2 u \omega_3 + 2u v^2 \omega_2^2 \omega_1 - 4u^2 \omega_3 v \omega_4 \omega_1 - 2u \omega_3^2 v \omega_4 - \frac{3}{2}\omega_3 \omega_4 + \frac{1}{4}\omega_4^2 \omega_1 + 2\omega_2 v \omega_1 + u^2 \omega_3^2 \omega_4 - 2\omega_2 u^2 \omega_3 \omega_1 + \\ & v^2 \omega_4^2 \omega_1 + \frac{1}{2}\omega_3^2 v \omega_4 + \omega_2 + \frac{1}{2}\omega_2 u \omega_4 \omega_1 - 2v^2 \omega_4^2 - u \omega_1^2 - \omega_2 u v \omega_4 \omega_1 - \frac{1}{2}\omega_2 \omega_1 + 4\omega_2 u \omega_3 v^2 \omega_4 - \omega_2 u \omega_3^2 + \frac{1}{4}\omega_3 \omega_4^2 + \\ & u^2 \omega_4 \omega_1^2 + 3\omega_2 \omega_3 v + \omega_2 u^2 \omega_1^2 - 2\omega_2^2 v^2 - 2v \omega_4 \omega_1 - 2u^2 \omega_3^2 - \frac{1}{2}u \omega_3 \omega_4^2 - \frac{1}{2}\omega_2 \omega_4 + u v \omega_4 \omega_1^2 - 2u \omega_3 v^2 \omega_4^2 - 2u^2 \omega_3 \omega_4 \omega_1 + \\ & 6\omega_2 u v \omega_1 + \frac{1}{2}u \omega_2 u \omega_1^2 - \frac{1}{2}\omega_2 \omega_3^2 v + \frac{1}{4}\omega_3 \omega_4 \omega_1 - 3\omega_3 v \omega_4 + \frac{1}{2}\omega_2 u \omega_3 \omega_1 - \omega_2 \omega_3 - \omega_2 u \omega_3 v \omega_1 + v \omega_4^2 \omega_1 + 2u \omega_3^2 - \\ & 2u \omega_3 v \omega_4^2 + \frac{1}{2}u \omega_4 \omega_1^2 + 2\omega_3 - 4\omega_2 u v^2 \omega_4 \omega_1 - 2v \omega_4^2 - \frac{1}{2}\omega_2 \omega_3 v + \omega_2 u \omega_3 v \omega_4 + \omega_2^2 u \omega_3 v - \frac{1}{2}\omega_2 u \omega_3 \omega_4 + 2u^2 \omega_3^2 v \omega_4 - \\ & 2u^2 \omega_1^2 + \omega_2 u^2 \omega_3^2 - \frac{1}{2}\omega_2 v \omega_4 \omega_1 - 2\omega_2^2 u \omega_3 v^2 - 2\omega_2 u^2 v \omega_1^2 + \frac{1}{4}\omega_2 \omega_3 \omega_1 - 2\omega_2 \omega_3 v^2 \omega_4 + \frac{1}{4}\omega_3 \omega_4 + 2\omega_2 u \omega_3^2 v + \\ & \frac{1}{2}\omega_3 v \omega_4 \omega_1 - \omega_4 \omega_1 + 4v \omega_4 + \omega_2^2 \omega_3 v^2 - 3u \omega_4 \omega_1 + 6u \omega_3 v \omega_4 - \omega_2^2 u v \omega_1 - \frac{1}{2}\omega_3^2 + 2\omega_4 + 2u v \omega_4^2 \omega_1 + 4u^2 \omega_3 \omega_1 + \\ & 4\omega_2 v^2 \omega_4 + 2u^2 v \omega_4 \omega_1^2 + \frac{1}{2}u \omega_3 \omega_4 \omega_1 - 4\omega_2 v - 2\omega_2 u \omega_1 + \omega_1 + \frac{1}{4}\omega_2 \omega_3 \omega_4 + \omega_3 v \omega_4^2 - 4u \omega_3 - u \omega_3^2 \omega_4 + \frac{1}{4}\omega_2 \omega_3^2 - \frac{1}{2}\omega_2^2 v \omega_1, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y+\delta_l}^{[\mu_1], t-2\delta_t} = & -1 + 2\omega_2 u^2 \omega_3^2 v - \frac{1}{2}c_s^2 \omega_3 \omega_4 \omega_1 + c_s^2 \omega_3 v \omega_4 - \omega_3 \omega_1 + \omega_2 u^2 \omega_1 - 3\omega_2 u^2 \omega_3 v \omega_1 + c_s^2 \omega_2 \omega_3 v \omega_1 + u^2 \omega_3 - \\ & \omega_2 \omega_3 v \omega_1 - 4\omega_2 u^2 v^2 \omega_1^2 + 2u^2 v^2 \omega_4 \omega_1^2 - u^2 \omega_3 v \omega_4 \omega_1 + u^2 \omega_4 \omega_1 - \frac{1}{2}\omega_3 \omega_4 + 2\omega_2 v \omega_1 - \frac{1}{2}v^2 \omega_4 - \frac{1}{2}\omega_2 v \omega_1^2 - \\ & \frac{1}{2}\omega_2 u^2 \omega_3 \omega_1 - c_s^2 \omega_3 - \frac{1}{2}c_s^2 \omega_2 \omega_3 \omega_1 + \frac{1}{2}\omega_2 + c_s^2 \omega_3 \omega_1 + 2u^2 \omega_3^2 v^2 \omega_4 - \frac{1}{2}\omega_2 \omega_1 + \omega_2 \omega_3 v - v \omega_4 \omega_1 + \frac{1}{2}c_s^2 \omega_3 \omega_4 + \\ & 4c_s^2 u^2 \omega_3 \omega_4 \omega_1 - 4\omega_2 u^2 \omega_3^2 v^2 - \frac{1}{2}u^2 \omega_3 \omega_4 \omega_1 - u^2 \omega_3 v \omega_4 + \omega_2 v^2 + \frac{1}{2}\omega_3 \omega_4 \omega_1 - \omega_3 v \omega_4 - \frac{1}{2}\omega_2 \omega_3 - c_s^2 \omega_4 \omega_1 + \\ & \omega_3 + 2u^2 v \omega_4 \omega_1 + \frac{1}{2}c_s^2 \omega_4 \omega_1 + v^2 \omega_4 \omega_1 + \omega_2 v^2 \omega_1^2 - 2c_s^2 u^2 \omega_3^2 \omega_4 - 2\omega_2 u^2 v \omega_1 + 2\omega_2 u^2 v \omega_1^2 + \frac{1}{2}\omega_2 \omega_3 \omega_1 - 2u^2 \omega_1 - \\ & c_s^2 \omega_3 v \omega_4 \omega_1 + \frac{1}{2}c_s^2 \omega_2 \omega_3 + \omega_3 v \omega_4 \omega_1 - \frac{1}{2}\omega_2 u^2 \omega_3 - \frac{1}{2}\omega_4 \omega_1 - 2\omega_2 v^2 \omega_1 - \frac{1}{2}u^2 \omega_3 \omega_4 - \frac{1}{2}v^2 \omega_4 \omega_1^2 + v \omega_4 - \\ & 2c_s^2 u^2 \omega_4 \omega_1^2 - 4u^2 \omega_3 v^2 \omega_4 \omega_1 - c_s^2 \omega_2 \omega_3 v + \omega_2 u^2 \omega_3 v + \frac{1}{2}\omega_4 + \frac{1}{2}c_s^2 \omega_4 \omega_1^2 + u^2 \omega_3 \omega_1 + 8\omega_2 u^2 \omega_3 v^2 \omega_1 - \frac{3}{2}\omega_2 v + \omega_1, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y+\delta_l}^{[\mu_3], t-2\delta_t} = & -2 + 4\omega_2 u^2 \omega_3^2 v - \omega_3 \omega_1 - 8\omega_2 u^2 \omega_3 v \omega_1 + v \omega_4 \omega_1^2 - \omega_2 \omega_3 v \omega_1 + \frac{1}{2}\omega_2 \omega_1^2 + 8u^2 \omega_3 v \omega_4 \omega_1 - \frac{1}{2}\omega_3 \omega_4 + \\ & 3\omega_2 v \omega_1 - 2u^2 \omega_3^2 \omega_4 - \omega_1^2 - \omega_2 v \omega_1^2 + 4\omega_2 u^2 \omega_3 \omega_1 + \omega_2 - \frac{3}{2}\omega_2 \omega_1 - 2u^2 \omega_4 \omega_1^2 + \omega_2 \omega_3 v - 2\omega_2 u^2 \omega_1^2 - 3v \omega_4 \omega_1 + \\ & 4u^2 \omega_3^2 + 4u^2 \omega_3 \omega_4 \omega_1 + \frac{1}{2}\omega_3 \omega_4 \omega_1 - \omega_3 v \omega_4 - \frac{1}{2}\omega_2 \omega_3 + \omega_3 + \frac{1}{2}\omega_4 \omega_1^2 - 4u^2 \omega_3^2 v \omega_4 + 4u^2 \omega_1^2 - 2\omega_2 u^2 \omega_3^2 + \\ & 4\omega_2 u^2 v \omega_1^2 + \frac{1}{2}\omega_2 \omega_3 \omega_1 + \omega_3 v \omega_4 \omega_1 - \frac{3}{2}\omega_4 \omega_1 + 2v \omega_4 + \omega_4 - 8u^2 \omega_3 \omega_1 - 4u^2 v \omega_4 \omega_1^2 - 2\omega_2 v + 3\omega_1, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_l, y+\delta_l}^{[\mu_1], t-2\delta_t} = & -1 + \frac{1}{2}u v \omega_4 \omega_1 - \omega_2 u^2 \omega_3^2 v - \frac{1}{4}\omega_3 v^2 \omega_4 \omega_1 + \frac{1}{2}c_s^2 \omega_3 \omega_4 \omega_1 - \omega_2^2 u v^2 \omega_1 + \frac{5}{2}u \omega_3 v^2 \omega_4 + \frac{1}{2}\omega_2 u v \omega_1^2 - \\ & \frac{1}{2}c_s^2 \omega_3 v \omega_4 + \frac{1}{4}\omega_2 v^2 \omega_4 \omega_1 + \frac{1}{2}c_s^2 v \omega_4^2 \omega_1 + 3\omega_2 u \omega_3 v^3 \omega_4 - \frac{1}{2}c_s^2 u \omega_4 \omega_1^2 - \frac{5}{2}\omega_2 \omega_3 v^2 + \frac{3}{2}\omega_2 u^2 \omega_3 v \omega_1 + \\ & v^3 \omega_4^2 - \frac{1}{2}\omega_3 \omega_4 + \frac{1}{2}\omega_2^2 v^2 \omega_1 - \frac{1}{2}c_s^2 \omega_2 \omega_3 v \omega_1 - \frac{1}{2}u^2 \omega_3 - \frac{1}{4}\omega_2 \omega_3 v \omega_1 - \frac{1}{4}v \omega_3 v^2 \omega_4^2 + \frac{1}{2}u \omega_3 v \omega_4 \omega_1 + \frac{1}{4}c_s^2 \omega_3 \omega_4^2 + \\ & 2\omega_2 u^2 v^2 \omega_1^2 - \frac{1}{2}\omega_2 \omega_1 - \frac{1}{2}u \omega_3 \omega_1 - u^2 v^2 \omega_4 \omega_1^2 - \frac{1}{2}c_s^2 \omega_2 \omega_3 v \omega_4 + \frac{5}{2}\omega_2 u \omega_3 v - \frac{1}{2}\omega_2 u \omega_3 + \frac{1}{2}u v^2 \omega_4 \omega_1^2 - \\ & 3\omega_2 u v^3 \omega_4 \omega_1 + \frac{1}{2}u^2 \omega_3 v \omega_4 \omega_1 - \frac{1}{2}u^2 \omega_4 \omega_1 - \frac{1}{4}\omega_3 \omega_4 - \frac{1}{2}c_s^2 \omega_2 \omega_4 - u \omega_3 v^3 \omega_4^2 + \frac{3}{4}\omega_2 v \omega_1 - \frac{3}{2}v^2 \omega_4 + \frac{1}{2}\omega_2 u^2 \omega_3 \omega_1 - \\ & \frac{1}{4}v^2 \omega_4 \omega_1 - \omega_2^2 v^3 \omega_1 + \frac{1}{2}c_s^2 \omega_3 + \frac{1}{4}c_s^2 \omega_2 \omega_3 \omega_1 - \frac{1}{2}\omega_3 v^3 \omega_4^2 + \frac{1}{2}\omega_2 - \frac{1}{2}c_s^2 \omega_2 \omega_4 \omega_1 + 2\omega_2^2 v^3 + \frac{1}{2}v^2 \omega_4^2 - \\ & \frac{1}{4}c_s^2 \omega_3 \omega_1 - u^2 \omega_3 v^2 \omega_4 - \frac{1}{4}\omega_2 \omega_1 + \frac{1}{2}\omega_2 u \omega_3 v^2 \omega_4 - 5\omega_2 u \omega_3 v^2 + c_s^2 \omega_2 u v \omega_4 \omega_1 + 2\omega_2^2 u v^3 \omega_1 + \frac{5}{4}\omega_2 \omega_3 v - \omega_2^2 v^2 + \\ & \frac{5}{2}c_s^2 u \omega_4 \omega_1 - \frac{1}{2}v \omega_4 \omega_1 - \omega_2 u \omega_3 v^2 \omega_1 - \frac{3}{2}c_s^2 \omega_3 \omega_4 + \frac{5}{4}\omega_3 v^2 \omega_4 - 2c_s^2 u^2 \omega_3 \omega_4 \omega_1 + 2\omega_2 u^2 \omega_3^2 v^2 + \frac{1}{4}c_s^2 \omega_4 \omega_1^2 - \\ & \frac{1}{2}u \omega_3 v^2 \omega_4^2 + \frac{1}{4}u^2 \omega_3 \omega_4 \omega_1 + \frac{1}{2}u^2 \omega_3 v \omega_4 + \frac{1}{2}c_s^2 \omega_3 v \omega_4^2 + \frac{1}{4}c_s^2 \omega_2 \omega_3 \omega_4 - 2\omega_2 u v \omega_1 + c_s^2 u \omega_3^2 \omega_4 + \frac{1}{4}c_s^2 \omega_2 \omega_4 \omega_1 + \\ & 3\omega_2 v^2 - \frac{1}{2}c_s^2 u \omega_4 \omega_1 - \frac{1}{4}\omega_2 \omega_3 v^2 - \frac{1}{2}\omega_3 v \omega_4 + \frac{1}{4}c_s^2 \omega_3 \omega_4 + \frac{1}{4}\omega_2 u \omega_3 \omega_1 - \frac{1}{4}\omega_2 \omega_3 + c_s^2 \omega_2 v \omega_4 + c_s^2 u \omega_3 v \omega_4^2 - \\ & \frac{3}{4}c_s^2 \omega_4 \omega_1 + \frac{1}{2}\omega_3 - u^2 v \omega_4 \omega_1 - \frac{5}{2}c_s^2 \omega_3 \omega_4 + \frac{3}{2}\omega_2 \omega_3 v^3 \omega_4 + u v^3 \omega_4 \omega_1 - \frac{1}{2}\omega_2 u v^2 \omega_4 \omega_1 + 5\omega_2 u v^2 \omega_1 - \frac{1}{4}\omega_3 v^2 \omega_4 + \\ & \frac{3}{2}c_s^2 \omega_4 + \frac{3}{4}v^2 \omega_4 \omega_1 + c_s^2 u^2 \omega_3 \omega_4 - 3\omega_2 v^3 \omega_4 + \frac{1}{2}c_s^2 \omega_2 \omega_3 \omega_4 + \omega_2 u^2 v \omega_1 + \frac{3}{2}\omega_2 v^3 \omega_4 \omega_1 + 2\omega_2 u \omega_3 v^2 - \\ & c_s^2 \omega_2 u \omega_3 v \omega_4 + \frac{1}{2}u v^2 \omega_4 \omega_1^2 + \omega_2^2 u \omega_3 v^2 - \omega_2 u^2 v \omega_1^2 + u^2 \omega_1 - \frac{1}{2}c_s^2 \omega_2 v \omega_4 \omega_1 + \frac{1}{4}\omega_2 \omega_3 v^2 \omega_4 + \frac{1}{2}c_s^2 \omega_3 v \omega_4 \omega_1 - \\ & u \omega_3 v^2 \omega_4 - \frac{5}{2}u v^2 \omega_4 \omega_1 - \frac{1}{4}c_s^2 \omega_2 \omega_3 - \omega_2 u \omega_3 v^2 + \frac{1}{4}\omega_2 u^2 \omega_3 + \frac{1}{2}u \omega_3 v^2 \omega_4 \omega_1 - \frac{1}{4}\omega_4 \omega_1 - \frac{3}{2}\omega_2 v^2 \omega_1 + \frac{1}{4}\omega_2 u^2 \omega_3 \omega_4 - \\ & \frac{1}{2}c_s^2 \omega_4^2 + v \omega_4 + c_s^2 u^2 \omega_4 \omega_1^2 + \frac{1}{2}\omega_2^2 \omega_3 v^2 + \frac{1}{4}u \omega_4 \omega_1 - c_s^2 u v \omega_4 \omega_1 + 2u^2 \omega_3 v^2 \omega_4 \omega_1 - u \omega_3 v \omega_4 + \frac{1}{2}c_s^2 \omega_2 \omega_3 v - \\ & \frac{1}{2}\omega_2 u^2 \omega_3 v^3 + \frac{1}{2}\omega_4 - \frac{1}{2}u^2 \omega_3 \omega_1 - c_s^2 v \omega_4^2 - \frac{1}{2}\omega_2 v^2 \omega_4 + \frac{1}{2}c_s^2 u \omega_3 \omega_4 \omega_1 - \omega_2 u v^2 \omega_1^2 + \frac{1}{4}\omega_3 \omega_4 \omega_1 - \\ & 2\omega_2^2 u \omega_3 v^3 - 4\omega_2 u^2 \omega_3 v^2 \omega_1 - \omega_2^2 \omega_3 v^3 - \frac{1}{2}v^3 \omega_4 \omega_1 + \frac{1}{2}\omega_2 \omega_3^2 v^2 - \frac{3}{2}\omega_2 v + \frac{1}{4}\omega_2 u \omega_1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_2 \omega_3 v^2 \omega_1 + u \omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_l, y+\delta_l}^{[\mu_3], t-2\delta_t} = & -2 + \frac{1}{4}\omega_2 \omega_4 \omega_1 + 6u v \omega_4 \omega_1 - \frac{1}{2}\omega_4^2 - 2\omega_2 u^2 \omega_3^2 v - 2\omega_2^2 u v^2 \omega_1 - \frac{1}{2}u \omega_4^2 \omega_1 + \omega_2 u v \omega_1^2 - 2\omega_2 v^2 \omega_4 \omega_1 + \omega_2 v \omega_4 - \frac{1}{2}\omega_3 \omega_1 + \\ & \omega_2^2 v + 4\omega_2 u^2 \omega_3 v \omega_1 - 3u \omega_3 \omega_4 + \omega_2^2 v^2 \omega_1 - \frac{1}{2}\omega_2 \omega_3 v \omega_1 + \omega_3 v^2 \omega_4^2 - u \omega_3 v \omega_4 \omega_1 - \frac{1}{2}\omega_2 \omega_3 v \omega_4 + 4u \omega_1 + u \omega_3 \omega_1 + \\ & 6\omega_2 u \omega_3 v - 2\omega_2 u \omega_3 - 2u v^2 \omega_4 \omega_1 - 4u^2 \omega_3 v \omega_4 \omega_1 + 2u \omega_3^2 v \omega_4 - \frac{3}{2}\omega_3 \omega_4 + \frac{1}{4}\omega_4^2 \omega_1 + 2\omega_2 v \omega_1 + u^2 \omega_3^2 \omega_4 - 2\omega_2 u^2 \omega_3 \omega_1 + \end{aligned}$$

$$\begin{aligned}
& v^2 \omega_4^2 \omega_1 + \frac{1}{2} \omega_3^2 v \omega_4 + \omega_2 - \frac{1}{2} \omega_2 u \omega_4 \omega_1 - 2v^2 \omega_4^2 + u \omega_1^2 + \omega_2 u v \omega_4 \omega_1 - \frac{1}{2} \omega_2 \omega_1 - 4 \omega_2 u \omega_3 v^2 \omega_4 + \omega_2 u \omega_3^2 + \frac{1}{4} \omega_3 \omega_4^2 + \\
& u^2 \omega_4 \omega_1^2 + 3 \omega_2 \omega_3 v + \omega_2 u^2 \omega_1^2 - 2 \omega_2^2 v^2 - 2 v \omega_4 \omega_1 - 2 u^2 \omega_3^2 + \frac{1}{2} u \omega_3 \omega_4^2 - \frac{1}{2} \omega_2 \omega_4 - u v \omega_4 \omega_1^2 + 2 u \omega_3 v^2 \omega_4^2 - 2 u^2 \omega_3 \omega_4 \omega_1 - \\
& 6 \omega_2 u v \omega_1 - \frac{1}{2} \omega_2 u \omega_1^2 - \frac{1}{2} \omega_2 \omega_3^2 v + \frac{1}{4} \omega_3 \omega_4 \omega_1 - 3 \omega_3 v \omega_4 - \frac{1}{2} \omega_2 u \omega_3 \omega_1 - \omega_2 \omega_3 + \omega_2 u \omega_3 v \omega_1 + v \omega_4^2 \omega_1 - 2 u \omega_3^2 + \\
& 2 u \omega_3 v \omega_4^2 - \frac{1}{2} u \omega_4 \omega_1^2 + 2 \omega_3 + 4 \omega_2 u v \omega_4 \omega_1 - 2 v \omega_4^2 - \frac{1}{2} \omega_2^2 \omega_3 v - \omega_2 u \omega_3 v \omega_4 - \omega_2^2 u \omega_3 v + \frac{1}{2} \omega_2 u \omega_3 \omega_4 + 2 u^2 \omega_3^2 v \omega_4 - \\
& 2 u^2 \omega_1^2 + \omega_2 u^2 \omega_3^2 - \frac{1}{2} \omega_2 v \omega_4 \omega_1 + 2 \omega_2^2 u \omega_3 v^2 - 2 \omega_2 u^2 v \omega_1^2 + \frac{1}{4} \omega_2 \omega_3 \omega_1 - 2 \omega_2 \omega_3 v^2 \omega_4 + \frac{1}{4} \omega_3 \omega_4^2 - 2 \omega_2 u \omega_3^2 v + \\
& \frac{1}{2} \omega_3 v \omega_4 \omega_1 - \omega_4 \omega_1 + 4 v \omega_4 + \omega_2^2 \omega_3 v^2 + 3 u \omega_4 \omega_1 - 6 u \omega_3 v \omega_4 + \omega_2^2 u v \omega_1 - \frac{1}{2} \omega_3^2 + 2 \omega_4 - 2 u v \omega_4^2 \omega_1 + 4 u^2 \omega_3 \omega_1 + \\
& 4 \omega_2 v^2 \omega_4 + 2 u^2 v \omega_4 \omega_1^2 - \frac{1}{2} u \omega_3 \omega_4 \omega_1 - 4 \omega_2 v + 2 \omega_2 u \omega_1 + \omega_1 + \frac{1}{4} \omega_2 \omega_3 \omega_4 + w_3 v \omega_4^2 + u \omega_3 + u \omega_3^2 \omega_4 + \frac{1}{4} \omega_2 \omega_3^2 - \frac{1}{2} \omega_2^2 v \omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_1],t-3\delta_t} = & -1 - 3 \omega_3 v^2 \omega_4 \omega_1 + 3 c_s^2 \omega_3 \omega_4 \omega_1 + \frac{1}{2} \omega_2 v^2 \omega_4 \omega_1 - c_s^2 v \omega_4^2 \omega_1 - \omega_3 \omega_1 - 5 \omega_2 \omega_3 v^2 - v^3 \omega_4^2 + \omega_2^2 v^2 \omega_1 + \\
& 3 \omega_2 \omega_3 v \omega_1 - \frac{1}{2} \omega_3 v^2 \omega_4^2 + \frac{1}{2} c_s^2 \omega_3 \omega_4^2 + c_s^2 \omega_2 \omega_3 v \omega_4 - \frac{1}{2} c_s^2 \omega_2 \omega_3 \omega_4 \omega_1 - \frac{1}{2} \omega_3 \omega_4 + c_s^2 \omega_3 v \omega_4^2 \omega_1 - \frac{1}{2} c_s^2 \omega_2 \omega_4 - \\
& \frac{5}{2} \omega_2 v \omega_1 - \omega_2 \omega_3^2 v^2 \omega_1 - 2 \omega_2^2 \omega_3 v^3 \omega_1 - 2 v^2 \omega_4 + \frac{1}{2} \omega_2 v \omega_1^2 - \frac{1}{2} v^2 \omega_4^2 \omega_1 + 2 \omega_2^2 v^3 \omega_1 + \omega_3 v^3 \omega_4^2 + \frac{1}{2} \omega_2 - 2 \omega_2^2 v^3 + \\
& \frac{1}{2} v^2 \omega_4^2 - \omega_3 v^3 \omega_4^2 \omega_1 - \frac{1}{2} \omega_2 \omega_1 - \frac{1}{2} \omega_2 \omega_3 v^2 \omega_4 \omega_1 - \frac{5}{2} \omega_2 \omega_3 v - \omega_2^2 v^2 - \omega_2^2 \omega_3 v^2 \omega_1 + v \omega_4 \omega_1 - \frac{5}{2} c_s^2 \omega_3 \omega_4 + \\
& \frac{5}{2} \omega_3 v^2 \omega_4 - \frac{1}{2} \omega_2 \omega_3 v \omega_1^2 + \frac{1}{2} \omega_3 v^2 \omega_4 \omega_1^2 + \frac{1}{2} c_s^2 \omega_2 \omega_4 \omega_1^2 - \frac{1}{2} c_s^2 \omega_3 \omega_4 \omega_1^2 - c_s^2 \omega_3 v \omega_4^2 + \frac{1}{2} c_s^2 \omega_2 \omega_3 \omega_4 + \\
& \frac{1}{2} c_s^2 \omega_2 \omega_4 \omega_1 + 4 \omega_2 v^2 + \frac{1}{2} \omega_2 \omega_3^2 v + \frac{1}{2} \omega_3 \omega_4 \omega_1 + \omega_3 v \omega_4 - \omega_2 \omega_3 v^2 \omega_1^2 + \frac{1}{2} c_s^2 \omega_3^2 \omega_4 - \frac{1}{2} \omega_2 \omega_3 - c_s^2 \omega_2 v \omega_4 - \\
& c_s^2 \omega_2 \omega_3 v \omega_4 \omega_1 - \frac{5}{2} c_s^2 \omega_4 \omega_1 + \omega_3 + \frac{1}{2} \omega_3 v^2 \omega_4 \omega_1 - 3 \omega_2 \omega_3 v^3 \omega_4 - \frac{1}{2} \omega_3^2 v^2 \omega_4 + 2 c_s^2 \omega_4 + \frac{5}{2} v^2 \omega_4 \omega_1 + \omega_2 v^2 \omega_1^2 + \\
& 3 \omega_2 v^3 \omega_4 - 3 \omega_2 v^3 \omega_4 \omega_1 + \frac{1}{2} \omega_2 \omega_3 \omega_1 + c_s^2 \omega_2 v \omega_4 \omega_1 + \frac{1}{2} \omega_2 \omega_3 v^2 \omega_4 - \frac{1}{2} c_s^2 \omega_3 \omega_4 \omega_1 - \omega_3 v \omega_4 \omega_1 - \frac{1}{2} \omega_2 \omega_3^2 v \omega_1 - \\
& \frac{1}{2} \omega_4 \omega_1 - 5 \omega_2 v^2 \omega_1 - \frac{1}{2} c_s^2 \omega_4^2 - \frac{1}{2} v^2 \omega_4 \omega_1^2 - v \omega_4 + \omega_2^2 \omega_3 v^2 - \frac{1}{2} c_s^2 \omega_3 \omega_4^2 \omega_1 + \frac{1}{2} \omega_3 v^2 \omega_4^2 \omega_1 + 3 \omega_2 \omega_3 v^3 \omega_4 \omega_1 + \\
& \frac{1}{2} \omega_4 + \frac{1}{2} c_s^2 \omega_4 \omega_1^2 + c_s^2 v \omega_4^2 - \frac{1}{2} \omega_2 v^2 \omega_4 + 2 \omega_2^2 \omega_3 v^3 + v^3 \omega_4^2 \omega_1 + \omega_2 \omega_3^2 v^2 + 2 \omega_2 v + \omega_1 + 6 \omega_2 \omega_3 v^2 \omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_3],t-3\delta_t} = & 3 - \frac{1}{2} \omega_2 \omega_4 \omega_1 + \frac{1}{2} \omega_4^2 + 4 \omega_2 v^2 \omega_4 \omega_1 + \omega_2 v \omega_4 + 5 \omega_3 \omega_1 + \omega_2^2 v - 2 \omega_2^2 v^2 \omega_1 + v \omega_4 \omega_1^2 - 7 \omega_2 \omega_3 v \omega_1 - \\
& 2 \omega_3 v^2 \omega_4^2 - \frac{1}{2} \omega_2 \omega_1^2 - \omega_2 \omega_3 v \omega_4 + \frac{1}{2} \omega_2 \omega_3^2 \omega_1 - 2 \omega_3 v \omega_4^2 \omega_1 + 3 \omega_3 \omega_4 + \frac{1}{2} \omega_2 \omega_3 \omega_4 \omega_1 - \frac{1}{2} \omega_4^2 \omega_1 + 6 \omega_2 v \omega_1 + \omega_1^2 - \\
& \omega_2 v \omega_1^2 - 2 v^2 \omega_4^2 \omega_1 + \omega_3^2 v \omega_4 - \frac{3}{2} \omega_2 + \frac{1}{2} \omega_3^2 \omega_4 \omega_1 + 2 v^2 \omega_4^2 + 2 \omega_2 \omega_1 - 4 \omega_2 \omega_3 v^2 \omega_4 \omega_1 - \omega_3^2 v \omega_4 \omega_1 - \frac{1}{2} \omega_3 \omega_4^2 + \\
& 6 \omega_2 \omega_3 v + \frac{1}{2} \omega_3 \omega_4^2 \omega_1 + 2 \omega_2^2 \omega_3^2 v - \omega_3 \omega_1^2 - 6 v \omega_4 \omega_1 + \frac{1}{2} \omega_2 \omega_4 + \omega_2 \omega_3 v \omega_1^2 + \omega_2^2 \omega_3 v \omega_1 - \omega_2 \omega_3^2 v - \\
& \frac{7}{2} \omega_3 \omega_4 \omega_1 - 6 \omega_3 v \omega_4 + 2 \omega_2 \omega_3 + 2 v \omega_4^2 \omega_1 - 4 \omega_3 + \omega_2 \omega_3 v \omega_4 \omega_1 - \frac{1}{2} \omega_4 \omega_1^2 - 2 v \omega_4^2 - \omega_2^2 \omega_3 v + \frac{1}{2} \omega_2 \omega_3 \omega_1^2 - \\
& \omega_3 v \omega_4 \omega_1^2 - \omega_2 v \omega_4 \omega_1 - \frac{5}{2} \omega_2 \omega_3 \omega_1 + 4 \omega_2 \omega_3 v^2 \omega_4 - \frac{1}{2} \omega_3^2 \omega_4 + 7 \omega_3 v \omega_4 \omega_1 + \omega_2 \omega_3^2 v \omega_1 + 3 \omega_4 \omega_1 + 5 v \omega_4 - 2 \omega_2^2 \omega_3 v^2 + \\
& \omega_3^2 + 2 \omega_3 v^2 \omega_4^2 \omega_1 - \frac{5}{2} \omega_4 - 4 \omega_2 v^2 \omega_4 + \frac{1}{2} \omega_3 \omega_4 \omega_1^2 - \omega_3^2 \omega_1 - 5 \omega_2 v - 4 \omega_1 - \frac{1}{2} \omega_2 \omega_3 \omega_4 + 2 \omega_3 v \omega_4^2 - \frac{1}{2} \omega_2 \omega_3^2 - \omega_2^2 v \omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l,y}^{[\mu_1],t-3\delta_t} = & u v \omega_4 \omega_1 + 2 \omega_2 u^2 \omega_3^2 v + \omega_2 u v \omega_1^2 + c_s^2 \omega_3 v \omega_4 + u^2 \omega_3 v \omega_4^2 - 6 \omega_2 v \omega_4 - \omega_2^2 v - 3 \omega_2 u^2 \omega_3 v \omega_1 + \\
& c_s^2 \omega_2 \omega_3 v \omega_1 + \frac{1}{2} \omega_2 \omega_3 v \omega_1 + \omega_3 v \omega_4 \omega_1 + 4 \omega_2 \omega_3 v \omega_4 - \omega_2 u v \omega_4 \omega_1^2 - \frac{1}{2} \omega_2 v \omega_4^2 \omega_1 + c_s^2 \omega_2 \omega_3 v \omega_4 + 7 \omega_2 u \omega_3 v - \\
& \omega_2 u^2 \omega_3 v \omega_4 - u^2 \omega_3 v \omega_4 \omega_1 + c_s^2 \omega_3 v \omega_4 \omega_1^2 - \frac{5}{2} \omega_2 v \omega_1 + 7 \omega_2 u v \omega_4 \omega_1 - \frac{1}{2} \omega_2 \omega_3 v \omega_4^2 - \frac{1}{2} \omega_2^2 v \omega_4 \omega_1 - \frac{7}{2} \omega_2 \omega_3 v - \\
& \omega_2^2 v \omega_4 \omega_1 + v \omega_4 \omega_1 - u^2 \omega_3 v \omega_4 - c_s^2 \omega_3 v \omega_4^2 - 6 \omega_2 u v \omega_1 + 2 \omega_2 u \omega_3^2 v \omega_4 + \omega_2 v \omega_4^2 - 2 u^2 v \omega_4^2 \omega_1 + \omega_2^2 u \omega_3 v \omega_4 + \\
& \frac{1}{2} \omega_2 \omega_3^2 v + \omega_3 v \omega_4 - v \omega_4^2 \omega_1 + 3 \omega_2 u^2 \omega_3 v \omega_4 \omega_1 + 2 u \omega_3 v \omega_4^2 - c_s^2 \omega_2 \omega_3 v \omega_4 \omega_1 + 2 u^2 v v \omega_4 \omega_1 - \frac{1}{2} \omega_2 \omega_3 v \omega_4 \omega_1 + \\
& 2 v \omega_4^2 + \frac{1}{2} \omega_2^2 \omega_3 v - 8 \omega_2 u \omega_3 v \omega_4 - \omega_2^2 u \omega_3 v - 2 \omega_2 u^2 v \omega_1 - \omega_2 u v \omega_4 \omega_1^2 - \frac{1}{2} \omega_2^2 \omega_3 v \omega_4 - 2 \omega_2 u^2 v \omega_4^2 + 3 \omega_2 v \omega_4 \omega_1 + \\
& \omega_2^2 v \omega_4 + \omega_2 u \omega_3 v \omega_4^2 + 2 \omega_2 u^2 v \omega_1^2 + 2 \omega_2 u^2 v \omega_4 \omega_1 - c_s^2 \omega_3 v \omega_4 \omega_1 + u^2 \omega_3 v \omega_4^2 \omega_1 - 2 \omega_2 u \omega_3^2 v - 2 v \omega_4 - 2 u \omega_3 v \omega_4 + \\
& \omega_2^2 v \omega_1 - c_s^2 \omega_2 \omega_3 v + \omega_2 u^2 \omega_3 v - 2 \omega_2 u^2 \omega_3^2 v \omega_4 - v \omega_4 \omega_1^2 - \frac{1}{2} \omega_2 \omega_3^2 v \omega_4 + 5 \omega_2 v - \omega_3 v \omega_4 \omega_1^2 + \frac{1}{2} \omega_2^2 v \omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l,y}^{[\mu_3],t-3\delta_t} = & 3 - \frac{5}{2} \omega_2 \omega_4 \omega_1 + \omega_4^2 - u \omega_4^2 \omega_1 + \frac{1}{2} \omega_3 \omega_1 - 6 u \omega_3 \omega_4 - \omega_2 \omega_4^2 + \frac{1}{2} \omega_2 \omega_3^2 \omega_4 - 5 u \omega_1 + u \omega_3 \omega_1 - 4 \omega_2 u^2 \omega_3 \omega_4 \omega_1 - \\
& \omega_2^2 u \omega_3 \omega_4 - 6 \omega_2 u \omega_3 + 3 \omega_3 \omega_4 + \frac{1}{2} \omega_2 \omega_3 \omega_4 \omega_1 - \frac{1}{2} \omega_4^2 \omega_1 - 2 u^2 \omega_3^2 \omega_4 + \frac{1}{2} \omega_2^2 \omega_3 \omega_4 + \omega_2 u \omega_4 \omega_1^2 - \omega_2^2 u \omega_1 + \\
& 4 \omega_2 u^2 \omega_3 \omega_1 + \omega_2^2 - 4 \omega_2 - 7 \omega_2 u \omega_4 \omega_1 + u \omega_1^2 + 2 \omega_2 \omega_1 - 2 \omega_2 u \omega_3^2 \omega_4 + 2 \omega_2 u \omega_3^2 - \frac{1}{2} \omega_3 \omega_4^2 - 2 u^2 \omega_4 \omega_1^2 - 2 \omega_2 u^2 \omega_1^2 + \\
& 2 u^2 \omega_3^2 + u \omega_3 \omega_4^2 - \frac{1}{2} \omega_2^2 \omega_3 \omega_3 + 5 \omega_2 \omega_4 + 4 u^2 \omega_3 \omega_4 \omega_1 - \omega_2 u \omega_1^2 - \frac{1}{2} \omega_3 \omega_4 \omega_1 - \omega_2^2 \omega_4 + \frac{1}{2} \omega_2 \omega_3 \omega_4^2 - \omega_2 u \omega_3 \omega_1 + \\
& 3 \omega_2 \omega_3 - 2 u \omega_3^2 - u \omega_4 \omega_1^2 - \frac{5}{2} \omega_3 + 2 \omega_2 u^2 \omega_3^2 \omega_4 + \omega_2 u \omega_4 \omega_1^2 + 7 \omega_2 u \omega_3 \omega_4 - \frac{1}{2} \omega_2^2 \omega_1 + 2 u^2 \omega_1^2 - 2 \omega_2 u^2 \omega_3^2 + \\
& \omega_2 u \omega_3 \omega_4 \omega_1 - \omega_2 u \omega_3 \omega_4^2 - \frac{1}{2} \omega_2 \omega_3 \omega_1 - \frac{1}{2} \omega_3 \omega_4 + \frac{1}{2} \omega_2^2 \omega_4 \omega_1 + \omega_2^2 u \omega_4 \omega_1 + 2 \omega_4 \omega_1 + 6 u \omega_4 \omega_1 + \frac{1}{2} \omega_3^2 + \omega_2^2 u \omega_3 + \\
& \frac{1}{2} \omega_2 \omega_4^2 \omega_1 - 4 \omega_4 - 4 u^2 \omega_3 \omega_1 - u \omega_3 \omega_4 \omega_1 + 2 \omega_2 u^2 \omega_4 \omega_1^2 + 6 \omega_2 u \omega_1 - \frac{3}{2} \omega_1 - \frac{7}{2} \omega_2 \omega_3 \omega_4 + 5 u \omega_3 + 2 u \omega_3^2 \omega_4 - \frac{1}{2} \omega_2 \omega_3^2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_1],t-3\delta_t} = & -4 \omega_2 u^2 \omega_3^2 v - 2 c_s^2 \omega_3 v \omega_4 - 2 u^2 \omega_3 v \omega_4^2 + 2 c_s^2 v \omega_4^2 \omega_1 - 4 \omega_2 v \omega_4 - \omega_2^2 v + 6 \omega_2 u^2 \omega_3 v \omega_1 + 2 v^3 \omega_4^2 - \\
& 2 c_s^2 \omega_2 \omega_3 v \omega_1 + 4 \omega_2 \omega_3 v \omega_1 + 3 \omega_2 \omega_3 v \omega_4 - 4 c_s^2 \omega_2 \omega_3 v \omega_4 + 2 \omega_3 v \omega_4^2 \omega_1 + 2 \omega_2 u^2 \omega_3 v \omega_4 + 2 u^2 \omega_3 v \omega_4 \omega_1 - \\
& 4 c_s^2 \omega_3 v \omega_4^2 \omega_1 - 6 \omega_2 v \omega_1 + 4 \omega_2^2 \omega_3 v^3 \omega_1 + \omega_2 v \omega_1^2 - 4 \omega_2^2 v^3 \omega_1 - 2 \omega_3 v^3 \omega_4^2 + 4 \omega_2^2 v^3 + 2 \omega_3 v^3 \omega_4^2 \omega_1 - 4 \omega_2 \omega_3 v + \\
& 2 v \omega_4 \omega_1 + 2 u^2 \omega_3 v \omega_4 + 4 c_s^2 \omega_3 v \omega_4^2 + 4 u^2 v \omega_4^2 \omega_1 - \omega_2^2 v \omega_3 v \omega_1 + 2 \omega_3 v \omega_4 + 2 c_s^2 \omega_2 v \omega_4 - 2 v \omega_4^2 \omega_1 - \\
& 6 \omega_2 u^2 \omega_3 v \omega_4 \omega_1 + 4 c_s^2 \omega_2 \omega_3 v \omega_4 \omega_1 - 4 u^2 v \omega_4 \omega_1 + 6 \omega_2 \omega_3 v^3 \omega_4 - 3 \omega_2 \omega_3 v \omega_4 \omega_1 + 2 v \omega_4^2 + \omega_2^2 \omega_3 v - \omega_2 v \omega_4 \omega_1^2 - \\
& 6 \omega_2 v^3 \omega_4 + 4 \omega_2 u^2 v \omega_1 + 6 \omega_2 v^3 \omega_4 \omega_1 + 4 \omega_2 u^2 v \omega_4 \omega_1^2 + 5 \omega_2 v \omega_4 \omega_1 - 4 \omega_2 u^2 v \omega_1^2 - 2 c_s^2 \omega_2 v \omega_4 \omega_1 -
\end{aligned}$$

$$\begin{aligned}
& 4\omega_2 u^2 v \omega_4 \omega_1 + 2c_s^2 \omega_3 v \omega_4 \omega_1 - 2u^2 \omega_3 v \omega_4^2 \omega_1 - 2\omega_3 v \omega_4 \omega_1 - 2v \omega_4 + 2c_s^2 \omega_2 \omega_3 v - 2\omega_2 u^2 \omega_3 v - \\
& 6\omega_2 \omega_3 v^3 \omega_4 \omega_1 + 4\omega_2 u^2 \omega_3^2 v \omega_4 - 2c_s^2 v \omega_4^2 - 4\omega_2^2 \omega_3 v^3 - 2v^3 \omega_4^2 \omega_1 + 5\omega_2 v - 2\omega_3 v \omega_4^2 + \omega_2^2 v \omega_1, \\
\alpha_{x,y}^{[\mu_3],t-3\delta_t} &= 3 - 3\omega_2 \omega_4 \omega_1 + \omega_2^2 \omega_3 \omega_1 - 8\omega_2 v^2 \omega_4 \omega_1 + 2\omega_3 \omega_1 + 4\omega_2^2 v^2 \omega_1 + 4\omega_3 v^2 \omega_4^2 - \omega_2 \omega_1^2 + 8\omega_2 u^2 \omega_3 \omega_4 \omega_1 + \\
& \omega_3 \omega_4 + \omega_2 \omega_3 \omega_4 \omega_1 + 4u^2 \omega_3^2 \omega_4 + \omega_1^2 - 8\omega_2 u^2 \omega_3 \omega_1 + 4v^2 \omega_4^2 \omega_1 + \omega_2^2 - 4\omega_2 - 4v^2 \omega_4^2 + 5\omega_2 \omega_1 + \\
& 8\omega_2 \omega_3 v^2 \omega_4 \omega_1 + 4u^2 \omega_4 \omega_1^2 + 4\omega_2 u^2 \omega_1^2 - 4\omega_2^2 v^2 - 4\omega_2^2 \omega_3 v^2 \omega_1 - 4u^2 \omega_3^2 - \omega_2^2 \omega_3 + 2\omega_2 \omega_4 + \omega_2 \omega_4 \omega_1^2 - \\
& 8u^2 \omega_3 \omega_4 \omega_1 - \omega_3 \omega_4 \omega_1 + 3\omega_2 \omega_3 - 2\omega_3 - 4\omega_2 u^2 \omega_3^2 \omega_4 - \omega_4 \omega_1^2 - \omega_2^2 \omega_1 - 4u^2 \omega_1^2 + 4\omega_2 u^2 \omega_3^2 - 3\omega_2 \omega_3 \omega_1 - \\
& 8\omega_2 \omega_3 v^2 \omega_4 + 3\omega_4 \omega_1 + 4\omega_2^2 \omega_3 v^2 - 4\omega_3 v^2 \omega_4^2 \omega_1 - 2\omega_4 + 8u^2 \omega_3 \omega_1 + 8\omega_2 v^2 \omega_4 - 4\omega_2 u^2 \omega_4 \omega_1^2 - 4\omega_1 - \omega_2 \omega_3 \omega_4, \\
\alpha_{x+\delta_l,y}^{[\mu_1],t-3\delta_t} &= -uv \omega_4 \omega_1 + 2\omega_2 u^2 \omega_3^2 v - \omega_2 u v \omega_1^2 + c_s^2 \omega_3 v \omega_4 + u^2 \omega_3 v \omega_4^2 - 6\omega_2 v \omega_4 - \omega_2^2 v - 3\omega_2 u^2 \omega_3 v \omega_1 + \\
& c_s^2 \omega_2 \omega_3 v \omega_1 + \frac{1}{2}\omega_2 \omega_3 v \omega_1 - u\omega_3 v \omega_4 \omega_1 + 4\omega_2 \omega_3 v \omega_4 + \omega_2 u v \omega_4 \omega_1^2 - \frac{1}{2}\omega_2 v \omega_4^2 \omega_1 + c_s^2 \omega_2 \omega_3 v \omega_4 - 7\omega_2 u \omega_3 v - \\
& \omega_2 u^2 \omega_3 v \omega_4 - u^2 \omega_3 v \omega_4 \omega_1 + c_s^2 \omega_3 v \omega_4^2 \omega_1 - \frac{5}{2}\omega_2 v \omega_1 - 7\omega_2 u v \omega_4 \omega_1 - \frac{1}{2}\omega_2 \omega_3 v \omega_4^2 - \frac{1}{2}\omega_2^2 v \omega_4 \omega_1 - \frac{7}{2}\omega_2 \omega_3 v + \\
& \omega_2^2 u v \omega_4 \omega_1 + v \omega_4 \omega_1 - u^2 \omega_3 v \omega_4 - c_s^2 \omega_3 v \omega_4^2 + 6\omega_2 u v \omega_1 - 2\omega_2 u \omega_3^2 v \omega_4 + \omega_2 v \omega_4^2 - 2u^2 v \omega_4 \omega_1 - \omega_2^2 u \omega_3 v \omega_4 + \\
& \frac{1}{2}\omega_2 \omega_3^2 v + \omega_3 v \omega_4 - v \omega_4^2 \omega_1 + 3\omega_2 u^2 \omega_3 v \omega_4 \omega_1 - 2u\omega_3 v \omega_4^2 - c_s^2 \omega_2 \omega_3 v \omega_4 \omega_1 + 2u^2 v \omega_4 \omega_1 - \frac{1}{2}\omega_2 \omega_3 v \omega_4 \omega_1 + \\
& 2v \omega_4^2 + \frac{1}{2}\omega_2^2 \omega_3 v + 8\omega_2 u \omega_3 v \omega_4 + \omega_2^2 u \omega_3 v - 2\omega_2 u^2 v \omega_1 + \omega_2 u v \omega_4 \omega_1^2 - \frac{1}{2}\omega_2^2 \omega_3 v \omega_4 - 2\omega_2 u^2 v \omega_4 \omega_1^2 + 3\omega_2 v \omega_4 \omega_1 + \\
& \omega_2^2 v \omega_4 - \omega_2 u \omega_3 v \omega_4^2 + 2\omega_2 u^2 v \omega_1^2 + 2\omega_2 u^2 v \omega_4 \omega_1 - c_s^2 \omega_3 v \omega_4 \omega_1 + u^2 \omega_3 v \omega_4^2 \omega_1 + 2\omega_2 u \omega_3^2 v - 2v \omega_4 + 2u \omega_3 v \omega_4 - \\
& \omega_2^2 u v \omega_1 - c_s^2 \omega_2 \omega_3 v + \omega_2 u^2 \omega_3 v - 2\omega_2 u^2 \omega_3^2 v \omega_4 + u v \omega_4^2 \omega_1 - \frac{1}{2}\omega_2 \omega_3^2 v \omega_4 + 5\omega_2 v + u \omega_3 v \omega_4^2 \omega_1 - \omega_3 v \omega_4^2 + \frac{1}{2}\omega_2^2 v \omega_1, \\
\alpha_{x+\delta_l,y}^{[\mu_3],t-3\delta_t} &= 3 - \frac{5}{2}\omega_2 \omega_4 \omega_1 + \omega_4^2 + u \omega_4^2 \omega_1 + \frac{1}{2}\omega_3 \omega_1 + 6u \omega_3 \omega_4 - \omega_2 \omega_4^2 + \frac{1}{2}\omega_2 \omega_3^2 \omega_4 + 5u \omega_1 - u \omega_3 \omega_1 - 4\omega_2 u^2 \omega_3 \omega_4 \omega_1 + \\
& \omega_2^2 u \omega_3 \omega_4 + 6\omega_2 u \omega_3 + 3\omega_3 \omega_4 + \frac{1}{2}\omega_2 \omega_3 \omega_4 \omega_1 - \frac{1}{2}\omega_4^2 \omega_1 - 2u^2 \omega_3^2 \omega_4 + \frac{1}{2}\omega_2^2 \omega_3 \omega_4 - \omega_2 u \omega_4 \omega_1^2 + \omega_2^2 u \omega_1 + \\
& 4\omega_2 u^2 \omega_3 \omega_1 + \omega_2^2 - 4\omega_2 + 7\omega_2 u \omega_4 \omega_1 - u\omega_1^2 + 2\omega_2 \omega_1 + 2\omega_2 u \omega_3^2 \omega_4 - 2\omega_2 u \omega_3^2 - \frac{1}{2}\omega_3 \omega_4^2 - 2u^2 \omega_4 \omega_1^2 - 2\omega_2 u^2 \omega_1^2 + \\
& 2u^2 \omega_3^2 - u \omega_3 \omega_4^2 - \frac{1}{2}\omega_2^2 \omega_3 + 5\omega_2 \omega_4 + 4u^2 \omega_3 \omega_4 \omega_1 + \omega_2 u \omega_1^2 - \frac{1}{2}\omega_3 \omega_4 \omega_1 - \omega_2 \omega_4 + \frac{1}{2}\omega_2 \omega_3 \omega_4^2 + \omega_2 u \omega_3 \omega_1 + \\
& 3\omega_2 \omega_3 + 2u \omega_3^2 + u \omega_4 \omega_1^2 - \frac{5}{2}\omega_3 + 2\omega_2 u^2 \omega_3^2 \omega_4 - \omega_2 u \omega_4 \omega_1^2 - 7\omega_2 u \omega_3 \omega_4 - \frac{1}{2}\omega_2^2 \omega_1 + 2u^2 \omega_1^2 - 2\omega_2 u^2 \omega_3^2 - \\
& \omega_2 u \omega_3 \omega_4 \omega_1 + \omega_2 u \omega_3 \omega_4^2 - \frac{1}{2}\omega_2 \omega_3 \omega_1 - \frac{1}{2}\omega_3^2 \omega_4 + \frac{1}{2}\omega_2^2 \omega_4 \omega_1 - \omega_2 u \omega_4 \omega_1 + 2\omega_4 \omega_1 - 6u \omega_4 \omega_1 + \frac{1}{2}\omega_3^2 - \omega_2^2 \omega_3 + \\
& \frac{1}{2}\omega_2 \omega_4^2 \omega_1 - 4\omega_4 - 4u^2 \omega_3 \omega_1 + u \omega_3 \omega_4 \omega_1 + 2\omega_2 u^2 \omega_4 \omega_1^2 - 6\omega_2 u \omega_1 - \frac{3}{2}\omega_1 - \frac{7}{2}\omega_2 \omega_3 \omega_4 - 5u \omega_3 - 2u \omega_3^2 \omega_4 - \frac{1}{2}\omega_2 \omega_3^2, \\
\alpha_{x,y+\delta_l}^{[\mu_1],t-3\delta_t} &= 1 + 3\omega_3 v^2 \omega_4 \omega_1 - 3c_s^2 \omega_3 \omega_4 \omega_1 - \frac{1}{2}\omega_2 v^2 \omega_4 \omega_1 - c_s^2 v \omega_4^2 \omega_1 + \omega_3 \omega_1 + 5\omega_2 \omega_3 v^2 - v^3 \omega_4^2 - \omega_2^2 v^2 \omega_1 + \\
& 3\omega_2 \omega_3 v \omega_1 + \frac{1}{2}\omega_3 v^2 \omega_4^2 - \frac{1}{2}c_s^2 \omega_3 \omega_4^2 + c_s^2 \omega_2 \omega_3 v \omega_4 + \frac{1}{2}c_s^2 \omega_2 \omega_3 \omega_4 \omega_1 + \frac{1}{2}\omega_3 \omega_4 + c_s^2 \omega_3 v \omega_4^2 \omega_1 + \frac{1}{2}c_s^2 \omega_2 \omega_4 - \\
& \frac{5}{2}\omega_2 v \omega_1 + \omega_2 \omega_3^2 v^2 \omega_1 - 2\omega_2^2 \omega_3 v^3 \omega_1 + 2v^2 \omega_4 + \frac{1}{2}\omega_2 v \omega_1^2 + \frac{1}{2}v^2 \omega_4^2 \omega_1 + 2\omega_2^2 v^3 \omega_1 + \omega_3 v^3 \omega_4^2 - \frac{1}{2}\omega_2 - 2\omega_2^2 v^3 - \\
& \frac{1}{2}v^2 \omega_4^2 - \omega_3 v^3 \omega_4^2 \omega_1 + \frac{1}{2}\omega_2 \omega_1 + \frac{1}{2}\omega_2 \omega_3 v^2 \omega_4 \omega_1 - \frac{5}{2}\omega_2 \omega_3 v + \omega_2^2 v^2 + \omega_2^2 \omega_3 v^2 \omega_1 + v \omega_4 \omega_1 + \frac{5}{2}c_s^2 \omega_3 \omega_4 - \\
& \frac{5}{2}\omega_3 v^2 \omega_4 - \frac{1}{2}\omega_2 \omega_3 v \omega_1^2 - \frac{1}{2}\omega_3 v^2 \omega_4 \omega_1^2 - \frac{1}{2}c_s^2 \omega_4 \omega_1 + \frac{1}{2}c_s^2 \omega_3 \omega_4 \omega_1^2 - c_s^2 \omega_3 v \omega_4^2 - \frac{1}{2}c_s^2 \omega_2 \omega_3 \omega_4 - \\
& \frac{1}{2}c_s^2 \omega_2 \omega_4 \omega_1 - 4\omega_2 v^2 + \frac{1}{2}\omega_2 \omega_3^2 v - \frac{1}{2}\omega_3 \omega_4 \omega_1 + \omega_3 v \omega_4 + \omega_2 \omega_3 v^2 \omega_1^2 - \frac{1}{2}\omega_3^2 \omega_4 \omega_1 + \frac{1}{2}\omega_2 \omega_3 - c_s^2 \omega_2 v \omega_4 - \\
& c_s^2 \omega_2 \omega_3 v \omega_4 \omega_1 + \frac{5}{2}c_s^2 \omega_4 \omega_1 - \omega_3 - \frac{1}{2}\omega_3^2 v^2 \omega_4 \omega_1 - 3\omega_2 \omega_3 v^3 \omega_4 + \frac{1}{2}\omega_3^2 v^2 \omega_4 - 2c_s^2 \omega_4 - \frac{5}{2}v^2 \omega_4 \omega_1 - \omega_2 v^2 \omega_1^2 + \\
& 3\omega_2 v^3 \omega_4 - 3\omega_2 v^3 \omega_4 \omega_1 - \frac{1}{2}\omega_2 \omega_3 \omega_1 + c_s^2 \omega_2 v \omega_4 \omega_1 - \frac{1}{2}\omega_2 \omega_3 v^2 \omega_4 + \frac{1}{2}c_s^2 \omega_3 \omega_4 \omega_1 - \omega_3 v \omega_4 \omega_1 - \frac{1}{2}\omega_2 \omega_3^2 v \omega_1 + \\
& \frac{1}{2}\omega_4 \omega_1 + 5\omega_2 v^2 \omega_1 + \frac{1}{2}c_s^2 \omega_4^2 + \frac{1}{2}v^2 \omega_4 \omega_1^2 - v \omega_4 - \omega_2^2 \omega_3 v^2 + \frac{1}{2}c_s^2 \omega_3 \omega_4 \omega_1^2 - \frac{1}{2}\omega_3 v^2 \omega_4^2 \omega_1 + 3\omega_2 \omega_3 v^3 \omega_4 \omega_1 - \\
& \frac{1}{2}\omega_4 - \frac{1}{2}c_s^2 \omega_4 \omega_1^2 + c_s^2 v \omega_4^2 + \frac{1}{2}\omega_2 v^2 \omega_4 + 2\omega_2^2 \omega_3 v^3 + v^3 \omega_4^2 \omega_1 - \omega_2 \omega_3^2 v^2 + 2\omega_2 v - \omega_1 - 6\omega_2 \omega_3 v^2 \omega_1, \\
\alpha_{x,y+\delta_l,y}^{[\mu_3],t-3\delta_t} &= 3 - \frac{1}{2}\omega_2 \omega_4 \omega_1 + \frac{1}{2}\omega_4^2 + 4\omega_2 v^2 \omega_4 \omega_1 - \omega_2 v \omega_4 + 5\omega_3 \omega_1 - \omega_2^2 v - 2\omega_2^2 v^2 \omega_1 - v \omega_4 \omega_1^2 + 7\omega_2 \omega_3 v \omega_1 - \\
& 2\omega_3 v^2 \omega_4^2 - \frac{1}{2}\omega_2 \omega_1^2 + \omega_2 \omega_3 v \omega_4 + \frac{1}{2}\omega_2 \omega_3^2 \omega_1 + 2\omega_3 v \omega_4^2 \omega_1 + 3\omega_3 \omega_4 + \frac{1}{2}\omega_2 \omega_3 \omega_4 \omega_1 - \frac{1}{2}\omega_4^2 \omega_1 - 6\omega_2 v \omega_1 + \omega_1^2 + \\
& \omega_2 v \omega_1^2 - 2v^2 \omega_4^2 \omega_1 - \omega_3^2 v \omega_4 - \frac{3}{2}\omega_2 + \frac{1}{2}\omega_3^2 \omega_4 \omega_1 + 2v^2 \omega_4^2 + 2\omega_2 \omega_1 - 4\omega_2 \omega_3 v^2 \omega_4 \omega_1 + \omega_3 v \omega_4 \omega_1 - \frac{1}{2}\omega_3 \omega_4^2 - \\
& 6\omega_2 \omega_3 v + \frac{1}{2}\omega_3 \omega_4 \omega_1 + 2\omega_2^2 v^2 + 2\omega_2^2 \omega_3 v^2 \omega_1 - \omega_3 \omega_1^2 + 6v \omega_4 \omega_1 + \frac{1}{2}\omega_2 \omega_4 - \omega_2 \omega_3 v \omega_1^2 - \omega_2^2 \omega_3 v \omega_1 + \omega_2 \omega_3^2 v - \\
& \frac{7}{2}\omega_3 \omega_4 \omega_1 + 6\omega_3 v \omega_4 + 2\omega_2 \omega_3 - 2\omega_2 \omega_4 \omega_1 - 4\omega_3 - \omega_2 \omega_3 v \omega_4 \omega_1 - \frac{1}{2}\omega_4 \omega_1^2 + 2v \omega_4^2 + \omega_2^2 \omega_3 v + \frac{1}{2}\omega_2 \omega_3 \omega_1^2 + \\
& \omega_3 v \omega_4 \omega_1^2 + \omega_2 v \omega_4 \omega_1 - \frac{5}{2}\omega_2 \omega_3 \omega_1 + 4\omega_2 \omega_3 v^2 \omega_4 - \frac{1}{2}\omega_3^2 \omega_4 - 7\omega_3 v \omega_4 \omega_1 - \omega_2 \omega_3^2 v \omega_1 + 3\omega_4 \omega_1 - 5v \omega_4 - 2\omega_2 \omega_3 v^2 + \\
& \omega_3^2 + 2\omega_3 v^2 \omega_4 \omega_1 - \frac{5}{2}\omega_4 - 4\omega_2 v^2 \omega_4 + \frac{1}{2}\omega_3 \omega_4 \omega_1^2 - \omega_3^2 \omega_1 + 5\omega_2 v - 4\omega_1 - \frac{1}{2}\omega_2 \omega_3 \omega_4 - 2\omega_3 v \omega_4^2 - \frac{1}{2}\omega_2 \omega_3^2 + \omega_2^2 v \omega_1, \\
\alpha_{x,y}^{[\mu_1],t-4\delta_t} &= -\omega_2 \omega_3^2 v \omega_4 \omega_1 + 7\omega_2 v \omega_4 + \omega_2^2 v - 8\omega_2 \omega_3 v \omega_1 - 8\omega_2 \omega_3 v \omega_4 + \omega_2 v \omega_4^2 \omega_1 - 2\omega_3 v \omega_4^2 \omega_1 + 7\omega_2 v \omega_1 - \\
& \omega_2 v \omega_1^2 + \omega_2 \omega_3 v \omega_4^2 + \omega_2^2 v \omega_4 \omega_1 + 7\omega_2 \omega_3 v - 2\omega_4 \omega_1 + \omega_2 \omega_3 v \omega_1^2 - \omega_2 \omega_3 v \omega_4^2 \omega_1 - \omega_2 v \omega_4^2 + \omega_2^2 \omega_3 v \omega_1 - \\
& \omega_2 \omega_3^2 v - 2\omega_3 v \omega_4 + 2\omega_2 \omega_4 \omega_1 + 9\omega_2 \omega_3 v \omega_4 \omega_1 - 2v \omega_4^2 - \omega_2^2 \omega_3 v - \omega_2 \omega_3 v \omega_4 \omega_1 + \omega_2 v \omega_4 \omega_1^2 + \omega_2^2 \omega_3 v \omega_4 - \\
& 8\omega_2 v \omega_4 \omega_1 - \omega_2^2 v \omega_4 + 2\omega_3 v \omega_4 \omega_1 + \omega_2 \omega_3^2 v \omega_1 + 2v \omega_4 - \omega_2 \omega_3 v \omega_4 \omega_1^2 + \omega_2 \omega_3^2 v \omega_4 - 6\omega_2 v + 2\omega_3 v \omega_4^2 - \omega_2^2 v \omega_1, \\
\alpha_{x,y}^{[\mu_3],t-4\delta_t} &= -4 + 7\omega_2 \omega_4 \omega_1 - \omega_4^2 - \omega_2^2 \omega_3 \omega_1 - 6\omega_3 \omega_1 + \omega_2 \omega_4^2 - \omega_2 \omega_3^2 \omega_4 + \omega_2 \omega_1^2 - \omega_2 \omega_3^2 \omega_1 - 6\omega_3 \omega_4 - 8\omega_2 \omega_3 \omega_4 \omega_1 + \omega_4^2 \omega_1 -
\end{aligned}$$

$$\begin{aligned} & \omega_2^2\omega_3\omega_4 - \omega_1^2 - \omega_2^2 + 5\omega_2 - \omega_3^2\omega_4\omega_1 - 6\omega_2\omega_1 + \omega_2\omega_3\omega_4\omega_1^2 + \omega_3\omega_4^2 - \omega_3\omega_4^2\omega_1 + \omega_3\omega_1^2 + \omega_2^2\omega_3 - 6\omega_2\omega_4 - \omega_2\omega_4\omega_1^2 + \\ & 7\omega_3\omega_4\omega_1 + \omega_2^2\omega_4 - \omega_2\omega_3\omega_4^2 - 6\omega_2\omega_3 + 5\omega_3 + \omega_4\omega_1^2 + \omega_2^2\omega_1 + \omega_2^2\omega_3\omega_4\omega_1 - \omega_2\omega_3\omega_1^2 + 7\omega_2\omega_3\omega_1 + \omega_2\omega_3\omega_4^2\omega_1 + \\ & \omega_3^2\omega_4 - \omega_2^2\omega_4\omega_1 - 6\omega_4\omega_1 - \omega_3^2 + \omega_2\omega_3^2\omega_4\omega_1 - \omega_2\omega_4^2\omega_1 + 5\omega_4 - \omega_3\omega_4\omega_1^2 + \omega_3^2\omega_1 + 5\omega_1 + 7\omega_2\omega_3\omega_4 + \omega_2\omega_3^2, \end{aligned}$$

## 7.5 EFDE for $\mu_4$

$$\mu_{4,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l, y+j\delta_l}^{[\mu_1], t-\ell\delta_t} \mu_{x+i\delta_l, y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l, y+j\delta_l}^{[\mu_4], t-\ell\delta_t} \mu_{4,x+i\delta_l, y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x-\delta_l, y}^{[\mu_1], t} = 1 - \frac{1}{2}u^2\omega_3 - \frac{1}{2}u\omega_1 + \frac{1}{2}c_s^2\omega_3 - \frac{1}{2}\omega_3 + u^2\omega_1 - \frac{1}{2}\omega_1 + u\omega_3.$$

$$\alpha_{x+\delta_l, y}^{[\mu_1], t} = 1 - \frac{1}{2}u^2\omega_3 + \frac{1}{2}u\omega_1 + \frac{1}{2}c_s^2\omega_3 - \frac{1}{2}\omega_3 + u^2\omega_1 - \frac{1}{2}\omega_1 - u\omega_3.$$

$$\begin{aligned} \alpha_{x-\delta_l, y-\delta_l}^{[\mu_1], t-\delta_t} = & -1 + uv\omega_4\omega_1 + \frac{1}{2}u\omega_3v^2\omega_4 + \frac{1}{2}\omega_2\omega_3v^2 + \frac{1}{2}u\omega_3\omega_4 + u\omega_1 + \frac{1}{2}\omega_2u\omega_3v + \frac{1}{2}\omega_2u\omega_3 - \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_2v\omega_1 + \\ & \frac{1}{2}v^2\omega_4 + \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2\omega_1 - \omega_2u\omega_3v^2 - \frac{1}{4}\omega_2\omega_3v + \frac{1}{2}c_s^2u\omega_4\omega_1 + \frac{1}{2}v\omega_4\omega_1 + \frac{1}{4}c_s^2\omega_3\omega_4 - \frac{1}{4}\omega_3v^2\omega_4 - \frac{1}{2}\omega_2uv\omega_1 - \\ & \omega_2v^2 + \frac{1}{2}\omega_3v\omega_4 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{4}c_s^2\omega_4\omega_1 + \frac{1}{2}\omega_3 - \frac{1}{2}c_s^2u\omega_3\omega_4 + \omega_2uv^2\omega_1 - \frac{1}{2}c_s^2\omega_4 - \frac{1}{4}v^2\omega_4\omega_1 - \frac{1}{2}uv^2\omega_4\omega_1 - \\ & \frac{1}{4}\omega_4\omega_1 + \frac{1}{2}\omega_2v^2\omega_1 - v\omega_4 - \frac{1}{2}u\omega_4\omega_1 - u\omega_3v\omega_4 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2v - \frac{1}{2}\omega_2u\omega_1 + \frac{1}{2}\omega_1 - u\omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_l, y-\delta_l}^{[\mu_4], t-\delta_t} = & 1 - uv\omega_4\omega_1 - \frac{1}{2}u\omega_3\omega_4 - u\omega_1 - \omega_2u\omega_3v - \frac{1}{2}\omega_2u\omega_3 + \frac{1}{4}\omega_3\omega_4 + \frac{1}{2}\omega_2v\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{2}\omega_2\omega_3v - \frac{1}{2}v\omega_4\omega_1 + \\ & \omega_2uv\omega_1 - \frac{1}{2}\omega_3v\omega_4 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_3 + \frac{1}{4}\omega_4\omega_1 + v\omega_4 + \frac{1}{2}u\omega_4\omega_1 + u\omega_3v\omega_4 - \frac{1}{2}\omega_4 - \omega_2v + \frac{1}{2}\omega_2u\omega_1 - \frac{1}{2}\omega_1 + u\omega_3, \end{aligned}$$

$$\alpha_{x, y-\delta_l}^{[\mu_4], t-\delta_t} = 1 + \frac{1}{2}\omega_4^2 + \omega_2v\omega_4 + \omega_2^2v - \frac{1}{2}\omega_2 + 2v^2\omega_4^2 + 2\omega_2^2v^2 + \frac{1}{2}\omega_2\omega_4 - 2v\omega_4^2 + 3v\omega_4 - \frac{3}{2}\omega_4 - 4\omega_2v^2\omega_4 - 3\omega_2v,$$

$$\begin{aligned} \alpha_{x+\delta_l, y-\delta_l}^{[\mu_1], t-\delta_t} = & -1 - uv\omega_4\omega_1 - \frac{1}{2}u\omega_3v^2\omega_4 + \frac{1}{2}\omega_2\omega_3v^2 - \frac{1}{2}u\omega_3\omega_4 - u\omega_1 - \frac{1}{2}\omega_2u\omega_3v - \frac{1}{2}\omega_2u\omega_3 - \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_2v\omega_1 + \\ & \frac{1}{2}v^2\omega_4 + \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2\omega_1 + \omega_2u\omega_3v^2 - \frac{1}{4}\omega_2\omega_3v - \frac{1}{2}c_s^2u\omega_4\omega_1 + \frac{1}{2}v\omega_4\omega_1 + \frac{1}{4}c_s^2\omega_3\omega_4 - \frac{1}{4}\omega_3v^2\omega_4 + \frac{1}{2}\omega_2uv\omega_1 - \\ & \omega_2v^2 + \frac{1}{2}\omega_3v\omega_4 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{4}c_s^2\omega_4\omega_1 + \frac{1}{2}\omega_3 + \frac{1}{2}c_s^2u\omega_3\omega_4 - \omega_2uv^2\omega_1 - \frac{1}{2}c_s^2\omega_4 - \frac{1}{4}v^2\omega_4\omega_1 + \frac{1}{2}uv^2\omega_4\omega_1 - \\ & \frac{1}{4}\omega_4\omega_1 + \frac{1}{2}\omega_2v^2\omega_1 - v\omega_4 + \frac{1}{2}u\omega_4\omega_1 + u\omega_3v\omega_4 + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2v + \frac{1}{2}\omega_2u\omega_1 + \frac{1}{2}\omega_1 + u\omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_l, y-\delta_l}^{[\mu_4], t-\delta_t} = & 1 + uv\omega_4\omega_1 + \frac{1}{2}u\omega_3\omega_4 + u\omega_1 + \omega_2u\omega_3v + \frac{1}{2}\omega_2u\omega_3 + \frac{1}{4}\omega_3\omega_4 + \frac{1}{2}\omega_2v\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{2}\omega_2\omega_3v - \frac{1}{2}v\omega_4\omega_1 - \\ & \omega_2uv\omega_1 - \frac{1}{2}\omega_3v\omega_4 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_3 + \frac{1}{4}\omega_4\omega_1 + v\omega_4 - \frac{1}{2}u\omega_4\omega_1 - u\omega_3v\omega_4 - \frac{1}{2}\omega_4 - \omega_2v - \frac{1}{2}\omega_2u\omega_1 - \frac{1}{2}\omega_1 - u\omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_l, y}^{[\mu_1], t-\delta_t} = & -1 - u\omega_3v^2\omega_4 - \omega_2\omega_3v^2 - u^2\omega_3 + u\omega_1 - u^3\omega_3^2 - \frac{1}{2}c_s^2\omega_3^2 - v^2\omega_4 + c_s^2\omega_3 - \frac{1}{2}c_s^2\omega_3\omega_1 + 2\omega_2u\omega_3v^2 + \\ & 3u^3\omega_3\omega_1 - c_s^2u\omega_4\omega_1 + \frac{1}{2}u^2\omega_3^2 - \frac{1}{2}c_s^2\omega_3\omega_4 + \frac{1}{2}\omega_3v^2\omega_4 + 2\omega_2v^2 - \frac{1}{2}c_s^2\omega_4\omega_1 + \frac{1}{2}\omega_3 + c_s^2u\omega_3\omega_4 - 2\omega_2uv^2\omega_1 + \\ & c_s^2\omega_4 + \frac{1}{2}v^2\omega_4\omega_1 - c_s^2u\omega_3\omega_1 - u^2\omega_1^2 + 2u^2\omega_1 + uv^2\omega_4\omega_1 + c_s^2u\omega_3^2 - \omega_2v^2\omega_1 - \frac{1}{2}u^2\omega_3\omega_1 - 2u^3\omega_1^2 + \frac{1}{2}\omega_1 - u\omega_3, \end{aligned}$$

$$\alpha_{x-\delta_l, y}^{[\mu_4], t-\delta_t} = 1 + \frac{1}{2}\omega_3\omega_1 - 3u\omega_1 + u\omega_3\omega_1 + u\omega_1^2 + 2u^2\omega_3^2 - 2u\omega_3^2 - \frac{3}{2}\omega_3 + 2u^2\omega_1^2 + \frac{1}{2}\omega_3^2 - 4u^2\omega_3\omega_1 - \frac{1}{2}\omega_1 + 3u\omega_3,$$

$$\alpha_{x, y}^{[\mu_1], t-\delta_t} = -2 - \omega_3\omega_1 + u^2\omega_3 - \omega_1^2 - c_s^2\omega_3 + c_s^2\omega_3\omega_1 + 4u^2\omega_3^2 + \omega_3 + 4u^2\omega_1^2 - 2u^2\omega_1 - 7u^2\omega_3\omega_1 + 3\omega_1,$$

$$\alpha_{x, y}^{[\mu_4], t-\delta_t} = 2 + \omega_1^2 + \omega_2^2 - 2\omega_2 - 4v^2\omega_4^2 - 4\omega_2^2v^2 - 4u^2\omega_3^2 - 4u^2\omega_1^2 + 8u^2\omega_3\omega_1 + 8\omega_2v^2\omega_4 - 2\omega_1,$$

$$\begin{aligned} \alpha_{x+\delta_l, y}^{[\mu_1], t-\delta_t} = & -1 + u\omega_3v^2\omega_4 - \omega_2\omega_3v^2 - u^2\omega_3 - u\omega_1 + u^3\omega_3^2 - \frac{1}{2}c_s^2\omega_3^2 - v^2\omega_4 + c_s^2\omega_3 - \frac{1}{2}c_s^2\omega_3\omega_1 - 2\omega_2u\omega_3v^2 - \\ & 3u^3\omega_3\omega_1 + c_s^2u\omega_4\omega_1 + \frac{1}{2}u^2\omega_3^2 - \frac{1}{2}c_s^2\omega_3\omega_4 + \frac{1}{2}\omega_3v^2\omega_4 + 2\omega_2v^2 - \frac{1}{2}c_s^2\omega_4\omega_1 + \frac{1}{2}\omega_3 - c_s^2u\omega_3\omega_4 + 2\omega_2uv^2\omega_1 + \\ & c_s^2\omega_4 + \frac{1}{2}v^2\omega_4\omega_1 + c_s^2u\omega_3\omega_1 - u^2\omega_1^2 + 2u^2\omega_1 - uv^2\omega_4\omega_1 - c_s^2u\omega_3^2 - \omega_2v^2\omega_1 - \frac{1}{2}u^2\omega_3\omega_1 + 2u^3\omega_1^2 + \frac{1}{2}\omega_1 + u\omega_3, \end{aligned}$$

$$\alpha_{x+\delta_l, y}^{[\mu_4], t-\delta_t} = 1 + \frac{1}{2}\omega_3\omega_1 + 3u\omega_1 - u\omega_3\omega_1 - u\omega_1^2 + 2u^2\omega_3^2 + 2u\omega_3^2 - \frac{3}{2}\omega_3 + 2u^2\omega_1^2 + \frac{1}{2}\omega_3^2 - 4u^2\omega_3\omega_1 - \frac{1}{2}\omega_1 - 3u\omega_3,$$

$$\begin{aligned}
\alpha_{x-\delta_l, y+\delta_l}^{[\mu_1], t-\delta_t} &= -1 - uvw_4\omega_1 + \frac{1}{2}uw_3v^2\omega_4 + \frac{1}{2}\omega_2\omega_3v^2 + \frac{1}{2}uw_3\omega_4 + uw_1 - \frac{1}{2}\omega_2uw_3v + \frac{1}{2}\omega_2u\omega_3 - \frac{1}{4}\omega_3\omega_4 + \frac{1}{4}\omega_2vw_1 + \\
&\quad \frac{1}{2}v^2\omega_4 + \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2\omega_1 - \omega_2\omega_3v^2 + \frac{1}{4}\omega_2\omega_3v + \frac{1}{2}c_s^2uw_4\omega_1 - \frac{1}{2}vw_4\omega_1 + \frac{1}{4}c_s^2\omega_3\omega_4 - \frac{1}{4}\omega_3v^2\omega_4 + \frac{1}{2}\omega_2uv\omega_1 - \\
&\quad \omega_2v^2 - \frac{1}{2}\omega_3vw_4 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{4}c_s^2\omega_4\omega_1 + \frac{1}{2}\omega_3 - \frac{1}{2}c_s^2uw_3\omega_4 + \omega_2uv^2\omega_1 - \frac{1}{2}c_s^2\omega_4 - \frac{1}{4}v^2\omega_4\omega_1 - \frac{1}{2}uv^2\omega_4\omega_1 - \\
&\quad \frac{1}{4}\omega_4\omega_1 + \frac{1}{2}\omega_2v^2\omega_1 + vw_4 - \frac{1}{2}uw_4\omega_1 + uw_3vw_4 + \frac{1}{2}\omega_4 - \frac{1}{2}\omega_2v - \frac{1}{2}\omega_2uw_1 + \frac{1}{2}\omega_1 - uw_3, \\
\alpha_{x-\delta_l, y+\delta_l}^{[\mu_4], t-\delta_t} &= 1 + uvw_4\omega_1 - \frac{1}{2}uw_3\omega_4 - uw_1 + \omega_2\omega_3v - \frac{1}{2}\omega_2uw_3 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{2}\omega_2vw_1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_3v + \frac{1}{2}vw_4\omega_1 - \\
&\quad \omega_2uv\omega_1 + \frac{1}{2}w_3vw_4 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_3 + \frac{1}{4}\omega_4\omega_1 - vw_4 + \frac{1}{2}uw_4\omega_1 - uw_3vw_4 - \frac{1}{2}\omega_4 + \omega_2v + \frac{1}{2}\omega_2uw_1 - \frac{1}{2}\omega_1 + uw_3, \\
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_4], t-\delta_t} &= 1 + \frac{1}{2}\omega_4^2 - \omega_2vw_4 - \omega_2^2v - \frac{1}{2}\omega_2 + 2v^2\omega_4^2 + 2\omega_2^2v^2 + \frac{1}{2}\omega_2\omega_4 + 2vw_4^2 - 3vw_4 - \frac{3}{2}\omega_4 - 4\omega_2v^2\omega_4 + 3\omega_2v, \\
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_1], t-\delta_t} &= -1 + uvw_4\omega_1 - \frac{1}{2}uw_3v^2\omega_4 + \frac{1}{2}\omega_2\omega_3v^2 - \frac{1}{2}uw_3\omega_4 - uw_1 + \frac{1}{2}\omega_2uw_3v - \frac{1}{2}\omega_2u\omega_3 - \frac{1}{4}\omega_3\omega_4 + \frac{1}{4}\omega_2vw_1 + \\
&\quad \frac{1}{2}v^2\omega_4 + \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2\omega_1 + \omega_2\omega_3v^2 + \frac{1}{4}\omega_2\omega_3v - \frac{1}{2}c_s^2uw_4\omega_1 - \frac{1}{2}vw_4\omega_1 + \frac{1}{4}c_s^2\omega_3\omega_4 - \frac{1}{4}\omega_3v^2\omega_4 - \frac{1}{2}\omega_2uv\omega_1 - \\
&\quad \omega_2v^2 - \frac{1}{2}\omega_3vw_4 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{4}c_s^2\omega_4\omega_1 + \frac{1}{2}\omega_3 + \frac{1}{2}c_s^2uw_3\omega_4 - \omega_2uv^2\omega_1 - \frac{1}{2}c_s^2\omega_4 - \frac{1}{4}v^2\omega_4\omega_1 + \frac{1}{2}uv^2\omega_4\omega_1 - \\
&\quad \frac{1}{4}\omega_4\omega_1 + \frac{1}{2}\omega_2v^2\omega_1 + vw_4 + \frac{1}{2}uw_4\omega_1 - uw_3vw_4 + \frac{1}{2}\omega_4 - \frac{1}{2}\omega_2v + \frac{1}{2}\omega_2uw_1 + \frac{1}{2}\omega_1 + uw_3, \\
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_4], t-\delta_t} &= 1 - uvw_4\omega_1 + \frac{1}{2}uw_3\omega_4 + uw_1 - \omega_2\omega_3v + \frac{1}{2}\omega_2\omega_3 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{2}\omega_2vw_1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_3v + \frac{1}{2}vw_4\omega_1 + \\
&\quad \omega_2uv\omega_1 + \frac{1}{2}w_3vw_4 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_3 + \frac{1}{4}\omega_4\omega_1 - vw_4 - \frac{1}{2}uw_4\omega_1 + uw_3vw_4 - \frac{1}{2}\omega_4 + \omega_2v - \frac{1}{2}\omega_2uw_1 - \frac{1}{2}\omega_1 - uw_3, \\
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_1], t-2\delta_t} &= 1 - \frac{5}{2}uvw_4\omega_1 + \frac{1}{2}\omega_2u^2\omega_3^2v - \frac{1}{4}c_s^2\omega_3\omega_4\omega_1 + 4\omega_2u^2v^2\omega_4\omega_1 - \omega_2^2uv^2\omega_1 - \frac{1}{2}c_s^2\omega_2\omega_3^2v - \frac{1}{4}uw_4^2\omega_1 + \\
&\quad \frac{1}{2}uw_3v^2\omega_4 - \frac{5}{2}c_s^2\omega_3vw_4 - u^2w_3v\omega_4^2 - \frac{1}{4}\omega_2v^2\omega_4\omega_1 + \omega_2^2u^2\omega_3v^2 - \frac{1}{2}\omega_2vw_4 + \frac{3}{2}w_2u^2\omega_1 + c_s^2uw_3vw_4\omega_1 + \\
&\quad \frac{1}{2}\omega_2\omega_3v^2 - \frac{1}{2}w_2u^2\omega_3vw_1 - \frac{1}{2}uw_3\omega_4 - \frac{1}{2}c_s^2\omega_2\omega_3vw_1 + \frac{3}{2}u^2w_3 + \frac{3}{2}u^3w_3\omega_4\omega_1 - \frac{1}{4}c_s^2\omega_3\omega_4^2 + \frac{1}{4}\omega_2w_3vw_4 - \\
&\quad \frac{3}{2}uw_1 - \frac{1}{2}c_s^2\omega_2\omega_3vw_4 - \frac{1}{2}\omega_2uw_3v - \frac{1}{2}\omega_2vw_3 + \frac{1}{2}\omega_2u^2\omega_3vw_4 - uv^2\omega_4^2\omega_1 - c_s^2\omega_2\omega_3vw_4 + \frac{1}{2}u^2\omega_3vw_4\omega_1 + \\
&\quad \frac{3}{2}u^2\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4 - \omega_2^2u^2\omega_2v\omega_1 - \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_4 + u^3\omega_3^2 + \frac{1}{4}\omega_2vw_1 + \frac{1}{4}u^2\omega_3^2\omega_4 + \frac{1}{2}c_s^2\omega_3^2\omega_4^2 - \omega_2u^3\omega_1^2 + \\
&\quad \frac{1}{2}v^2\omega_4 - \frac{1}{4}\omega_2u^2\omega_3\omega_1 - \frac{3}{2}c_s^2\omega_3 - \frac{1}{4}c_s^2\omega_2\omega_3\omega_1 - \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2uw_4\omega_1 - \frac{1}{2}c_s^2\omega_2\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_3\omega_1 + \frac{1}{4}\omega_2\omega_1 + \\
&\quad \frac{1}{2}\omega_2uw_3v^2\omega_4 - \omega_2\omega_3v^2 - c_s^2\omega_2\omega_3v^2 - 3u^3w_3\omega_1 - \frac{1}{2}u^2\omega_4\omega_1^2 + \frac{1}{4}\omega_2\omega_3v - \frac{1}{2}\omega_2u^2\omega_1^2 + \frac{1}{2}c_s^2\omega_2\omega_4\omega_1 - \frac{1}{2}v\omega_4\omega_1 - \\
&\quad \frac{1}{2}u^2\omega_3^2 + \frac{3}{2}c_s^2\omega_3\omega_4 - \frac{1}{4}\omega_3v^2\omega_4 - 2\omega_2u^3vw_1 - \frac{1}{4}u^2\omega_3\omega_4\omega_1 + \frac{5}{2}u^2\omega_3vw_4 + 3\omega_2u^3\omega_3vw_1 + c_s^2\omega_3\omega_4\omega_1^2 - \\
&\quad \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 + 2\omega_2uv\omega_1 + \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 + \frac{1}{4}\omega_2u^2\omega_3\omega_4 + \frac{1}{2}\omega_2u^2\omega_3v + 2u^2vw_2\omega_1 - c_s^2\omega_2\omega_3vw_1 - \frac{1}{4}c_s^2\omega_2\omega_4\omega_1 - \\
&\quad \frac{1}{2}\omega_2u^2\omega_4\omega_1 - \omega_2v^2 - \frac{1}{2}u^3\omega_3\omega_4 + 2u^3vw_4\omega_1^2 - \frac{1}{2}\omega_3vw_4 - \frac{1}{4}c_s^2\omega_3\omega_4 - \frac{1}{2}c_s^2\omega_2\omega_3\omega_1 + \frac{1}{4}\omega_2\omega_3 + \frac{1}{4}c_s^2\omega_4\omega_1 - \\
&\quad \frac{1}{2}\omega_3 - 5u^2vw_4\omega_1 - \frac{1}{2}c_s^2\omega_3\omega_4 + \frac{3}{2}\omega_2uv^2\omega_4\omega_1 + \omega_2uv^2\omega_1 - c_s^2\omega_3v\omega_4^2 - \frac{1}{2}c_s^2\omega_4 - \frac{1}{4}v^2\omega_4\omega_1 + \frac{1}{4}u^2\omega_3\omega_4^2 + \\
&\quad c_s^2\omega_2\omega_3\omega_1 - \frac{1}{2}\omega_2\omega_3vw_4 - 2u^2v^2\omega_4\omega_1 - \frac{1}{2}u^2\omega_3\omega_4v - \omega_2u^3\omega_3^2v + u^2\omega_1^2 + \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 + 5\omega_2u^2vw_1 + \\
&\quad \frac{1}{4}\omega_2u^2\omega_3^2 - \frac{1}{4}c_s^2\omega_2\omega_3^2 + \frac{1}{4}\omega_2\omega_4\omega_1 + 2c_s^2\omega_2\omega_3v^2\omega_4 - \omega_2u^2vw_1^2 - 3u^2\omega_1 + \frac{1}{2}c_s^2\omega_2\omega_3v\omega_4 - \frac{1}{4}\omega_2\omega_3v^2\omega_4 - \\
&\quad 2\omega_2u^2v^2\omega_1 - \omega_2u^2vw_4\omega_1 + \frac{1}{2}c_s^2\omega_3\omega_4\omega_1 + c_s^2\omega_2\omega_3v\omega_4 - \frac{1}{2}u^2\omega_4\omega_1^2 - \frac{1}{2}uv^2\omega_4\omega_1 + \frac{3}{4}c_s^2\omega_2\omega_3 - c_s^2\omega_3\omega_4^2 - \\
&\quad \frac{3}{4}\omega_2u^2\omega_3 - 2\omega_2u^2\omega_3v^2\omega_4 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{2}\omega_2v^2\omega_1 - \frac{5}{4}u^2\omega_3\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 + u^3\omega_3^2\omega_4 + vvw_4 + \frac{5}{4}uw_4\omega_1 + \\
&\quad uw_3vw_4 - \frac{1}{2}\omega_2u^2vw_1 + \frac{5}{2}c_s^2\omega_2\omega_3\omega_4 - \frac{5}{2}\omega_2u^2\omega_3v - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_2u^3\omega_3^2 + uvw_2\omega_1 + \frac{1}{2}u^2\omega_3\omega_4 - u^3\omega_4\omega_1^2 - \\
&\quad \frac{1}{2}c_s^2\omega_2\omega_3\omega_4\omega_1 + u^2vw_4\omega_1^2 + 2u^3\omega_1^2 + u^2\omega_3v^2\omega_4^2 + \frac{3}{2}\omega_2u^3\omega_3\omega_1 - \frac{1}{2}\omega_2v + \frac{3}{4}\omega_2\omega_1 + 3u^3\omega_3vw_4\omega_1 - \frac{1}{2}\omega_1 + uw_3, \\
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_4], t-2\delta_t} &= \\
&-2 + \frac{1}{4}\omega_2\omega_4\omega_1 + 6uvw_4\omega_1 - \frac{1}{2}\omega_4^2 + 2\omega_2u^2\omega_3^2v + 2\omega_2^2uv^2\omega_1 + \frac{1}{2}uw_4^2\omega_1 + \omega_2uv\omega_1^2 - 2\omega_2v^2\omega_4\omega_1 - \omega_2vw_4 - \frac{1}{2}\omega_3\omega_1 - \\
&\quad \omega_2^2v - 4\omega_2u^2\omega_3vw_1 + 3uw_3\omega_4 + \omega_2^2v^2\omega_1 + \frac{1}{2}\omega_2\omega_3vw_1 + \omega_3v^2\omega_4^2 - uw_3vw_4\omega_1 + \frac{1}{2}\omega_2\omega_3vw_4 + 4uw_1 - uw_3\omega_1 + \\
&\quad 6\omega_2\omega_3v + 2\omega_2\omega_3 + 2uv^2\omega_4^2\omega_1 + 4u^2\omega_3vw_4\omega_1 + 2uw_3^2vw_4 - \frac{3}{2}\omega_3\omega_4 + \frac{1}{4}\omega_4^2\omega_1 - 2\omega_2vw_1 + u^2\omega_3^2\omega_4 - 2\omega_2u^2\omega_3\omega_1 + \\
&\quad v^2\omega_4^2\omega_1 - \frac{1}{2}\omega_3^2\omega_4 + \omega_2 + \frac{1}{2}\omega_2\omega_4\omega_1 - 2v^2\omega_4^2 - \omega_1^2 + \omega_2uv\omega_4\omega_1 - \frac{1}{2}\omega_2\omega_1 + 4\omega_2\omega_3v^2\omega_4 - \omega_2\omega_3^2 + \frac{1}{4}\omega_3\omega_4^2 + \\
&\quad u^2\omega_4\omega_1^2 - 3\omega_2\omega_3v + \omega_2u^2\omega_3^2 - 2\omega_2^2v^2 + 2\omega_4\omega_1 - 2u^2\omega_3^2 - \frac{1}{2}\omega_3\omega_4^2 - uvw_4\omega_1^2 - 2\omega_3\omega_4\omega_1^2 - 2u^2\omega_3\omega_4\omega_1 - \\
&\quad 6\omega_2\omega_3vw_1 + \frac{1}{2}\omega_2\omega_3\omega_1^2 + \frac{1}{2}\omega_2\omega_3^2v + \frac{1}{4}\omega_3\omega_4\omega_1 + 3\omega_3vw_4 + \frac{1}{2}\omega_2\omega_3\omega_1 - \omega_2\omega_3 + \omega_2\omega_3vw_1 - vvw_4\omega_1 + 2uw_2^2 + \\
&\quad 2uw_3vw_4^2 + \frac{1}{2}uw_4\omega_1^2 + 2\omega_3 - 4\omega_2uv^2\omega_4\omega_1 + 2vw_4^2 + \frac{1}{2}\omega_2\omega_3v - \omega_2\omega_3vw_4 - \frac{1}{2}\omega_2\omega_3\omega_4 - 2u^2\omega_3^2vw_4 - \\
&\quad 2u^2\omega_1^2 + \omega_2u^2\omega_3^2 + \frac{1}{2}\omega_2\omega_3v^2 + 2\omega_2\omega_3v^2 + 2\omega_2u^2\omega_1^2 + \frac{1}{4}\omega_2\omega_3\omega_1 - 2\omega_2\omega_3v^2\omega_4 + \frac{1}{4}\omega_3\omega_4^2 - 2\omega_2\omega_3\omega_4^2 - \\
&\quad \frac{1}{2}\omega_3\omega_4\omega_1 - \omega_4\omega_1 - 4vw_4 + \omega_2\omega_3v^2 - 3uw_4\omega_1 - 6uw_3vw_4 + \omega_2^2uv\omega_1 - \frac{1}{2}\omega_3^2 + 2\omega_4 - 2uvw_4\omega_1^2 + 4u^2\omega_3\omega_1 + \\
&\quad 4\omega_2v^2\omega_4 - 2u^2vw_4\omega_1^2 + \frac{1}{2}uw_3\omega_4\omega_1 + 4\omega_2v - 2\omega_2\omega_4\omega_1 + \omega_1 + \frac{1}{4}\omega_2\omega_3\omega_4 - \omega_3\omega_4\omega_1^2 - \frac{1}{2}\omega_3\omega_4 + \frac{1}{4}\omega_2\omega_3^2 + \frac{1}{2}\omega_2^2\omega_1,
\end{aligned}$$

$$\begin{aligned}
& 4\omega_2 u^2 \omega_3 \omega_1 - \omega_2 + 2u^2 \omega_3^2 v^2 \omega_4 + \frac{3}{2} \omega_3 \omega_1 + 2u^2 \omega_4 \omega_1^2 + \frac{1}{2} \omega_2 \omega_3 v + 2\omega_2 u^2 \omega_1^2 - 3v\omega_4 \omega_1 - 4u^2 \omega_3^2 - \frac{1}{2} c_s^2 \omega_3 \omega_4 + \\
& \frac{1}{2} \omega_3 v^2 \omega_4 + 4c_s^2 u^2 \omega_3 \omega_4 \omega_1 - 4\omega_2 u^2 \omega_3^2 v^2 - 4u^2 \omega_3 \omega_4 \omega_1 + 2\omega_2 v^2 - \frac{1}{2} \omega_3 \omega_4 \omega_1 - \omega_3 v \omega_4 + \frac{1}{2} \omega_2 \omega_3 - \frac{3}{2} c_s^2 \omega_4 \omega_1 - \\
& \omega_3 + c_s^2 \omega_4 + \frac{3}{2} v^2 \omega_4 \omega_1 + \omega_2 v^2 \omega_1^2 - \frac{1}{2} \omega_4 \omega_1^2 - 2c_s^2 u^2 \omega_3^2 \omega_4 - 4u^2 \omega_3^2 v \omega_4 - 4u^2 \omega_1^2 + 2\omega_2 u^2 \omega_3^2 + 2\omega_2 u^2 v \omega_1^2 - \\
& \frac{1}{2} \omega_2 \omega_3 \omega_1 + \omega_3 v \omega_4 \omega_1 + \frac{3}{2} \omega_4 \omega_1 - 3\omega_2 v^2 \omega_1 - \frac{1}{2} v^2 \omega_4 \omega_1^2 + 2v\omega_4 - 2c_s^2 u^2 \omega_4 \omega_1^2 - 4u^2 \omega_3 v^2 \omega_4 \omega_1 - \omega_4 + \\
& \frac{1}{2} c_s^2 \omega_4 \omega_1^2 + 8u^2 \omega_3 \omega_1 - 4u^2 v \omega_4 \omega_1^2 + 8\omega_2 u^2 \omega_3 v^2 \omega_1 - \omega_2 v - 3\omega_1 + \omega_2 \omega_3 v^2 \omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_4],t-2\delta_t} = & -2 - 4\omega_2 u^2 \omega_3^2 v - \omega_3 \omega_1 + 8\omega_2 u^2 \omega_3 v \omega_1 - v\omega_4 \omega_1^2 + \omega_2 \omega_3 v \omega_1 + \frac{1}{2} \omega_2 \omega_1^2 - 8u^2 \omega_3 v \omega_4 \omega_1 - \frac{1}{2} \omega_3 \omega_4 - \\
& 3\omega_2 v \omega_1 - 2u^2 \omega_3^2 \omega_4 - \omega_1^2 + \omega_2 v \omega_1^2 + 4\omega_2 u^2 \omega_3 \omega_1 + \omega_2 - \frac{3}{2} \omega_2 \omega_1 - 2u^2 \omega_4 \omega_1^2 - \omega_2 \omega_3 v - 2\omega_2 u^2 \omega_1^2 + 3v\omega_4 \omega_1 + \\
& 4u^2 \omega_3^2 + 4u^2 \omega_3 \omega_4 \omega_1 + \frac{1}{2} \omega_3 \omega_4 \omega_1 + \omega_3 v \omega_4 - \frac{1}{2} \omega_2 \omega_3 + \omega_3 + \frac{1}{2} \omega_4 \omega_1^2 + 4u^2 \omega_3^2 v \omega_4 + 4u^2 \omega_1^2 - 2\omega_2 u^2 \omega_3^2 - \\
& 4\omega_2 u^2 v \omega_1^2 + \frac{1}{2} \omega_2 \omega_3 \omega_1 - \omega_3 v \omega_4 \omega_1 - \frac{3}{2} \omega_4 \omega_1 - 2v\omega_4 + \omega_4 - 8u^2 \omega_3 \omega_1 + 4u^2 v \omega_4 \omega_1^2 + 2\omega_2 v + 3\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-2\delta_t} = & 1 + \frac{5}{2} u v \omega_4 \omega_1 + \frac{1}{2} \omega_2 u^2 \omega_3^2 v - \frac{1}{4} c_s^2 \omega_3 \omega_4 \omega_1 + 4\omega_2 u^2 v^2 \omega_4 \omega_1 + \omega_2^2 u v^2 \omega_1 - \frac{1}{2} c_s^2 \omega_2 \omega_3^2 v + \frac{1}{4} u w_4^2 \omega_1 - \\
& \frac{1}{2} u \omega_3 v^2 \omega_4 - \frac{5}{2} c_s^2 \omega_3 v \omega_4 - u^2 \omega_3 v \omega_4^2 - \frac{1}{4} \omega_2 v^2 \omega_4 \omega_1 + \omega_2^2 u^2 \omega_3 v^2 - \frac{1}{2} \omega_2 v \omega_4 + \frac{3}{2} c_s^2 u \omega_3 v \omega_4 \omega_1 - \\
& \frac{1}{2} \omega_2 \omega_3 v^2 - \frac{1}{2} \omega_2 u^2 \omega_3 v \omega_1 + \frac{1}{2} u \omega_3 \omega_4 - \frac{1}{2} c_s^2 \omega_2 \omega_3 v \omega_1 + \frac{3}{2} u^2 \omega_3 - \frac{3}{2} u^3 \omega_3 \omega_4 \omega_1 - \frac{1}{4} c_s^2 \omega_3 \omega_4^2 + \frac{1}{4} \omega_2 \omega_3 v \omega_4 + \\
& \frac{3}{2} u \omega_1 - \frac{1}{2} c_s^2 \omega_2 \omega_3 v \omega_4 + \frac{1}{2} \omega_2 u \omega_3 v + \frac{1}{2} \omega_2 u^2 \omega_3 v \omega_4 + u v^2 \omega_4 \omega_1 + c_s^2 u \omega_3^2 v \omega_4 + \frac{1}{2} u^2 \omega_3 v \omega_4 \omega_1 + \\
& \frac{5}{2} u^2 \omega_4 \omega_1 + \frac{1}{2} \omega_3 \omega_4 - \omega_2^2 u^2 \omega_1^2 - \frac{1}{2} c_s^2 \omega_2 \omega_3 v + \frac{1}{2} c_s^2 \omega_2 \omega_4 - u^3 \omega_3^2 + \frac{1}{4} \omega_2 v \omega_1 + \frac{1}{4} u^2 \omega_3^2 \omega_4 + \frac{1}{2} c_s^2 \omega_3^2 + \\
& + \frac{1}{2} u^2 \omega_4 - \frac{1}{4} \omega_2 u^2 \omega_3 \omega_1 - \frac{3}{2} c_s^2 \omega_3 \omega_4 - \frac{1}{4} c_s^2 \omega_2 \omega_3 \omega_1 - \frac{1}{2} \omega_2 + \frac{1}{4} \omega_2 u \omega_4 \omega_1 + \frac{1}{2} c_s^2 \omega_2 u \omega_4 \omega_1 + \frac{1}{2} c_s^2 \omega_3 \omega_1 + \frac{1}{4} \omega_2 \omega_1 - \\
& \frac{1}{2} \omega_2 u \omega_3 v^2 \omega_4 + \omega_2 u \omega_3 v^2 - c_s^2 \omega_2 \omega_3 v^2 + 3u^3 \omega_3 \omega_1 - \frac{1}{2} u^2 \omega_4 \omega_1^2 + \frac{1}{4} \omega_2 \omega_3 v - \frac{1}{2} \omega_2 u^2 \omega_1^2 - \frac{1}{2} c_s^2 u \omega_4 \omega_1 - \frac{1}{2} v \omega_4 \omega_1 - \\
& \frac{1}{2} u^2 \omega_3^2 + \frac{3}{2} c_s^2 \omega_3 \omega_4 - \frac{1}{4} \omega_3 v^2 \omega_4 + 2\omega_2 u^3 v \omega_1^2 - \frac{1}{4} u^2 \omega_3 \omega_4 \omega_1 + \frac{5}{2} u^2 \omega_3 v \omega_4 - 3\omega_2 u^3 \omega_3 v \omega_1 + c_s^2 \omega_3 v \omega_4^2 - \\
& \frac{1}{2} c_s^2 \omega_2 \omega_3 \omega_4 - 2\omega_2 u v \omega_1 - \frac{1}{2} c_s^2 u \omega_3 \omega_4 + \frac{1}{4} \omega_2 u^2 \omega_3 \omega_4 + \frac{1}{2} \omega_2 u^2 \omega_3 v + 2u^2 v \omega_4 \omega_1 + c_s^2 \omega_2 u \omega_3 v \omega_1 - \frac{1}{4} c_s^2 \omega_2 \omega_4 \omega_1 - \\
& \frac{1}{2} \omega_2 u^2 \omega_4 \omega_1 - \omega_2 v^2 + \frac{1}{2} u^3 \omega_3 \omega_4 - 2u^3 v \omega_4 \omega_1^2 - \frac{1}{2} \omega_3 v \omega_4 - \frac{1}{4} c_s^2 \omega_3 \omega_4^2 + \frac{1}{2} c_s^2 \omega_2 u \omega_3 \omega_1 + \frac{1}{4} \omega_2 \omega_3 + \frac{1}{4} c_s^2 \omega_4 \omega_1 - \\
& \frac{1}{2} \omega_3 - 5u^2 v \omega_4 \omega_1 + \frac{1}{2} c_s^2 u \omega_3 \omega_4 - \frac{3}{2} \omega_2 u v^2 \omega_4 \omega_1 - \omega_2 u v^2 \omega_1 - c_s^2 \omega_3 v^2 \omega_4^2 - \frac{1}{2} c_s^2 \omega_4 \omega_1 - \frac{1}{4} v^2 \omega_4 \omega_1 + \frac{1}{4} u^2 \omega_3 \omega_4^2 - \\
& c_s^2 u \omega_3 \omega_1 + \frac{1}{2} \omega_2 u \omega_3 v \omega_4 - 2u^2 v^2 \omega_4 \omega_1 - \frac{1}{2} u^2 \omega_3^2 v \omega_4 + \omega_2 u^3 \omega_3^2 v + u^2 \omega_1^2 - \frac{1}{2} c_s^2 \omega_2 u \omega_3 \omega_4 + 5\omega_2 u^2 v \omega_1 + \\
& \frac{1}{4} \omega_2 u^2 \omega_3^2 - \frac{1}{4} c_s^2 \omega_2 \omega_3^2 + \frac{1}{4} \omega_2 u \omega_4 \omega_1 + 2c_s^2 \omega_2 u \omega_3 v^2 \omega_4 - \omega_2 u^2 v \omega_1^2 - 3u^2 \omega_1 + \frac{1}{2} c_s^2 \omega_3 v \omega_4 - \frac{1}{4} \omega_2 \omega_3 v^2 \omega_4 - \\
& 2\omega_2^2 u^2 v^2 \omega_1 - \omega_2 u^2 v \omega_4 \omega_1 + \frac{1}{2} c_s^2 \omega_3 v \omega_4 \omega_1 - c_s^2 \omega_2 u \omega_3 v^2 - \frac{1}{2} u^2 \omega_4 \omega_1^2 + \frac{1}{2} u v^2 \omega_4 \omega_1 + \frac{3}{4} c_s^2 \omega_2 \omega_3 + c_s^2 u \omega_3^2 - \\
& \frac{3}{4} \omega_2 u^2 \omega_3 - 2\omega_2 u^2 \omega_3 v^2 \omega_4 + \frac{1}{4} \omega_4 \omega_1 + \frac{1}{2} \omega_2 v^2 \omega_1 - \frac{5}{4} u^2 \omega_3 \omega_4 - \frac{1}{2} c_s^2 \omega_2 u \omega_3^2 - u^3 \omega_3^2 v \omega_4 + v \omega_4 - \frac{5}{4} u \omega_4 \omega_1 - \\
& u \omega_3 v \omega_4 + \frac{1}{2} \omega_2^2 u v \omega_1 + \frac{5}{2} c_s^2 \omega_2 \omega_3 v - \frac{5}{2} \omega_2 u^2 \omega_3 v - \frac{1}{2} \omega_4 + \frac{1}{2} \omega_2 u^3 \omega_3^2 - u v \omega_4 \omega_1 + \frac{1}{2} u^2 \omega_3 \omega_1 + \frac{1}{2} \omega_2 v^2 \omega_4 + u^3 \omega_4 \omega_1^2 + \\
& \frac{1}{2} c_s^2 u \omega_3 \omega_4 \omega_1 + u^2 v \omega_4 \omega_1^2 - 2u^3 \omega_1^2 + u^2 \omega_3 v^2 \omega_4^2 - \frac{3}{2} \omega_2 u^3 \omega_3 \omega_1 - \frac{1}{2} \omega_2 v - \frac{3}{4} \omega_2 u \omega_1 + 3u^3 \omega_3 v \omega_4 \omega_1 - \frac{1}{2} \omega_1 - u \omega_3,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_4],t-2\delta_t} = & -2 + \frac{1}{4} \omega_2 \omega_4 \omega_1 - 6u v \omega_4 \omega_1 - \frac{1}{2} \omega_4^2 + 2\omega_2 u^2 \omega_3^2 v - 2\omega_2^2 u v^2 \omega_1 - \frac{1}{2} u \omega_4^2 \omega_1 - \omega_2 u v \omega_1^2 - 2\omega_2 v^2 \omega_4 \omega_1 - \omega_2 v \omega_4 - \frac{1}{2} \omega_3 \omega_1 - \\
& \omega_2^2 v - 4\omega_2 u^2 \omega_3 v \omega_1 - 3u \omega_3 \omega_4 + \omega_2^2 v^2 \omega_1 + \frac{1}{2} \omega_2 \omega_3 v \omega_1 + \omega_3 v^2 \omega_4^2 + u \omega_3 v \omega_4 \omega_1 + \frac{1}{2} \omega_2 \omega_3 v \omega_4 - 4u \omega_1 + u \omega_3 \omega_1 - \\
& 6\omega_2 u \omega_3 v - 2\omega_2 u \omega_3 - 2u v^2 \omega_4 \omega_1 + 4u^2 \omega_3 v \omega_4 \omega_1 - 2u \omega_3^2 v \omega_4 - \frac{3}{2} \omega_3 \omega_4 + \frac{1}{4} \omega_4^2 \omega_1 - 2\omega_2 v \omega_1 + u^2 \omega_3^2 \omega_4 - 2\omega_2 u^2 \omega_3 \omega_1 + \\
& v^2 \omega_4 \omega_1 - \frac{1}{2} \omega_3^2 v \omega_4 + \omega_2 - \frac{1}{2} \omega_2 u \omega_4 \omega_1 - 2v^2 \omega_4^2 + u \omega_1^2 - \omega_2 u v \omega_4 \omega_1 - \frac{1}{2} \omega_2 \omega_1 - 4\omega_2 u \omega_3 v^2 \omega_4 + \omega_2 u \omega_3^2 + \frac{1}{4} \omega_3 \omega_4^2 + \\
& u^2 \omega_4 \omega_1^2 - 3\omega_2 \omega_3 v + \omega_2 u^2 \omega_1^2 - 2\omega_2^2 v^2 + 2v \omega_4 \omega_1 - 2u^2 \omega_3^2 + \frac{1}{2} u \omega_3 \omega_4^2 - \frac{1}{2} \omega_2 \omega_4 \omega_1 - \\
& 6\omega_2 u v \omega_1 - \frac{1}{2} \omega_2 u \omega_1^2 + \frac{1}{2} \omega_2 \omega_3^2 v + \frac{1}{4} \omega_3 \omega_4 \omega_1 + 3\omega_3 v \omega_4 - \frac{1}{2} \omega_2 u \omega_3 \omega_1 - \omega_2 \omega_3 - \omega_2 u \omega_3 v \omega_1 - v \omega_4^2 \omega_1 - 2u \omega_3^2 - \\
& 2u \omega_3 v \omega_4^2 - \frac{1}{2} \omega_2 u \omega_1^2 + 2\omega_3 + 4\omega_2 u v^2 \omega_4 \omega_1 + 2v \omega_4^2 + \frac{1}{2} \omega_2 \omega_3 v + \omega_2 u \omega_3 v \omega_4 + \omega_2^2 u \omega_3 v + \frac{1}{2} \omega_2 u \omega_3 \omega_4 - 2u^2 \omega_3^2 v \omega_4 - \\
& 2u^2 \omega_1^2 + \omega_2 u^2 \omega_3^2 + \frac{1}{2} \omega_2 \omega_3 v \omega_4 + 2\omega_2^2 u \omega_3 v^2 + 2\omega_2 u^2 v \omega_1^2 + \frac{1}{4} \omega_2 \omega_3 \omega_1 - 2\omega_2 \omega_3 v^2 \omega_4 + \frac{1}{4} \omega_3 \omega_4^2 + 2\omega_2 u \omega_3^2 v - \\
& \frac{1}{2} \omega_3 v \omega_4 \omega_1 - \omega_4 \omega_1 - 4v \omega_4 + \omega_2^2 \omega_3 v^2 + 3u \omega_4 \omega_1 + 6u \omega_3 v \omega_4 - \omega_2^2 u v \omega_1 - \frac{1}{2} \omega_3^2 + 2\omega_4 + 2u v \omega_4^2 \omega_1 + 4u^2 \omega_3 \omega_1 + \\
& 4\omega_2 v^2 \omega_4 - 2u^2 v \omega_4 \omega_1^2 - \frac{1}{2} u \omega_3 \omega_4 \omega_1 + 4\omega_2 v + 2\omega_2 u \omega_1 + \omega_1 + \frac{1}{4} \omega_2 \omega_3 \omega_4 + \frac{1}{2} \omega_2^2 v \omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l,y}^{[\mu_1],t-2\delta_t} = & 1 - \frac{1}{2} \omega_2 \omega_4 \omega_1 + \frac{1}{2} \omega_2^2 u^2 \omega_3 - 8\omega_2 u^2 v^2 \omega_4 \omega_1 + 2\omega_2^2 u v^2 \omega_1 - u \omega_3 v^2 \omega_4 + \frac{1}{2} \omega_2 v^2 \omega_4 \omega_1 - 2\omega_2^2 u^2 \omega_3 v^2 + \\
& 2\omega_2 u^2 \omega_1 - \omega_2 \omega_3 v^2 - u \omega_3 \omega_4 + \frac{1}{2} u^2 \omega_3 - \frac{3}{2} u \omega_1 - \omega_2 u \omega_3 + 2u v^2 \omega_4 \omega_1 - \frac{1}{2} c_s^2 \omega_2 \omega_3^2 + \frac{1}{2} \omega_3 \omega_4 - c_s^2 \omega_2 \omega_4 - \frac{1}{2} \omega_2^2 u \omega_1 - \\
& v^2 \omega_4 - \frac{1}{2} c_s^2 \omega_3 - \omega_2 - \omega_2 u \omega_4 \omega_1 + c_s^2 \omega_2 u \omega_4 \omega_1 + \frac{1}{2} \omega_2 \omega_1 - \omega_2 u \omega_3 v^2 \omega_4 + 2\omega_2 u \omega_3 v^2 + 2c_s^2 \omega_2 \omega_3 v^2 - c_s^2 u \omega_4 \omega_1 - \\
& \frac{1}{2} c_s^2 \omega_3 \omega_4 + \omega_2 \omega_4 + \frac{1}{2} \omega_3 v^2 \omega_4 + \frac{1}{2} c_s^2 \omega_2 \omega_3 \omega_4 + \frac{1}{2} c_s^2 \omega_2 \omega_4 \omega_1 + 2\omega_2 v^2 + \frac{1}{2} \omega_2 \omega_3 - \frac{1}{2} c_s^2 \omega_4 \omega_1 - \frac{1}{2} \omega_3 + c_s^2 u \omega_3 \omega_4 - \\
& 3\omega_2 u v^2 \omega_4 \omega_1 - 2\omega_2 u v^2 \omega_1 + 2c_s^2 \omega_3 v^2 \omega_4^2 + c_s^2 \omega_4 + \frac{1}{2} v^2 \omega_4 \omega_1 + \omega_2 u \omega_3 v \omega_4 + 4u^2 v^2 \omega_4 \omega_1 - c_s^2 \omega_2 u \omega_3 \omega_4 - \\
& 4c_s^2 \omega_2 \omega_3 v^2 \omega_4 - u^2 \omega_1 + \frac{1}{2} \omega_2 \omega_3 v^2 \omega_4 + 4\omega_2^2 u^2 v^2 \omega_1 + u v^2 \omega_4 \omega_1 + c_s^2 \omega_2 \omega_3 - \omega_2 u^2 \omega_3 + 4\omega_2 u^2 \omega_3 v^2 \omega_4 + \\
& \frac{1}{2} \omega_4 \omega_1 - \omega_2 v^2 \omega_1 - \omega_2^2 u^2 \omega_1 + u \omega_4 \omega_1 - \omega_4 - \omega_2 v^2 \omega_4 - 2u^2 \omega_3 v^2 \omega_4^2 + 2\omega_2 u \omega_1 - \frac{1}{2} \omega_1 - \frac{1}{2} \omega_2 \omega_3 \omega_4 + u \omega_3,
\end{aligned}$$

$$\alpha_{x-\delta_l,y}^{[\mu_4],t-2\delta_t} = -2 + \frac{1}{2} \omega_2 \omega_4 \omega_1 - 4\omega_2^2 u v^2 \omega_1 + 4\omega_2 v^2 \omega_4 \omega_1 + u \omega_3 \omega_4 - 2\omega_2^2 v^2 \omega_1 - 2\omega_3 v^2 \omega_4^2 + 2u \omega_1 + 3\omega_2 u \omega_3 -$$

$$4uv^2\omega_4^2\omega_1 - \frac{1}{2}\omega_3\omega_4 + \omega_2^2u\omega_1 - 2v^2\omega_4^2\omega_1 - \omega_2^2 + 3\omega_2 + \omega_2u\omega_4\omega_1 + 4v^2\omega_4^2 - \frac{3}{2}\omega_2\omega_1 - 8\omega_2u\omega_3v^2\omega_4 + 4\omega_2^2v^2 + \frac{1}{2}\omega_2^2\omega_3 - \omega_2\omega_4 + 4u\omega_3v^2\omega_4^2 - \frac{3}{2}\omega_2\omega_3 + \omega_3 + 8\omega_2uv^2\omega_4\omega_1 - \omega_2u\omega_3\omega_4 + \frac{1}{2}\omega_2^2\omega_1 + 4\omega_2^2u\omega_3v^2 + 4\omega_2\omega_3v^2\omega_4 - \frac{1}{2}\omega_4\omega_1 - 2\omega_2^2\omega_3v^2 - u\omega_4\omega_1 - \omega_2^2u\omega_3 + \omega_4 - 8\omega_2v^2\omega_4 - 3\omega_2u\omega_1 + \omega_1 + \frac{1}{2}\omega_2u\omega_3\omega_4 - 2u\omega_3,$$

$$\begin{aligned} & \alpha_{x,y}^{[\mu_1],t-2\delta_t} = \\ & 2 + w_3 v^2 \omega_4 \omega_1 - c_s^2 \omega_3 \omega_4 \omega_1 - u^2 \omega_3^2 \omega_1 + w_3 \omega_1 + 2 \omega_2 \omega_3 v^2 + 2 u^2 \omega_3 + 8 \omega_2 u^2 v^2 \omega_1^2 - c_s^2 \omega_3 \omega_1^2 - 4 u^2 v^2 \omega_4 \omega_1^2 + c_s^2 \omega_3^2 + \\ & 2 v^2 \omega_4 + \omega_1^2 - 2 c_s^2 \omega_3 + 3 c_s^2 \omega_3 \omega_1 - 4 u^2 \omega_3^2 v^2 \omega_4 - 5 u^2 \omega_3^2 + c_s^2 \omega_3 \omega_4 - w_3 v^2 \omega_4 - 8 c_s^2 u^2 \omega_3 \omega_4 \omega_1 + 8 \omega_2 u^2 \omega_3^2 v^2 - \\ & 4 \omega_2 v^2 + 3 c_s^2 \omega_4 \omega_1 - w_3 - u^2 \omega_3 \omega_1^2 - 2 c_s^2 \omega_4 - 3 v^2 \omega_4 \omega_1 - 2 \omega_2 v^2 \omega_1^2 + 4 c_s^2 u^2 \omega_3^2 \omega_4 - 2 u^2 \omega_1^2 - c_s^2 \omega_3^2 \omega_1 - 4 u^2 \omega_1 + \\ & 6 \omega_2 v^2 \omega_1 + v^2 \omega_4 \omega_1^2 + 4 c_s^2 u^2 \omega_4 \omega_1^2 + 8 u^2 \omega_3 v^2 \omega_4 \omega_1 - c_s^2 \omega_4 \omega_1^2 + 11 u^2 \omega_3 \omega_1 - 16 \omega_2 u^2 \omega_3 v^2 \omega_1 - 3 \omega_1 - 2 \omega_2 \omega_3 v^2 \omega_1, \end{aligned}$$

$$a_{xx}^{[\mu_4],t-2\delta t} = -4 - \omega_4^2 - 4\omega_3\omega_1 + \omega_2\omega_4^2 - \omega_1^2 - \omega_2^2 + 3\omega_2 + \omega_3\omega_1^2 - 4\omega_2\omega_4 + \omega_2^2\omega_4 + 3\omega_3 - \omega_3^2 + 3\omega_4 + \omega_3^2\omega_1 + 3\omega_1,$$

$$\begin{aligned} \alpha_{x+\delta_1,y}^{[\mu_1,t-\delta_t]} = & 1 - \frac{1}{2}\omega_2\omega_4\omega_1 + \frac{1}{2}\omega_2^2u^2\omega_3 - 8\omega_2u^2v^2\omega_4\omega_1 - 2\omega_2^2uv^2\omega_1 + u\omega_3v^2\omega_4 + \frac{1}{2}\omega_2v^2\omega_4\omega_1 - 2\omega_2^2u^2\omega_3v^2 + \\ & 2\omega_2u^2\omega_1 - \omega_2\omega_3v^2 + u\omega_3\omega_4 + \frac{1}{2}u^2\omega_3 + \frac{3}{2}u\omega_1 + \omega_2u\omega_3 - 2uv^2\omega_4^2\omega_1 - \frac{1}{2}c_s^2\omega_2^2\omega_3 + \frac{1}{2}\omega_3\omega_4 - c_s^2\omega_2\omega_4 + \frac{1}{2}\omega_2^2u\omega_1 - \\ & v^2\omega_4 - \frac{1}{2}c_s^2\omega_3 - \omega_2 + \omega_2u\omega_4\omega_1 - c_s^2\omega_2u\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_1 + \omega_2u\omega_3v^2\omega_4 - 2\omega_2u\omega_3v^2 + 2c_s^2\omega_2^2\omega_3v^2 + c_s^2u\omega_4\omega_1 - \\ & \frac{1}{2}c_s^2\omega_3\omega_4 + \omega_2\omega_4 + \frac{1}{2}\omega_3v^2\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_4\omega_1 + 2\omega_2v^2 + \frac{1}{2}\omega_2\omega_3 - \frac{1}{2}c_s^2\omega_4\omega_1 - \frac{1}{2}\omega_3 - c_s^2u\omega_3\omega_4 + \\ & 3\omega_2uv^2\omega_4\omega_1 + 2\omega_2u\omega^2\omega_1 + 2c_s^2\omega_3v^2\omega_4^2 + c_s^2\omega_4 + \frac{1}{2}v^2\omega_4\omega_1 - \omega_2u\omega_3\omega_4 + 4u^2v^2\omega_4^2\omega_1 + c_s^2\omega_2u\omega_3\omega_4 - \\ & 4c_s^2\omega_2\omega_3v^2\omega_4 - u^2\omega_1 + \frac{1}{2}\omega_2\omega_3v^2\omega_4 + 4\omega_2^2u^2v^2\omega_1 - uv^2\omega_4\omega_1 + c_s^2\omega_2\omega_3 - \omega_2u^2\omega_3 + 4\omega_2u^2\omega_3v^2\omega_4 + \\ & \frac{1}{2}\omega_4\omega_1 - \omega_2v^2\omega_1 - \omega_2^2u^2\omega_1 - u\omega_4\omega_1 - \omega_4 - \omega_2v^2\omega_4 - 2u^2\omega_3v^2\omega_4^2 - 2\omega_2u\omega_1 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_2\omega_3\omega_4 - u\omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_1,y}^{[\mu_4],t-2\delta_t} = & -2 + \frac{1}{2}\omega_2 w_4 \omega_1 + 4\omega_2^2 u v^2 \omega_1 + 4\omega_2 v^2 w_4 \omega_1 - u \omega_3 \omega_4 - 2\omega_2^2 v^2 \omega_1 - 2\omega_3 v^2 \omega_4^2 - 2u \omega_1 - 3\omega_2 u \omega_3 + \\ & 4u v^2 \omega_4^2 \omega_1 - \frac{1}{2}\omega_3 \omega_4 - \omega_2^2 u \omega_1 - 2v^2 \omega_4^2 \omega_1 - \omega_2^2 + 3\omega_2 - \omega_2 u \omega_4 \omega_1 + 4v^2 \omega_4^2 - \frac{3}{2}\omega_2 \omega_1 + 8\omega_2 u \omega_3 v^2 \omega_4 + 4\omega_2^2 v^2 + \\ & \frac{1}{2}\omega_2^2 \omega_3 - \omega_2 \omega_4 - 4u \omega_3 v^2 \omega_4^2 - \frac{3}{2}\omega_2 \omega_3 + \omega_3 - 8\omega_2 u v^2 w_4 \omega_1 + \omega_2 u \omega_3 \omega_4 + \frac{1}{2}\omega_2^2 \omega_1 - 4\omega_2^2 u \omega_3 v^2 + 4\omega_2 \omega_3 v^2 \omega_4 - \\ & \frac{1}{2}\omega_4 \omega_1 - 2\omega_2^2 \omega_3 v^2 + u \omega_4 \omega_1 + \omega_2^2 u \omega_3 + \omega_4 - 8\omega_2 v^2 \omega_4 + 3\omega_2 u \omega_1 + \omega_1 + \frac{1}{2}\omega_2 \omega_3 \omega_4 + 2u \omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_i, y+\delta_i}^{[\mu_1], t-2\delta_t} = & 1 + \frac{5}{2}uvw_4\omega_1 - \frac{1}{2}\omega_2u^2w_3^2v - \frac{1}{4}c_s^2w_3\omega_4\omega_1 + 4\omega_2u^2v^2\omega_4\omega_1 - \omega_2^2uv^2\omega_1 + \frac{1}{2}c_s^2\omega_2\omega_3^2v - \frac{1}{4}uw_4^2\omega_1 + \\ & \frac{1}{2}uw_3v^2\omega_4 + \frac{5}{2}c_s^2w_3vw_4 + u^2w_3vw_4^2 - \frac{1}{4}\omega_2v^2\omega_4\omega_1 + \omega_2^2u^2w_3v^2 + \frac{1}{2}\omega_2vw_4 + \frac{3}{2}\omega_2u^2\omega_1 - c_s^2vw_3vw_4\omega_1 + \\ & \frac{1}{2}\omega_2w_3v^2 + \frac{1}{2}\omega_2u^2w_3vw_1 - \frac{1}{2}uw_3\omega_4 + \frac{1}{2}c_s^2w_2w_3vw_1 + \frac{3}{2}u^2w_3 + \frac{3}{2}u^3w_3\omega_4\omega_1 - \frac{1}{4}c_s^2w_3\omega_4^2 - \frac{1}{4}\omega_2w_3vw_4 - \\ & \frac{3}{2}u\omega_1 + \frac{1}{2}c_s^2w_2w_3vw_4 + \frac{1}{2}\omega_2uw_3v - \frac{1}{2}\omega_2uw_3 - \frac{1}{2}\omega_2u^2w_3v\omega_4 - uv^2w_4^2\omega_1 + c_s^2uw_3^2vw_4 - \frac{1}{2}u^2w_3vw_4\omega_1 + \\ & \frac{5}{2}u^2w_4\omega_1 + \frac{1}{4}w_3\omega_4 + w_2^2u^2vw_1 + \frac{1}{2}c_s^2w_2w_3v + \frac{1}{2}c_s^2w_2\omega_4 + u^3w_3^2 - \frac{1}{4}\omega_2vw_1 + \frac{1}{4}u^2w_3^2w_4 + \frac{1}{2}c_s^2w_3^2 - \omega_2u^3w_1^2 + \\ & \frac{1}{2}v^2\omega_4 - \frac{1}{4}\omega_2u^2w_3\omega_1 - \frac{3}{2}c_s^2w_3 - \frac{1}{4}c_s^2w_2w_3\omega_1 - \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2uw_4\omega_1 - \frac{1}{2}c_s^2w_2uw_4\omega_1 + \frac{1}{2}c_s^2w_3\omega_1 + \frac{1}{4}\omega_2\omega_1 + \\ & \frac{1}{2}w_2uw_3v^2\omega_4 - w_2uw_3v^2 - c_s^2w_2w_3v^2 - 3u^3w_3\omega_1 - \frac{1}{2}u^2w_4\omega_1^2 - \frac{1}{4}w_2w_3v - \frac{1}{2}w_2u^2w_1^2 + \frac{1}{2}c_s^2uw_4\omega_1 + \frac{1}{4}v\omega_4\omega_1 - \\ & \frac{1}{2}u^2w_3^2 + \frac{3}{2}c_s^2w_3\omega_4 - \frac{1}{4}w_3v^2\omega_4 + 2w_2u^3vw_1^2 - \frac{1}{4}u^2w_3\omega_4\omega_1 - \frac{5}{2}u^2w_3vw_4 - 3w_2u^3w_3vw_1 - c_s^2w_3vw_4^2 - \\ & \frac{1}{2}c_s^2w_2w_3\omega_4 - 2w_2uvw_1 + \frac{1}{2}c_s^2uw_3^2\omega_4 + \frac{1}{4}\omega_2u^2w_3\omega_4 - \frac{1}{2}w_2u^2w_3v - 2u^2vw_4^2\omega_1 + c_s^2w_2vw_3vw_1 - \frac{1}{4}c_s^2w_2w_4\omega_1 - \\ & \frac{1}{2}\omega_2u^2w_4\omega_1 - \omega_2v^2 - \frac{1}{2}u^3w_3^2\omega_4 - 2u^3vw_4\omega_1^2 + \frac{1}{2}w_3vw_4 - \frac{1}{4}c_s^2w_3^2\omega_4 - \frac{1}{2}c_s^2w_2w_3\omega_1 + \frac{1}{4}\omega_2w_3 + \frac{1}{4}c_s^2w_4\omega_1 - \\ & \frac{1}{2}w_3 + 5u^2vw_4\omega_1 - \frac{1}{2}c_s^2uw_3\omega_4 + \frac{3}{2}\omega_2uv^2w_4\omega_1 + w_2uv^2\omega_1 - c_s^2w_3v^2\omega_4^2 - \frac{1}{2}c_s^2\omega_4 - \frac{1}{4}v^2w_4\omega_1 + \frac{1}{4}u^2w_3\omega_4^2 + \\ & c_s^2uw_3\omega_1 + \frac{1}{2}w_2uw_3vw_4 - 2u^2v^2w_4^2\omega_1 + \frac{1}{2}u^2w_3^2vw_4 + \omega_2u^3w_3^2v + u^2w_1^2 + \frac{1}{2}c_s^2w_2uw_3\omega_4 - 5w_2u^2vw_1 + \\ & \frac{1}{4}\omega_2u^2w_3^2 - \frac{1}{4}c_s^2w_2w_3^2 - \frac{1}{4}\omega_2vw_4\omega_1 + 2c_s^2w_2w_3v^2\omega_4 + \omega_2u^2vw_1^2 - 3u^2\omega_1 - \frac{1}{2}c_s^2w_3^2vw_4 - \frac{1}{4}\omega_2w_3v^2\omega_4 - \\ & 2w_2^2u^2v^2\omega_1 + w_2u^2vw_4\omega_1 - \frac{1}{2}c_s^2w_3vw_4\omega_1 - c_s^2w_2w_3w_4^2 - \frac{1}{2}u^2w_4^2\omega_1 - \frac{1}{2}uv^2w_4\omega_1 + \frac{3}{4}c_s^2w_2w_3 - c_s^2uw_3^2 - \\ & \frac{3}{4}\omega_2u^2w_3 - 2w_2u^2w_3v^2\omega_4 + \frac{1}{4}w_4\omega_1 + \frac{1}{2}w_2v^2\omega_1 - \frac{5}{4}u^2w_3\omega_4 + \frac{1}{2}c_s^2w_2vw_3^2 - u^3w_3^2vw_4 - v\omega_4 + \frac{5}{4}uw_4\omega_1 - \\ & uw_3vw_4 + \frac{1}{2}\omega_2^2uvw_1 - \frac{5}{2}c_s^2w_2w_3v + \frac{5}{2}\omega_2u^2w_3v - \frac{1}{2}\omega_4 - \frac{1}{2}w_2u^3w_3^2 - uvw_4^2\omega_1 + \frac{1}{2}u^2w_3\omega_1 + \frac{1}{2}\omega_2v^2w_4 - u^3w_4\omega_1^2 - \\ & \frac{1}{2}c_s^2uw_3\omega_4\omega_1 - u^2vw_4\omega_1^2 + 2u^3\omega_1^2 + u^2w_3v^2\omega_4^2 + \frac{3}{2}\omega_2u^3w_3\omega_1 + \frac{1}{2}\omega_2v + \frac{3}{4}\omega_2vw_1 + 3u^3w_3vw_4\omega_1 - \frac{1}{2}\omega_1 + uw_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_i, y+\delta_i}^{[\mu_4], t-2\delta_t} = & -2 + \frac{1}{4}\omega_2\omega_4\omega_1 - 6uv\omega_4\omega_1 - \frac{1}{2}\omega_4^2 - 2\omega_2u^2\omega_3^2v + 2\omega_2^2uv^2\omega_1 + \frac{1}{2}u\omega_4^2\omega_1 - u_2vv\omega_1^2 - 2\omega_2v^2\omega_4\omega_1 + \omega_2vw_4 - \frac{1}{2}\omega_3\omega_1 + \\ & \omega_2^2v + 4\omega_2u^2\omega_3vw_1 + 3u\omega_3\omega_4 + \omega_2^2v^2\omega_1 - \frac{1}{2}\omega_2\omega_3vw_1 + \omega_3v^2\omega_4^2 + u\omega_3vw_4\omega_1 - \frac{1}{2}\omega_2\omega_3vw_4 + 4uw_1 - u\omega_3\omega_1 - \\ & 6\omega_2u\omega_3v + 2\omega_2u\omega_3 + 2uv^2\omega_4^2\omega_1 - 4u^2\omega_3vw_4\omega_1 - 2u\omega_3^2vw_4 - \frac{3}{2}\omega_3\omega_4 + \frac{1}{4}\omega_4^2\omega_1 + 2\omega_2vw_1 + u^2\omega_3^2\omega_4 - 2\omega_2u^2\omega_3\omega_1 + \\ & v^2\omega_4^2\omega_1 + \frac{1}{2}\omega_3^2vw_4 + \omega_2 + \frac{1}{2}\omega_2u\omega_4\omega_1 - 2v^2\omega_4^2 - uw_1^2 - \omega_2uv\omega_4\omega_1 - \frac{1}{2}\omega_2\omega_1 + 4\omega_2u\omega_3v^2\omega_4 - \omega_2u\omega_3^2 + \frac{1}{4}\omega_3\omega_4^2 + \\ & u^2\omega_4\omega_1^2 + 3\omega_2\omega_3v + \omega_2u^2\omega_1^2 - 2\omega_2^2v^2 - 2v\omega_4\omega_1 - 2u^2\omega_3^2 - \frac{1}{2}u\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_4 + uv\omega_4\omega_1^2 - 2u\omega_3v^2\omega_4^2 - 2u^2\omega_3\omega_4\omega_1 + \\ & 6\omega_2uv\omega_1 + \frac{1}{2}\omega_2u\omega_1^2 - \frac{1}{2}\omega_2\omega_3^2v + \frac{1}{4}\omega_3\omega_4\omega_1 - 3u\omega_3vw_1 + \frac{1}{2}\omega_2u\omega_3\omega_1 - \omega_2\omega_3 - \omega_2u\omega_3vw_1 + vw_4^2\omega_1 + 2u\omega_3^2 - \\ & 2u\omega_3vw_4^2 + \frac{1}{2}u\omega_4\omega_1^2 + 2w_3 - 4\omega_2uv^2\omega_4\omega_1 - 2v\omega_4^2 - \frac{1}{2}\omega_2^2\omega_3v + \omega_2u\omega_3vw_4 + \omega_2^2u\omega_3v - \frac{1}{2}\omega_2u\omega_3\omega_4 + 2u^2\omega_3^2vw_4 - \end{aligned}$$

$$\begin{aligned}
& 2u^2\omega_1^2 + \omega_2u^2\omega_3^2 - \frac{1}{2}\omega_2v\omega_4\omega_1 - 2\omega_2^2u\omega_3v^2 - 2\omega_2u^2v\omega_1^2 + \frac{1}{4}\omega_2\omega_3\omega_1 - 2\omega_2\omega_3v^2\omega_4 + \frac{1}{4}\omega_3^2\omega_4 + 2\omega_2u\omega_3^2v + \\
& \frac{1}{2}\omega_3v\omega_4\omega_1 - \omega_4\omega_1 + 4v\omega_4 + \omega_2^2\omega_3v^2 - 3u\omega_4\omega_1 + 6u\omega_3v\omega_4 - \omega_2^2uv\omega_1 - \frac{1}{2}\omega_3^2 + 2\omega_4 + 2uv\omega_2^2\omega_1 + 4u^2\omega_3\omega_1 + \\
& 4\omega_2v^2\omega_4 + 2u^2v\omega_4\omega_1^2 + \frac{1}{2}u\omega_3\omega_4\omega_1 - 4\omega_2v - 2\omega_2u\omega_1 + \omega_1 + \frac{1}{4}\omega_2\omega_3\omega_4 + \omega_3v\omega_4^2 - 4u\omega_3 - u\omega_3^2\omega_4 + \frac{1}{4}\omega_2\omega_3^2 - \frac{1}{2}\omega_2^2v\omega_1, \\
\alpha_{x,y+\delta_t}^{[\mu_1],t-\delta_t} &= 2 - 2\omega_2u^2\omega_3^2v - \frac{1}{2}\omega_3v^2\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_3\omega_4\omega_1 + \omega_3\omega_1 - \omega_2\omega_3v^2 + 4\omega_2u^2\omega_3v\omega_1 - v\omega_4\omega_1^2 + \frac{1}{2}\omega_2\omega_3v\omega_1 - \\
& \frac{1}{2}\omega_2\omega_1^2 - 4\omega_2u^2v^2\omega_1^2 + 2u^2v^2\omega_4\omega_1^2 - 8u^2\omega_3v\omega_4\omega_1 + \frac{1}{2}\omega_3\omega_4 - \frac{3}{2}\omega_2v\omega_1 + 2u^2\omega_3^2\omega_4 - v^2\omega_4 + \omega_1^2 + \frac{1}{2}\omega_2v\omega_1^2 - \\
& 4\omega_2u^2\omega_3\omega_1 - \omega_2 + 2u^2\omega_3^2v^2\omega_4 + \frac{3}{2}\omega_2\omega_1 + 2u^2\omega_4\omega_1^2 - \frac{1}{2}\omega_2\omega_3v + 2\omega_2u^2\omega_1^2 + 3v\omega_4\omega_1 - 4u^2\omega_3^2 - \frac{1}{2}c_s^2\omega_3\omega_4 + \\
& \frac{1}{2}\omega_3v^2\omega_4 + 4c_s^2u^2\omega_3\omega_4\omega_1 - 4\omega_2u^2\omega_3^2v^2 - 4u^2\omega_3\omega_4\omega_1 + 2\omega_2v^2 - \frac{1}{2}\omega_3\omega_4\omega_1 + \omega_3v\omega_4 + \frac{1}{2}\omega_2\omega_3 - \frac{3}{2}c_s^2\omega_4\omega_1 + \\
& \omega_3 + c_s^2\omega_4 + \frac{3}{2}v^2\omega_4\omega_1 + \omega_2v^2\omega_1^2 - \frac{1}{2}\omega_4\omega_1^2 - 2c_s^2u^2\omega_3^2\omega_4 + 4u^2\omega_3^2v\omega_4 - 4u^2\omega_1^2 + 2\omega_2u^2\omega_3^2 - 2\omega_2u^2v\omega_1^2 - \\
& \frac{1}{2}\omega_2\omega_3\omega_1 - \omega_3v\omega_4\omega_1 + \frac{3}{2}\omega_4\omega_1 - 3\omega_2v^2\omega_1 - \frac{1}{2}v^2\omega_4\omega_1^2 - 2v\omega_4 - 2c_s^2u^2\omega_4\omega_1^2 - 4u^2\omega_3v^2\omega_4\omega_1 - \omega_4 + \\
& \frac{1}{2}c_s^2\omega_4\omega_1^2 + 8u^2\omega_3\omega_1 + 4u^2v\omega_4\omega_1^2 + 8\omega_2u^2\omega_3v^2\omega_1 + \omega_2v - 3\omega_1 + \omega_2\omega_3v^2\omega_1, \\
\alpha_{x,y+\delta_t}^{[\mu_4],t-\delta_t} &= -2 + 4\omega_2u^2\omega_3^2v - \omega_3\omega_1 - 8\omega_2u^2\omega_3v\omega_1 + v\omega_4\omega_1^2 - \omega_2\omega_3v\omega_1 + \frac{1}{2}\omega_2\omega_1^2 + 8u^2\omega_3v\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4 + \\
& 3\omega_2v\omega_1 - 2u^2\omega_3^2\omega_4 - \omega_1^2 - \omega_2v\omega_1^2 + 4\omega_2u^2\omega_3\omega_1 + \omega_2 - \frac{3}{2}\omega_2\omega_1 - 2u^2\omega_4\omega_1^2 + \omega_2\omega_3v - 2\omega_2u^2\omega_1^2 - 3v\omega_4\omega_1 + \\
& 4u^2\omega_3^2 + 4u^2\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1 - \omega_3v\omega_4 - \frac{1}{2}\omega_2\omega_3 + \omega_3 + \frac{1}{2}\omega_4\omega_1^2 - 4u^2\omega_3^2v\omega_4 + 4u^2\omega_1^2 - 2\omega_2u^2\omega_3^2 + \\
& 4\omega_2u^2v\omega_1^2 + \frac{1}{2}\omega_2\omega_3\omega_1 + \omega_3v\omega_4\omega_1 - \frac{3}{2}\omega_4\omega_1 + 2v\omega_4 + \omega_4 - 8u^2\omega_3\omega_1 - 4u^2v\omega_4\omega_1^2 - 2\omega_2v + 3\omega_1, \\
\alpha_{x+\delta_t,y+\delta_t}^{[\mu_1],t-\delta_t} &= 1 - \frac{5}{2}uv\omega_4\omega_1 - \frac{1}{2}\omega_2u^2\omega_3^2v - \frac{1}{4}c_s^2\omega_3\omega_4\omega_1 + 4\omega_2u^2v^2\omega_4\omega_1 + \omega_2^2uv^2\omega_1 + \frac{1}{2}c_s^2\omega_2\omega_3^2v + \frac{1}{4}u\omega_4^2\omega_1 - \\
& \frac{1}{2}\omega_3v^2\omega_4 + \frac{5}{2}c_s^2\omega_3v\omega_4 + u^2\omega_3v\omega_4^2 - \frac{1}{4}\omega_2v^2\omega_4\omega_1 + \omega_2^2u^2\omega_3v^2 + \frac{1}{2}\omega_2v\omega_4 + \frac{3}{2}\omega_2u^2\omega_1 + c_s^2\omega_3v\omega_4\omega_1 + \\
& \frac{1}{2}\omega_2\omega_3v^2 + \frac{5}{2}c_s^2\omega_2\omega_3v\omega_1 + \frac{1}{2}\omega_3\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3v\omega_1 + \frac{3}{2}u^2\omega_3 - \frac{3}{2}u^3\omega_3\omega_4\omega_1 - \frac{1}{4}c_s^2\omega_3\omega_4^2 - \frac{1}{4}\omega_2\omega_3v\omega_4 + \\
& \frac{3}{2}\omega_1 + \frac{1}{2}c_s^2\omega_2\omega_3v\omega_4 - \frac{1}{2}\omega_2u\omega_3v + \frac{1}{2}\omega_2u^2\omega_3v\omega_4 + uv^2\omega_4\omega_1 - c_s^2\omega_3v\omega_4 - \frac{1}{2}u^2\omega_3v\omega_4\omega_1 + \\
& \frac{5}{2}u^2\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_4 + \omega_2^2u^2v\omega_1 + \frac{1}{2}c_s^2\omega_2\omega_3v + \frac{1}{2}c_s^2\omega_2\omega_4\omega_1 - u^3\omega_3 - \frac{1}{4}\omega_2v\omega_1 + \frac{1}{4}u^2\omega_3^2\omega_4 + \frac{1}{2}c_s^2\omega_3^2 + \omega_2u^3\omega_1^2 + \\
& \frac{1}{2}v^2\omega_4 - \frac{1}{4}\omega_2u^2\omega_3\omega_1 - \frac{3}{2}c_s^2\omega_3 - \frac{1}{4}c_s^2\omega_2\omega_3\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_2u\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_2u\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_3\omega_1 + \frac{1}{4}\omega_2\omega_1 - \\
& \frac{1}{2}\omega_2u\omega_3v^2\omega_4 + \omega_2u\omega_3v^2 - c_s^2\omega_2\omega_3v^2 + 3u^3\omega_3\omega_1 - \frac{1}{2}u^2\omega_4\omega_1^2 - \frac{1}{4}\omega_2\omega_3v - \frac{1}{2}\omega_2u^2\omega_1^2 - \frac{1}{2}c_s^2\omega_4\omega_1 + \frac{1}{2}v\omega_4\omega_1 - \\
& \frac{1}{2}u^2\omega_3^2 + \frac{3}{2}c_s^2\omega_3\omega_4 - \frac{1}{4}\omega_3v^2\omega_4 - 2\omega_2u^3v\omega_1^2 - \frac{1}{4}u^2\omega_3\omega_4\omega_1 - \frac{5}{2}u^2\omega_3v\omega_4 + 3\omega_2u^3\omega_3v\omega_1 - c_s^2\omega_3v\omega_4^2 - \\
& \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 + 2\omega_2u\omega_1 - \frac{1}{2}c_s^2\omega_3\omega_4 + \frac{1}{4}\omega_2u^2\omega_3\omega_4 - \frac{1}{2}\omega_2u^2\omega_3v - 2u^2v\omega_4\omega_1 - c_s^2\omega_2u\omega_3v\omega_1 - \frac{1}{4}c_s^2\omega_2\omega_4\omega_1 - \\
& \frac{1}{2}\omega_2u^2\omega_4\omega_1 - \omega_2v^2 + \frac{1}{2}u^3\omega_3\omega_4 + 2u^3v\omega_4\omega_1^2 + \frac{1}{2}\omega_3v\omega_4 - \frac{1}{4}c_s^2\omega_3\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3\omega_1 + \frac{1}{4}\omega_2\omega_3 + \frac{1}{4}c_s^2\omega_4\omega_1 - \\
& \frac{1}{2}\omega_3 + 5u^2v\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_3\omega_4 - \frac{3}{2}\omega_2u\omega_3v^2\omega_4\omega_1 - \omega_2u\omega_3v^2\omega_1 - c_s^2\omega_3v^2\omega_4^2 - \frac{1}{2}c_s^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_4\omega_1 + \frac{1}{4}u^2\omega_3\omega_4^2 - \\
& c_s^2\omega_3v\omega_1 - \frac{1}{2}\omega_2u\omega_3v\omega_4 - 2u^2v^2\omega_4\omega_1 + \frac{1}{2}u^2\omega_3v\omega_4\omega_1 - \frac{5}{2}u^2\omega_3v\omega_4 + 3\omega_2u^3\omega_3v\omega_1 - c_s^2\omega_3v\omega_4^2 - \\
& \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 + 2\omega_2u\omega_1 - \frac{1}{2}c_s^2\omega_3\omega_4 + \frac{1}{4}\omega_2u^2\omega_3\omega_4 - \frac{1}{2}\omega_2u^2\omega_3v - 2u^2v\omega_4\omega_1 - c_s^2\omega_2u\omega_3v\omega_1 - \frac{1}{4}c_s^2\omega_2\omega_4\omega_1 - \\
& \frac{1}{2}\omega_2u^2\omega_4\omega_1 - \omega_2v^2 + \frac{1}{2}u^3\omega_3\omega_4 + 2u^3v\omega_4\omega_1^2 + \frac{1}{2}\omega_3v\omega_4 - \frac{1}{4}c_s^2\omega_3\omega_4 + \frac{1}{2}c_s^2\omega_2\omega_3\omega_1 + \frac{1}{4}\omega_2\omega_3 + \frac{1}{4}c_s^2\omega_4\omega_1 - \\
& \frac{1}{2}\omega_3 + 5u^2v\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_3\omega_4 - \frac{3}{2}\omega_2u\omega_3v^2\omega_4\omega_1 - \omega_2u\omega_3v^2\omega_1 - c_s^2\omega_3v^2\omega_4^2 - \frac{1}{2}c_s^2\omega_4\omega_1 + \frac{1}{4}u^2\omega_3\omega_4^2 - \\
& c_s^2\omega_3v\omega_1 - \frac{1}{2}\omega_2u\omega_3v\omega_4 - 2u^2v^2\omega_4\omega_1 + \frac{1}{2}u^2\omega_3v\omega_4\omega_1 - \omega_2u\omega_3v^2\omega_1 + u^2\omega_1^2 - \frac{1}{2}c_s^2\omega_2u\omega_3\omega_4 - 5\omega_2u^2v\omega_1 + \\
& \frac{1}{4}c_s^2\omega_2\omega_3\omega_4 - \frac{1}{4}c_s^2\omega_2\omega_3^2 - \frac{1}{4}\omega_2v\omega_4\omega_1 + 2c_s^2\omega_2\omega_3v^2\omega_4 + \omega_2u^2v\omega_1^2 - 3u^2\omega_1 - \frac{1}{2}c_s^2\omega_3^2v\omega_4 - \frac{1}{4}\omega_2\omega_3v^2\omega_4 - \\
& 2\omega_2u^2v^2\omega_1 + \omega_2u^2v\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_3v\omega_4\omega_1 + c_s^2\omega_2u\omega_3\omega_1 - \frac{1}{2}u^2\omega_4\omega_1^2 + \frac{1}{2}c_s^2\omega_2\omega_3 + c_s^2\omega_2\omega_3^2 - \\
& \frac{3}{4}\omega_2u^2\omega_3 - 2\omega_2u^2\omega_3v^2\omega_4 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{2}\omega_2v^2\omega_1 - \frac{5}{4}u^2\omega_3\omega_4 - \frac{1}{2}c_s^2\omega_2u\omega_3^2 + u^3\omega_3^2v\omega_4 - v\omega_4 - \frac{5}{4}u\omega_4\omega_1 + \\
& u\omega_3v\omega_4 - \frac{1}{2}\omega_2u\omega_3v\omega_1 - \frac{5}{2}c_s^2\omega_2\omega_3v + \frac{5}{2}\omega_2u^2\omega_3v - \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2u^3\omega_3^2 + uv\omega_4\omega_1 + \frac{1}{2}u^2\omega_3\omega_1 + \frac{1}{2}\omega_2v^2\omega_4 + u^3\omega_4\omega_1^2 + \\
& \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 - u^2v\omega_4\omega_1^2 - 2u^3\omega_1^2 + u^2\omega_3v^2\omega_4^2 - \frac{3}{2}\omega_2u\omega_3\omega_1 + \frac{1}{2}\omega_2v - \frac{3}{4}\omega_2u\omega_1 - 3u^3\omega_3v\omega_4\omega_1 - \frac{1}{2}\omega_1 - u\omega_3, \\
\alpha_{x+\delta_t,y+\delta_t}^{[\mu_4],t-\delta_t} &= \\
& -2 + \frac{1}{4}\omega_2\omega_4\omega_1 + 6uv\omega_4\omega_1 - \frac{1}{2}\omega_4^2 - 2\omega_2u^2\omega_3^2v - 2\omega_2^2uv^2\omega_1 - \frac{1}{2}u\omega_4^2\omega_1 + \omega_2uv\omega_1^2 - 2\omega_2v^2\omega_4\omega_1 + \omega_2v\omega_4 - \frac{1}{2}\omega_3\omega_1 + \\
& \omega_2^2v + 4\omega_2u^2\omega_3v\omega_1 - 3u\omega_3\omega_4 + \omega_2^2v^2\omega_1 - \frac{1}{2}\omega_2\omega_3v\omega_1 + \omega_3v\omega_4^2 - u\omega_3v\omega_4\omega_1 - \frac{1}{2}\omega_2\omega_3v\omega_4 - 4u\omega_1 + u\omega_3\omega_1 + \\
& 6\omega_2u\omega_3v - 2\omega_2u\omega_3 - 2uv^2\omega_4\omega_1 - 4u^2\omega_3v\omega_4\omega_1 + 2u\omega_3^2v\omega_4 - \frac{3}{2}\omega_3\omega_4 + \frac{1}{4}\omega_4\omega_1 + 2\omega_2v\omega_1 + u^2\omega_3^2\omega_4 - 2\omega_2u^2\omega_3\omega_1 + \\
& v^2\omega_4\omega_1 + \frac{1}{2}\omega_3v\omega_4 + \omega_2 - \frac{1}{2}\omega_2u\omega_4\omega_1 - 2v^2\omega_4^2 + u\omega_1^2 + \omega_2uv\omega_4\omega_1 - \frac{1}{2}\omega_2\omega_1 - 4\omega_2u\omega_3v^2\omega_4 + \omega_2u\omega_3^2 + \frac{1}{4}\omega_3\omega_4^2 + \\
& u^2\omega_4\omega_1^2 + 3\omega_2\omega_3v + \omega_2u^2\omega_1^2 - 2\omega_2v^2 - 2v\omega_4\omega_1 - 2u\omega_3^2 + \frac{1}{2}u\omega_3\omega_4 - \frac{1}{2}\omega_2\omega_4\omega_1 + u^3\omega_3^2v\omega_4 - v\omega_4 - \frac{5}{4}u\omega_4\omega_1 + \\
& u\omega_3v\omega_4 - \frac{1}{2}\omega_2u\omega_3v\omega_1 - \frac{5}{2}c_s^2\omega_2\omega_3v + \frac{5}{2}\omega_2u^2\omega_3v - \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2u^3\omega_3^2 + uv\omega_4\omega_1 + \frac{1}{2}u^2\omega_3\omega_1 + \frac{1}{2}\omega_2v^2\omega_4 + u^3\omega_4\omega_1^2 + \\
& \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 - u^2v\omega_4\omega_1^2 - 2u^3\omega_1^2 + u^2\omega_3v^2\omega_4^2 - \frac{3}{2}\omega_2u\omega_3\omega_1 + \frac{1}{2}\omega_2v - \frac{3}{4}\omega_2u\omega_1 - 3u^3\omega_3v\omega_4\omega_1 - \frac{1}{2}\omega_1 - u\omega_3, \\
\alpha_{x,y-\delta_t}^{[\mu_1],t-\delta_t} &= -2 - 3\omega_2u^2\omega_3^2v - \frac{1}{2}\omega_3v^2\omega_4\omega_1 + 2\omega_2u^2\omega_3^2v^2\omega_4 + \frac{7}{2}c_s^2\omega_3\omega_4\omega_1 - 8\omega_2u^2v^2\omega_4\omega_1 - \frac{1}{2}u^2\omega_3\omega_4\omega_1^2 + \\
& c_s^2\omega_2\omega_3^2v - 2u^2\omega_3v^2\omega_4\omega_1 + 5c_s^2\omega_3v\omega_4 + 2u^2\omega_3v\omega_4^2 + \frac{3}{2}\omega_2v^2\omega_4\omega_1 + u^2\omega_3^2\omega_1 - 2\omega_2u^2\omega_3v^2 + \omega_2v\omega_4 - \\
& \omega_3\omega_1 - 3\omega_2u^2\omega_1 - \omega_2\omega_3v^2 + 10\omega_2u^2\omega_3v\omega_1 + 6c_s^2\omega_2\omega_3v\omega_1 - 3u^2\omega_3 - v\omega_4\omega_1^2 + \frac{1}{2}\omega_2\omega_3v\omega_1 + \frac{1}{2}c_s^2\omega_3\omega_4^2 + \\
& 4\omega_2v^2\omega_4 + 2u^2v\omega_4\omega_1^2 - \frac{1}{2}u\omega_3\omega_4\omega_1 - 4\omega_2v + 2\omega_2u\omega_1 + \omega_1 + \frac{1}{4}\omega_2\omega_3\omega_4 + \omega_3v\omega_4^2 + 4u\omega_3 + u\omega_3^2\omega_4 + \frac{1}{4}\omega_2\omega_3^2 - \frac{1}{2}\omega_2^2v\omega_1,
\end{aligned}$$

$$\begin{aligned}
& \frac{1}{2}\omega_2\omega_1^2 - \frac{1}{2}\omega_2\omega_3v\omega_4 - 4\omega_2u^2v^2\omega_1^2 + c_s^2\omega_3\omega_1^2 + 2u^2v^2\omega_4\omega_1^2 - \omega_2^2u^2\omega_3v\omega_4\omega_1 + c_s^2\omega_2\omega_3v\omega_4\omega_1 - \\
& c_s^2\omega_2\omega_3\omega_4\omega_1 - \omega_2u^2\omega_3v\omega_4 - 4c_s^2\omega_2u^2\omega_3\omega_4\omega_1 - 14u^2\omega_3v\omega_4\omega_1 - 5u^2\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4 + 2\omega_2^2u^2v\omega_1 + \\
& 2c_s^2\omega_3v\omega_4^2\omega_1 + c_s^2\omega_2^2\omega_3v - c_s^2\omega_2\omega_4 - \frac{3}{2}\omega_2v\omega_1 - \frac{1}{2}\omega_2u^2\omega_3\omega_1^2 - \frac{5}{2}u^2\omega_3^2\omega_4 - \frac{1}{2}c_s^2\omega_2\omega_3\omega_1^2 - c_s^2\omega_3^2 - v^2\omega_4 - \\
& \omega_1^2 + \frac{1}{2}\omega_2v\omega_1^2 + 6\omega_2u^2\omega_3\omega_1 + 3c_s^2\omega_3 + 2c_s^2\omega_2\omega_3\omega_1 + \omega_2 - 4c_s^2\omega_3\omega_1 + c_s^2\omega_3^2v\omega_4\omega_1 + 2u^2\omega_3^2v^2\omega_4 - \frac{3}{2}\omega_2\omega_1 - \\
& \frac{1}{2}\omega_2\omega_3v^2\omega_4\omega_1 + 2c_s^2\omega_2^2\omega_3v^2 + 4c_s^2\omega_2\omega_3v^2\omega_4\omega_1 + u^2\omega_3v\omega_4\omega_1^2 - u^2\omega_4\omega_1^2 - \frac{1}{2}\omega_2\omega_3v - \omega_2u^2\omega_1^2 - 2c_s^2\omega_2^2\omega_3v^2\omega_1 - \\
& \omega_2u^2\omega_3v\omega_1^2 + 3v\omega_4\omega_1 - c_s^2\omega_2\omega_3v\omega_1^2 + 5u^2\omega_3^2 - 3c_s^2\omega_3\omega_4 + \frac{1}{2}\omega_3v^2\omega_4 + 4c_s^2u^2\omega_3\omega_4\omega_1 - 4\omega_2u^2\omega_3^2v^2 + \\
& 7u^2\omega_3\omega_4\omega_1 + 2\omega_2u^2v^2\omega_4\omega_1^2 - \frac{1}{2}c_s^2\omega_3v\omega_4\omega_1^2 - 5u^2\omega_3v\omega_4 - 2c_s^2\omega_3v\omega_4^2 + c_s^2\omega_2\omega_3\omega_4 - \frac{1}{2}\omega_2u^2\omega_3\omega_4 - \omega_2^2u^2\omega_3v - \\
& 4u^2v\omega_4^2\omega_1 - \frac{1}{2}\omega_2v^2\omega_4\omega_1^2 + \frac{3}{2}c_s^2\omega_2\omega_4\omega_1 - c_s^2\omega_2^2\omega_3v\omega_1 + \omega_2u^2\omega_4\omega_1 + 2\omega_2v^2 + \frac{1}{2}\omega_3\omega_4\omega_1 + \omega_3v\omega_4 + \frac{1}{2}c_s^2\omega_3^2\omega_4 - \\
& \frac{1}{2}\omega_2\omega_3 + 3\omega_2u^2\omega_3v\omega_4\omega_1 - \frac{1}{2}u^2\omega_3\omega_4^2\omega_1 - c_s^2\omega_2\omega_3v\omega_4\omega_1 - \frac{3}{2}c_s^2\omega_4\omega_1 + \omega_3 + 10u^2v\omega_4\omega_1 + u^2\omega_3\omega_1^2 + \\
& 2c_s^2\omega_2u^2\omega_3^2\omega_4 + \frac{1}{2}\omega_2\omega_3v\omega_4\omega_1 + 2c_s^2\omega_3v^2\omega_4^2 - \frac{1}{2}c_s^2\omega_2\omega_3^2\omega_1 + c_s^2\omega_4 + \frac{3}{2}v^2\omega_4\omega_1 + \omega_2v^2\omega_1^2 - \frac{1}{2}u^2\omega_3\omega_4^2 - \\
& \frac{1}{2}\omega_2u^2\omega_3^2\omega_1 + \frac{1}{2}\omega_4\omega_1^2 - 2c_s^2u^2\omega_3^2\omega_4 + 4u^2v^2\omega_4^2\omega_1 + \frac{1}{2}\omega_2v\omega_4\omega_1^2 + 5u^2\omega_3^2v\omega_4 + u^2\omega_3^2v\omega_4\omega_1 + 2u^2\omega_1^2 + \\
& c_s^2\omega_3^2\omega_1 - 10\omega_2u^2v\omega_1 - \frac{1}{2}u^2\omega_3^2\omega_4\omega_1 - 2\omega_2u^2v\omega_4\omega_1^2 + c_s^2\omega_3v\omega_4\omega_1^2 - \frac{5}{2}\omega_2u^2\omega_3^2 + \frac{1}{2}c_s^2\omega_2\omega_3^2 - \frac{3}{2}\omega_2v\omega_4\omega_1 - \\
& 2\omega_2u^2\omega_3v^2\omega_1 - 4c_s^2\omega_2\omega_3v^2\omega_4 + \frac{1}{2}\omega_2\omega_3\omega_1 + 6u^2\omega_1 - c_s^2\omega_2^2v\omega_4 + \frac{1}{2}\omega_2\omega_3v^2\omega_4 + 4\omega_2^2u^2v^2\omega_1 - \frac{1}{2}c_s^2\omega_3^2\omega_4\omega_1 + \\
& 2\omega_2u^2v\omega_4\omega_1 - 6c_s^2\omega_3v\omega_4\omega_1 + 2u^2\omega_3v\omega_4^2\omega_1 + u^2\omega_4^2\omega_1 - \frac{3}{2}c_s^2\omega_2\omega_3 - \omega_3v\omega_4\omega_1 + \frac{3}{2}\omega_2u^2\omega_3 + 4\omega_2u^2\omega_3v^2\omega_4 - \\
& \frac{3}{2}\omega_4\omega_1 - 3\omega_2v^2\omega_1 + \frac{5}{2}u^2\omega_3\omega_4 - c_s^2\omega_2\omega_3^2v\omega_1 - \frac{1}{2}v^2\omega_4\omega_1^2 - \omega_2u^2\omega_3^2v\omega_1 - 2v\omega_4 - 2c_s^2u^2\omega_4\omega_1^2 - 4u^2\omega_3v^2\omega_4\omega_1 - \\
& 2c_s^2\omega_3v^2\omega_4^2\omega_1 - \frac{1}{2}c_s^2\omega_3\omega_4^2\omega_1 - 5c_s^2\omega_2\omega_3v + 5\omega_2u^2\omega_3v - 2\omega_2u^2\omega_3^2v\omega_4 + \omega_4 + \frac{1}{2}c_s^2\omega_4\omega_1^2 - 12u^2\omega_3\omega_1 - \\
& \omega_2v^2\omega_4 + 2u^2v\omega_4\omega_1^2 - 2u^2\omega_3v^2\omega_4^2 - \frac{1}{2}c_s^2\omega_2\omega_4\omega_1^2 + 2c_s^2\omega_2u^2\omega_4\omega_1^2 + 8\omega_2u^2\omega_3v^2\omega_1 + \omega_2v + 3\omega_1 + \omega_2\omega_3v^2\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_4],t-3\delta_t} = & 3 - \frac{1}{2}\omega_2\omega_4\omega_1 + \frac{1}{2}\omega_4^2 + 4\omega_2v^2\omega_4\omega_1 + \omega_2v\omega_4 + 5\omega_3\omega_1 + \omega_2^2v - 2\omega_2^2v^2\omega_1 + v\omega_4\omega_1^2 - 7\omega_2\omega_3v\omega_1 - \\
& 2\omega_3v^2\omega_4^2 - \frac{1}{2}\omega_2\omega_1^2 - \omega_2\omega_3v\omega_4 + \frac{1}{2}\omega_2\omega_3^2\omega_1 - 2\omega_3v\omega_4^2\omega_1 + 3\omega_3\omega_4 + \frac{1}{2}\omega_2\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_4^2\omega_1 + 6\omega_2v\omega_1 + \omega_1^2 - \\
& \omega_2v\omega_1^2 - 2v^2\omega_4^2\omega_1 + \omega_3^2v\omega_4 - \frac{3}{2}\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_1 + 2v^2\omega_4^2 + 2\omega_2\omega_1 - 4\omega_2\omega_3v^2\omega_4\omega_1 - \omega_3^2v\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4^2 + \\
& 6\omega_2\omega_3v + \frac{1}{2}\omega_3\omega_4\omega_1 + 2\omega_2^2v^2 + 2\omega_2^2\omega_3v^2\omega_1 - \omega_3\omega_1^2 - 6v\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_4 + \omega_2\omega_3v\omega_1^2 + \omega_2^2\omega_3v\omega_1 - \omega_2\omega_3^2v - \\
& \frac{7}{2}\omega_3\omega_4\omega_1 - 6\omega_3v\omega_4 + 2\omega_2\omega_3 + 2v\omega_4^2\omega_1 - 4\omega_3 + \omega_2\omega_3v\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_1^2 - 2v\omega_4^2 - \omega_2^2\omega_3v + \frac{1}{2}\omega_2\omega_3\omega_1^2 - \\
& \omega_3v\omega_4\omega_1^2 - \omega_2v\omega_4\omega_1 - \frac{5}{2}\omega_2\omega_3\omega_1 + 4\omega_2\omega_3v^2\omega_4 - \frac{1}{2}\omega_3^2\omega_4 + 7\omega_3v\omega_4\omega_1 + \omega_2\omega_3^2v\omega_1 + 3\omega_4\omega_1 + 5v\omega_4 - 2\omega_2\omega_3v^2 + \\
& \omega_3^2 + 2\omega_3v^2\omega_4^2\omega_1 - \frac{5}{2}\omega_4 - 4\omega_2v^2\omega_4 + \frac{1}{2}\omega_3\omega_4\omega_1^2 - \omega_3^2\omega_1 - 5\omega_2v - 4\omega_1 - \frac{1}{2}\omega_2\omega_3\omega_4 + 2\omega_3v\omega_4^2 - \frac{1}{2}\omega_2\omega_3^2 - \omega_2^2v\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l,y}^{[\mu_1],t-3\delta_t} = & -1 + \frac{1}{2}\omega_2\omega_4\omega_1 - \frac{1}{2}\omega_2^2u^2\omega_3 + \frac{1}{2}c_s^2\omega_3\omega_4\omega_1 + \frac{1}{2}u\omega_4^2\omega_1 - \frac{1}{2}c_s^2\omega_2\omega_3\omega_4^2 + \frac{1}{2}\omega_2u^2\omega_3\omega_4^2 - 5\omega_2u^2\omega_1 + \\
& u\omega_3\omega_4 - 2u^2\omega_3 - 3u^3\omega_3\omega_4\omega_1 - \omega_2^2u^2\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_3\omega_4^2 + 2u\omega_1 - \frac{1}{2}\omega_2u^2\omega_3\omega_4\omega_1 + \omega_2u\omega_3 - \frac{1}{2}c_s^2\omega_2\omega_3\omega_4\omega_1 + \\
& \frac{1}{2}c_s^2\omega_2^2\omega_3 - 5u^2\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4 - \omega_2u^3\omega_3^2\omega_4 - u^3\omega_3^2 - \frac{1}{2}u^2\omega_3^2\omega_4 - \frac{1}{2}c_s^2\omega_3^2 + 2\omega_2u^3\omega_1^2 + \frac{1}{2}\omega_2^2u^2\omega_3\omega_1 + \\
& \frac{1}{2}\omega_2u^2\omega_3\omega_1 - 2\omega_2u^3\omega_4\omega_1^2 + 2c_s^2\omega_3 + \frac{1}{2}c_s^2\omega_2\omega_3\omega_1 + \omega_2 + 3\omega_2u\omega_4\omega_1 + 3\omega_2u^3\omega_3\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_3\omega_1 + \\
& c_s^2\omega_2u\omega_3\omega_4 - \frac{1}{2}\omega_2\omega_1 + 3u^3\omega_3\omega_1 + u^2\omega_4\omega_1^2 + \omega_2u^2\omega_4\omega_1^2 - \omega_2u^2\omega_4\omega_1 + \frac{1}{2}u^2\omega_3^2 - \frac{5}{2}c_s^2\omega_3\omega_4 - \omega_2\omega_4 + \\
& \frac{1}{2}u^2\omega_3\omega_4\omega_1 + 3c_s^2\omega_2\omega_3\omega_4 - c_s^2u\omega_3^2\omega_4 - 3\omega_2u^2\omega_3\omega_4 + 6\omega_2u^2\omega_4\omega_1 + u^3\omega_3^2\omega_4 + \frac{1}{2}c_s^2\omega_3^2\omega_4 + c_s^2\omega_2u\omega_3\omega_1 - \\
& \frac{1}{2}\omega_2\omega_3 + \frac{1}{2}\omega_3 + \frac{1}{2}\omega_2u^2\omega_3^2\omega_4 - \frac{1}{2}c_s^2\omega_2\omega_3^2\omega_4 - \frac{1}{2}u^2\omega_3\omega_4 - c_s^2u\omega_3\omega_1 - \frac{1}{2}\omega_2u\omega_4\omega_1 - \omega_2u\omega_3\omega_4 - \\
& c_s^2\omega_2u\omega_3\omega_4\omega_1 - u^2\omega_1^2 - \frac{1}{2}c_s^2\omega_2^2\omega_3\omega_4 - \frac{1}{2}\omega_2u^2\omega_3^2 + \frac{1}{2}c_s^2\omega_2\omega_3^2 + 4u^2\omega_1 + u^2\omega_4^2\omega_1 - \frac{5}{2}c_s^2\omega_2\omega_3 + c_s^2u\omega_3^2 + \\
& \frac{5}{2}\omega_2u^2\omega_3 - \frac{1}{2}\omega_2u\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_1 + \frac{5}{2}u^2\omega_3\omega_4 - c_s^2\omega_2\omega_3\omega_3^2 + \omega_2^2u^2\omega_1 - \frac{5}{2}u\omega_4\omega_1 + \frac{1}{2}\omega_2u^2\omega_3\omega_4 + \omega_4 + \omega_2u^3\omega_3^2 - \\
& \frac{1}{2}u^2\omega_3\omega_1 + 2u^3\omega_4\omega_1^2 + c_s^2u\omega_3\omega_4\omega_1 - 2u^3\omega_1^2 - 3\omega_2u^3\omega_3\omega_1 - \omega_2u^2\omega_4\omega_1^2 - \frac{5}{2}\omega_2u\omega_1 + \frac{1}{2}\omega_2\omega_3\omega_4 - \omega_3,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l,y}^{[\mu_4],t-3\delta_t} = & 3 - \frac{5}{2}\omega_2\omega_4\omega_1 + \omega_4^2 - \omega_4\omega_1 + \frac{1}{2}\omega_3\omega_1 - 6u\omega_3\omega_4 - \omega_2\omega_4^2 + \frac{1}{2}\omega_2\omega_3^2\omega_4 - 5u\omega_1 + u\omega_3\omega_1 - 4\omega_2u^2\omega_3\omega_4\omega_1 - \\
& \omega_2^2u\omega_3\omega_4 - 6\omega_2u\omega_3 + 3\omega_3\omega_4 + \frac{1}{2}\omega_2\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_4^2\omega_1 - 2u^2\omega_3^2\omega_4 + \frac{1}{2}\omega_2^2\omega_3\omega_4\omega_1 + \omega_2u\omega_4\omega_1^2 - \omega_2^2u\omega_1 + \\
& 4\omega_2u^2\omega_3\omega_1 + \omega_2^2 - 4\omega_2 - 7\omega_2u\omega_4\omega_1 + \omega_2^2 + 2\omega_2\omega_1 - 2\omega_2u\omega_3^2\omega_4 + 2\omega_2u\omega_1^2 - \frac{1}{2}\omega_3\omega_4^2 - 2u^2\omega_4\omega_1^2 - 2\omega_2u^2\omega_1^2 + \\
& 2u^2\omega_3^2 + u\omega_3\omega_4^2 - \frac{1}{2}\omega_2^2\omega_3\omega_4 - \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 - \frac{1}{2}\omega_2u^2\omega_3^2 + \frac{1}{2}c_s^2\omega_2\omega_3^2 + 4u^2\omega_1 + u^2\omega_4^2\omega_1 - \frac{5}{2}c_s^2\omega_2\omega_3 + c_s^2u\omega_3^2 + \\
& 3\omega_2\omega_3 - 2u\omega_3^2 - u\omega_4\omega_1^2 - \frac{5}{2}\omega_3 + 2\omega_2u^2\omega_3^2\omega_4 + \omega_2u\omega_4\omega_1^2 + 7\omega_2u\omega_3\omega_4 - \frac{1}{2}\omega_2^2\omega_1 + 2u^2\omega_1^2 - 2\omega_2u^2\omega_3^2 + \\
& \omega_2u\omega_3\omega_4\omega_1 - \omega_2u\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_3\omega_1 - \frac{1}{2}\omega_3^2\omega_4 + \frac{1}{2}\omega_2^2\omega_4\omega_1 + \omega_2^2u\omega_4\omega_1 + 2\omega_4\omega_1 + 6u\omega_4\omega_1 + \frac{1}{2}\omega_3^2 + \omega_2^2u\omega_3 + \\
& \frac{1}{2}\omega_2\omega_4^2\omega_1 - 4\omega_4 - 4u^2\omega_3\omega_1 - u\omega_3\omega_4\omega_1 + 2\omega_2u^2\omega_4\omega_1^2 + 6\omega_2u\omega_1 - \frac{3}{2}\omega_1 - \frac{7}{2}\omega_2\omega_3\omega_4 + 5u\omega_3 + 2u\omega_3^2\omega_4 - \frac{1}{2}\omega_2\omega_3^2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_1],t-3\delta_t} = & -2 + 3\omega_2\omega_4\omega_1 - \omega_2^2u^2\omega_3 + \omega_3v^2\omega_4\omega_1 - 4\omega_2u^2\omega_3^2v^2\omega_4 - c_s^2\omega_3\omega_4\omega_1 + 16\omega_2u^2v^2\omega_4\omega_1 + 4u^2\omega_3v^2\omega_4^2\omega_1 - \\
& 3\omega_2v^2\omega_4\omega_1 + 4\omega_2^2u^2\omega_3v^2 - \omega_3\omega_1 - 4\omega_2u^2\omega_1 + 2\omega_2\omega_3v^2 - u^2\omega_3 + \omega_2\omega_1^2 + 8\omega_2u^2v^2\omega_1^2 - 4u^2v^2\omega_4\omega_1^2 - \\
& 8\omega_2u^2\omega_3\omega_4\omega_1 + c_s^2\omega_2\omega_3\omega_4\omega_1 + 8c_s^2\omega_2u^2\omega_3\omega_4\omega_1 + c_s^2\omega_2^2\omega_3 - \omega_3\omega_4 + 2c_s^2\omega_2\omega_4 - \omega_2\omega_3\omega_4\omega_1 - 4u^2\omega_3^2\omega_4 + \\
& 2v^2\omega_4 - \omega_1^2 + 10\omega_2u^2\omega_3\omega_1 + c_s^2\omega_3 + 2c_s^2\omega_2\omega_3\omega_1 + 2\omega_2 - c_s^2\omega_3\omega_1 - 4u^2\omega_3^2v^2\omega_4 - 3\omega_2\omega_1 + \omega_2\omega_3v^2\omega_4\omega_1 - \\
& 4c_s^2\omega_2^2\omega_3v^2 - 8c_s^2\omega_2\omega_3v^2\omega_4\omega_1 - 4u^2\omega_4\omega_1^2 - 4\omega_2u^2\omega_1^2 + 4c_s^2\omega_2^2\omega_3v^2\omega_1 + 4u^2\omega_3^2 + c_s^2\omega_3\omega_4 - 2\omega_2\omega_4 - \omega_3v^2\omega_4 -
\end{aligned}$$

$$\begin{aligned}
& 8c_s^2 u^2 \omega_3 \omega_4 \omega_1 + 8\omega_2 u^2 \omega_3^2 v^2 - \omega_2 \omega_4 \omega_1^2 + 8u^2 \omega_3 \omega_4 \omega_1 - 4\omega_2 u^2 v^2 \omega_4 \omega_1^2 - c_s^2 \omega_2 \omega_3 \omega_4 + \omega_2 v^2 \omega_4 \omega_1^2 - 3c_s^2 \omega_2 \omega_4 \omega_1 - \\
& 4\omega_2 v^2 + \omega_3 \omega_4 \omega_1 - c_s^2 \omega_2^2 \omega_3 \omega_1 - \omega_2 \omega_3 + 3c_s^2 \omega_4 \omega_1 + \omega_3 + 4\omega_2 u^2 \omega_3^2 \omega_4 - 4c_s^2 \omega_2 u^2 \omega_3^2 \omega_4 - 4c_s^2 \omega_3 v^2 \omega_4^2 - 2c_s^2 \omega_4 - \\
& 3v^2 \omega_4 \omega_1 - 2\omega_2 v^2 \omega_1^2 + \omega_4 \omega_1^2 + 4c_s^2 u^2 \omega_3^2 \omega_4 - 8u^2 v^2 \omega_4^2 \omega_1 + 4u^2 \omega_1^2 - 4\omega_2 u^2 \omega_3^2 + 4\omega_2^2 u^2 \omega_3 v^2 \omega_1 + 8c_s^2 \omega_2 \omega_3 v^2 \omega_4 + \\
& \omega_2 \omega_3 \omega_1 + 2u^2 \omega_1^2 - \omega_2 \omega_3 v^2 \omega_4 - 8\omega_2^2 u^2 v^2 \omega_1 - 2c_s^2 \omega_2 \omega_3 + 2\omega_2 u^2 \omega_3^2 - 8\omega_2 u^2 \omega_3 v^2 \omega_4 - 3\omega_4 \omega_1 + 6\omega_2 v^2 \omega_1 + v^2 \omega_4 \omega_1^2 - \\
& \omega_2^2 u^2 \omega_3 \omega_1 + 4c_s^2 u^2 \omega_4 \omega_1^2 + 2\omega_2^2 u^2 \omega_1 + 8u^2 \omega_3 v^2 \omega_4 \omega_1 + 4c_s^2 \omega_3 v^2 \omega_4^2 \omega_1 + 2\omega_4 - c_s^2 \omega_4 \omega_1^2 - 9u^2 \omega_3 \omega_1 + 2\omega_2 v^2 \omega_4 + \\
& 4u^2 \omega_3 v^2 \omega_4^2 + c_s^2 \omega_2 \omega_4 \omega_1^2 - 4c_s^2 \omega_2 u^2 \omega_4 \omega_1^2 - 16\omega_2 u^2 \omega_3 v^2 \omega_1 + 4\omega_2 u^2 \omega_4 \omega_1^2 + 3\omega_1 + \omega_2 \omega_3 \omega_4 - 2\omega_2 \omega_3 v^2 \omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_4],t-3\delta_t} = & 3 - 3\omega_2 \omega_4 \omega_1 + \omega_2^2 \omega_3 \omega_1 - 8\omega_2 v^2 \omega_4 \omega_1 + 2\omega_3 \omega_1 + 4\omega_2^2 v^2 \omega_1 + 4\omega_3 v^2 \omega_4^2 - \omega_2 \omega_1^2 + 8\omega_2 u^2 \omega_3 \omega_4 \omega_1 + \\
& \omega_3 \omega_4 + \omega_2 \omega_3 \omega_4 \omega_1 + 4u^2 \omega_3^2 \omega_4 + \omega_1^2 - 8\omega_2 u^2 \omega_3 \omega_1 + 4v^2 \omega_4^2 \omega_1 + \omega_2^2 - 4\omega_2 - 4v^2 \omega_4^2 + 5\omega_2 \omega_1 + \\
& 8\omega_2 \omega_3 v^2 \omega_4 \omega_1 + 4u^2 \omega_4 \omega_1^2 + 4\omega_2 u^2 \omega_1^2 - 4\omega_2^2 v^2 - 4\omega_2^2 \omega_3 v^2 \omega_1 - 4u^2 \omega_3^2 - \omega_2^2 \omega_3 + 2\omega_2 \omega_4 + \omega_2 \omega_4 \omega_1^2 - \\
& 8u^2 \omega_3 \omega_4 \omega_1 - \omega_3 \omega_4 \omega_1 + 3\omega_2 \omega_3 - 2\omega_3 - 4\omega_2 u^2 \omega_3^2 \omega_4 - \omega_4 \omega_1^2 - \omega_2^2 \omega_1 - 4u^2 \omega_1^2 + 4\omega_2 u^2 \omega_3^2 - 3\omega_2 \omega_3 \omega_1 - \\
& 8\omega_2 \omega_3 v^2 \omega_4 + 3\omega_4 \omega_1 + 4\omega_2^2 \omega_3 v^2 - 4\omega_3 v^2 \omega_4^2 \omega_1 - 2\omega_4 + 8u^2 \omega_3 \omega_1 + 8\omega_2 v^2 \omega_4 - 4\omega_2 u^2 \omega_4 \omega_1^2 - 4\omega_1 - \omega_2 \omega_3 \omega_4,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l,y}^{[\mu_1],t-3\delta_t} = & -1 + \frac{1}{2}\omega_2 \omega_4 \omega_1 - \frac{1}{2}\omega_2^2 u^2 \omega_3 + \frac{1}{2}c_s^2 \omega_3 \omega_4 \omega_1 - \frac{1}{2}u\omega_4^2 \omega_1 - \frac{1}{2}c_s^2 \omega_2 \omega_3 \omega_4^2 + \frac{1}{2}\omega_2 u^2 \omega_3 \omega_4^2 - 5\omega_2 u^2 \omega_1 - \\
& u\omega_3 \omega_4 - 2u^2 \omega_3 + 3u^3 \omega_3 \omega_4 \omega_1 - \omega_2^2 u^2 \omega_4 \omega_1 + \frac{1}{2}c_s^2 \omega_3 \omega_4^2 - 2u\omega_1 - \frac{1}{2}\omega_2 u^2 \omega_3 \omega_4 \omega_1 - \omega_2 u\omega_3 - \frac{1}{2}c_s^2 \omega_2 \omega_3 \omega_4 \omega_1 + \\
& \frac{1}{2}c_s^2 \omega_2^2 \omega_3 - 5u^2 \omega_4 \omega_1 - \frac{1}{2}\omega_3 \omega_4 + \omega_2 u^3 \omega_3^2 \omega_4 + u^3 \omega_3^2 - \frac{1}{2}u^2 \omega_3^2 \omega_4 - \frac{1}{2}c_s^2 \omega_3^2 - 2\omega_2 u^3 \omega_1^2 - \frac{1}{2}\omega_2^2 u\omega_1 + \\
& \frac{1}{2}\omega_2 u^2 \omega_3 \omega_1 + 2\omega_2 u^3 \omega_4 \omega_1^2 + 2c_s^2 \omega_3 + \frac{1}{2}c_s^2 \omega_2 \omega_3 \omega_1 + \omega_2 - 3\omega_2 u\omega_4 \omega_1 - 3\omega_2 u^3 \omega_3 \omega_4 \omega_1 - \frac{1}{2}c_s^2 \omega_3 \omega_1 - \\
& c_s^2 \omega_2 u\omega_3^2 \omega_4 - \frac{1}{2}\omega_2 \omega_1 - 3u^3 \omega_3 \omega_1 + u^2 \omega_4 \omega_1^2 + \omega_2 u^2 \omega_2^2 - \omega_2 u^2 \omega_4^2 \omega_1 + \frac{1}{2}u^2 \omega_3^2 - \frac{5}{2}c_s^2 \omega_3 \omega_4 - \omega_2 \omega_4 + \\
& \frac{1}{2}u^2 \omega_3 \omega_4 \omega_1 + 3c_s^2 \omega_2 \omega_3 \omega_4 + c_s^2 u\omega_3^2 \omega_4 - 3\omega_2 u^2 \omega_3 \omega_4 + 6\omega_2 u^2 \omega_4 \omega_1 - u^3 \omega_3^2 \omega_4 + \frac{1}{2}c_s^2 \omega_3^2 \omega_4 - c_s^2 \omega_2 u\omega_3 \omega_1 - \\
& \frac{1}{2}\omega_2 \omega_3 + \frac{1}{2}\omega_3 + \frac{1}{2}\omega_2 u^2 \omega_3^2 \omega_4 - \frac{1}{2}c_s^2 \omega_2 \omega_3^2 \omega_4 - \frac{1}{2}u^2 \omega_3 \omega_4^2 + c_s^2 u\omega_3 \omega_1 + \frac{1}{2}\omega_2 u\omega_4 \omega_1 + \omega_2 u\omega_3 \omega_4 + \\
& c_s^2 \omega_2 u\omega_3 \omega_4 \omega_1 - u^2 \omega_1^2 - \frac{1}{2}c_s^2 \omega_2^2 \omega_3 \omega_4 - \frac{1}{2}\omega_2 u^2 \omega_3^2 + \frac{1}{2}c_s^2 \omega_2 \omega_3^2 + 4u^2 \omega_1 + u^2 \omega_4 \omega_1^2 - \frac{5}{2}c_s^2 \omega_2 \omega_3 - c_s^2 u\omega_3^2 + \\
& \frac{5}{2}\omega_2 u^2 \omega_3 + \frac{1}{2}\omega_2^2 u\omega_4 \omega_1 - \frac{1}{2}\omega_4 \omega_1 + \frac{5}{2}u^2 \omega_3 \omega_4 + c_s^2 \omega_2 u\omega_3^2 + \omega_2^2 u^2 \omega_1 + \frac{5}{2}u\omega_4 \omega_1 + \frac{1}{2}\omega_2 u^2 \omega_3 \omega_4 + \omega_4 - \omega_2 u^3 \omega_3^2 - \\
& \frac{1}{2}u^2 \omega_3 \omega_1 - 2u^3 \omega_4 \omega_1^2 - c_s^2 u\omega_3 \omega_4 \omega_1 + 2u^3 \omega_1^2 + 3\omega_2 u^3 \omega_3 \omega_1 - \omega_2 u^2 \omega_4 \omega_1^2 + \frac{5}{2}\omega_2 u\omega_1 + \frac{1}{2}\omega_1 + \frac{1}{2}\omega_2 \omega_3 \omega_4 + u\omega_3,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l,y}^{[\mu_4],t-3\delta_t} = & 3 - \frac{5}{2}\omega_2 \omega_4 \omega_1 + \omega_4^2 + u\omega_4^2 \omega_1 + \frac{1}{2}\omega_3 \omega_1 + 6u\omega_3 \omega_4 - \omega_2 \omega_4^2 + \frac{1}{2}\omega_2 \omega_3^2 \omega_4 + 5u\omega_1 - u\omega_3 \omega_1 - 4\omega_2 u^2 \omega_3 \omega_4 \omega_1 + \\
& \omega_2^2 u\omega_3 \omega_4 + 6\omega_2 u\omega_3 + 3\omega_3 \omega_4 + \frac{1}{2}\omega_2 \omega_3 \omega_4 \omega_1 - \frac{1}{2}\omega_4^2 \omega_1 - 2u^2 \omega_3^2 \omega_4 + \frac{1}{2}\omega_2^2 \omega_3 \omega_4 - \omega_2 u\omega_4 \omega_1^2 + \omega_2^2 u\omega_1 + \\
& 4\omega_2 u^2 \omega_3 \omega_1 + \omega_2^2 - 4\omega_2 + 7\omega_2 u\omega_4 \omega_1 - \omega_2^2 + 2\omega_2 \omega_1 + 2\omega_2 u\omega_3^2 \omega_4 - 2\omega_2 u\omega_3^2 - \frac{1}{2}\omega_3 \omega_4^2 - 2u^2 \omega_4 \omega_1^2 - 2\omega_2 u^2 \omega_1^2 + \\
& 2u^2 \omega_3^2 - u\omega_3 \omega_4^2 - \frac{1}{2}\omega_2^2 \omega_3 \omega_3 + 5\omega_2 \omega_4 + 4u^2 \omega_3 \omega_4 \omega_1 + \omega_2 u\omega_1^2 - \frac{1}{2}\omega_3 \omega_4 \omega_1 - \omega_2 \omega_4^2 + \frac{1}{2}\omega_2 \omega_3 \omega_4^2 + \omega_2 u\omega_3 \omega_1 + \\
& 3\omega_2 \omega_3 + 2u\omega_3^2 + u\omega_4 \omega_1^2 - \frac{5}{2}\omega_3 + 2\omega_2 u^2 \omega_3^2 \omega_4 - \omega_2 u\omega_4 \omega_1 - 7\omega_2 u\omega_3 \omega_4 - \frac{1}{2}\omega_2^2 \omega_1 + 2u^2 \omega_1^2 - 2\omega_2 u^2 \omega_3^2 - \\
& \omega_2 u\omega_3 \omega_4 \omega_1 + \omega_2 u\omega_3 \omega_4^2 - \frac{1}{2}\omega_2 \omega_3 \omega_1 - \frac{1}{2}\omega_3^2 \omega_4 + \frac{1}{2}\omega_2^2 \omega_4 \omega_1 - \omega_2^2 u\omega_4 \omega_1 + 2\omega_4 \omega_1 - 6u\omega_4 \omega_1 + \frac{1}{2}\omega_3^2 - \omega_2^2 u\omega_3 + \\
& \frac{1}{2}\omega_2 \omega_4^2 \omega_1 - 4\omega_4 - 4u^2 \omega_3 \omega_1 + u\omega_3 \omega_4 \omega_1 + 2\omega_2 u^2 \omega_4 \omega_1^2 - 6\omega_2 u\omega_1 - \frac{3}{2}\omega_1 - \frac{7}{2}\omega_2 \omega_3 \omega_4 - 5u\omega_3 - 2u\omega_3^2 \omega_4 - \frac{1}{2}\omega_2 \omega_3^2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y+\delta_l}^{[\mu_1],t-3\delta_t} = & -2 + 3\omega_2 u^2 \omega_3^2 v - \frac{1}{2}\omega_3 v^2 \omega_4 \omega_1 + 2\omega_2 u^2 \omega_3^2 v^2 \omega_4 + \frac{7}{2}c_s^2 \omega_3 \omega_4 \omega_1 - 8\omega_2 u^2 v^2 \omega_4 \omega_1 - \frac{1}{2}u^2 \omega_3 \omega_4 \omega_1^2 - \\
& c_s^2 \omega_2 \omega_3^2 v - 2u^2 \omega_3 v^2 \omega_4 \omega_1 - 5c_s^2 \omega_3 v \omega_4 - 2u^2 \omega_3 v \omega_4^2 + \frac{3}{2}\omega_2 v^2 \omega_4 \omega_1 + u^2 \omega_3^2 \omega_1 - 2\omega_2 u^2 \omega_3 v^2 - \omega_2 v \omega_4 - \\
& \omega_3 \omega_1 - 3\omega_2 u^2 \omega_1 - \omega_2 \omega_3 v^2 - 10\omega_2 u^2 \omega_3 v \omega_1 - 6c_s^2 \omega_2 \omega_3 v \omega_1 - 3u^2 \omega_3 + v\omega_4 \omega_1^2 - \frac{1}{2}\omega_2 \omega_3 v \omega_1 + \frac{1}{2}c_s^2 \omega_3 \omega_4^2 + \\
& \frac{1}{2}\omega_2 \omega_1^2 + \frac{1}{2}\omega_2 \omega_3 v \omega_4 - 4\omega_2 u^2 v^2 \omega_1^2 + c_s^2 \omega_3 \omega_1^2 + 2u^2 v^2 \omega_4 \omega_1^2 + \omega_2^2 u^2 \omega_3 v \omega_1 - \frac{1}{2}\omega_2 u^2 \omega_3 \omega_4 \omega_1 - c_s^2 \omega_2 \omega_3 v \omega_4 - \\
& c_s^2 \omega_2 \omega_3 \omega_4 \omega_1 + \omega_2 u^2 \omega_3 v \omega_4 - 4c_s^2 \omega_2 u^2 \omega_3 \omega_4 \omega_1 + 14u^2 \omega_3 v \omega_4 \omega_1 - 5u^2 \omega_4 \omega_1 - \frac{1}{2}\omega_3 \omega_4 - 2\omega_2 u^2 v \omega_1 - \\
& 2c_s^2 \omega_3 v \omega_4 \omega_1 - c_s^2 \omega_2^2 \omega_3 v - c_s^2 \omega_2 \omega_4 + \frac{3}{2}\omega_2 v \omega_1 - \frac{1}{2}\omega_2 u^2 \omega_3 \omega_1^2 - \frac{5}{2}u^2 \omega_3^2 \omega_4 - \frac{1}{2}c_s^2 \omega_2 \omega_3 \omega_1^2 - c_s^2 \omega_3^2 - v^2 \omega_4 - \\
& \omega_1^2 - \frac{1}{2}\omega_2 v \omega_1^2 + 6\omega_2 u^2 \omega_3 \omega_1 + 3c_s^2 \omega_3 + 2c_s^2 \omega_2 \omega_3 \omega_1 + \omega_2 - 4c_s^2 \omega_3 \omega_1 - c_s^2 \omega_3^2 v \omega_4 + 2u^2 \omega_3^2 \omega_4 - \frac{3}{2}\omega_2 \omega_1 - \\
& \frac{1}{2}\omega_2 \omega_3 v^2 \omega_4 \omega_1 + 2c_s^2 \omega_2 \omega_3 v^2 + 4c_s^2 \omega_2 \omega_3 v^2 \omega_4 \omega_1 - u^2 \omega_3 v \omega_4 \omega_1^2 - u^2 \omega_4 \omega_1^2 + \frac{1}{2}\omega_2 \omega_3 v - \omega_2 u^2 \omega_1^2 - 2c_s^2 \omega_2 \omega_3 v^2 \omega_1 + \\
& \omega_2 u^2 \omega_3 v \omega_1^2 - 3v\omega_4 \omega_1 + c_s^2 \omega_2 \omega_3 v \omega_1^2 + 5u^2 \omega_3^2 - 3c_s^2 \omega_3 \omega_4 + \frac{1}{2}\omega_3 v^2 \omega_4 + 4c_s^2 u^2 \omega_3 \omega_4 \omega_1 - 4\omega_2 u^2 \omega_3 \omega_4^2 + \\
& 7u^2 \omega_3 \omega_4 \omega_1 + 2\omega_2 u^2 v^2 \omega_4 \omega_1^2 - \frac{1}{2}c_s^2 \omega_3 \omega_4 \omega_1^2 + 5u^2 \omega_3 v \omega_4 + 2c_s^2 \omega_3 v \omega_4^2 + c_s^2 \omega_2 \omega_3 \omega_4 - \frac{1}{2}\omega_2 u^2 \omega_3 \omega_4 + \omega_2^2 u^2 \omega_3 v + \\
& 4u^2 v \omega_4 \omega_1^2 - \frac{1}{2}\omega_2 v^2 \omega_4 \omega_1^2 + \frac{3}{2}c_s^2 \omega_2 \omega_3 \omega_4 \omega_1 + c_s^2 \omega_2 \omega_3^2 v \omega_1 + \omega_2 u^2 \omega_4 \omega_1 + 2\omega_2 v^2 + \frac{1}{2}\omega_3 \omega_4 \omega_1 - \omega_3 v \omega_4 + \frac{1}{2}c_s^2 \omega_3^2 \omega_4 - \\
& \frac{1}{2}\omega_2 \omega_3 - 3\omega_2 u^2 \omega_3 v \omega_4 \omega_1 - \frac{1}{2}u^2 \omega_3 \omega_4 \omega_1 + c_s^2 \omega_2 \omega_3 v \omega_4 \omega_1 - \frac{3}{2}c_s^2 \omega_4 \omega_1 + \omega_3 - 10u^2 v \omega_4 \omega_1 + u^2 \omega_3 \omega_4^2 + \\
& 2c_s^2 \omega_2 u^2 \omega_3^2 \omega_4 - \frac{1}{2}\omega_2 \omega_3 v \omega_4 \omega_1 + 2c_s^2 \omega_3 v^2 \omega_4^2 - \frac{1}{2}c_s^2 \omega_2 \omega_3^2 \omega_1 + c_s^2 \omega_4 + \frac{3}{2}v^2 \omega_4 \omega_1 + \omega_2 v^2 \omega_1^2 - \frac{1}{2}u^2 \omega_3 \omega_4^2 - \\
& \frac{1}{2}\omega_2 \omega_3^2 \omega_1 + \frac{1}{2}\omega_4 \omega_1^2 - 2c_s^2 u^2 \omega_3^2 \omega_4 + 4u^2 v^2 \omega_4 \omega_1^2 - \frac{1}{2}\omega_2 v \omega_4 \omega_1^2 - 5u^2 \omega_3^2 v \omega_4 - u^2 \omega_3^2 v \omega_4 \omega_1 + 2u^2 \omega_1^2 + \\
& c_s^2 \omega_3^2 \omega_1 + 10\omega_2 u^2 v \omega_1 - \frac{1}{2}u^2 \omega_3 \omega_4 \omega_1 + 2\omega_2 u^2 v \omega_4 \omega_1^2 - c_s^2 \omega_3 v \omega_4 \omega_1^2 - \frac{5}{2}\omega_2 u^2 \omega_3^2 + \frac{1}{2}c_s^2 \omega_2 \omega_3^2 + \frac{3}{2}\omega_2 v \omega_4 \omega_1 - \\
& 2\omega_2^2 u^2 \omega_3 v^2 \omega_1 - 4c_s^2 \omega_2 \omega_3 v^2 \omega_4 + \frac{1}{2}\omega_2 \omega_3 \omega_1 + 6u^2 \omega_1 + c_s^2 \omega_3 v \omega_4 + \frac{1}{2}\omega_2 \omega_3 v^2 \omega_4 + 4\omega_2^2 u^2 v^2 \omega_1 - \frac{1}{2}c_s^2 \omega_3^2 \omega_4 \omega_1 - \\
& 2\omega_2 u^2 v \omega_4 \omega_1 + 6c_s^2 \omega_3 v \omega_4 \omega_1 - 2u^2 \omega_3 v \omega_4 \omega_1^2 + u^2 \omega_4 \omega_1^2 - \frac{3}{2}c_s^2 \omega_2 \omega_3 + \omega_3 v \omega_4 \omega_1 + \frac{3}{2}\omega_2 u^2 \omega_3 + 4\omega_2 u^2 \omega_3 v^2 \omega_4 - \\
& \frac{3}{2}\omega_4 \omega_1 - 3\omega_2 v^2 \omega_1 + \frac{5}{2}u^2 \omega_3 \omega_4 + c_s^2 \omega_2 \omega_3 \omega_3 v \omega_1 - \frac{1}{2}v^2 \omega_4 \omega_1^2 + \omega_2 u^2 \omega_3^2 v \omega_1 + 2v \omega_4 - 2c_s^2 u^2 \omega_4 \omega_1^2 - 4u^2 \omega_3 v^2 \omega_4 \omega_1
\end{aligned}$$

$$2c_s^2\omega_3v^2\omega_4^2\omega_1 - \frac{1}{2}c_s^2\omega_3\omega_4^2\omega_1 + 5c_s^2\omega_2\omega_3v - 5\omega_2u^2\omega_3v + 2\omega_2u^2\omega_3^2vw_4 + \omega_4 + \frac{1}{2}c_s^2\omega_4\omega_1^2 - 12u^2\omega_3\omega_1 - \omega_2v^2\omega_4 - 2u^2vw_4\omega_1^2 - 2u^2\omega_3v^2\omega_4^2 - \frac{1}{2}c_s^2\omega_2\omega_4\omega_1^2 + 2c_s^2\omega_2u^2\omega_4\omega_1^2 + 8\omega_2u^2\omega_3v^2\omega_1 - \omega_2v + 3\omega_1 + \omega_2\omega_3v^2\omega_1,$$

$$\alpha_{x,y+\delta_l}^{[\mu_4],t-3\delta_t} = 3 - \frac{1}{2}\omega_2\omega_4\omega_1 + \frac{1}{2}\omega_4^2 + 4\omega_2v^2\omega_4\omega_1 - \omega_2vw_4 + 5\omega_3\omega_1 - \omega_2^2v - 2\omega_2^2v^2\omega_1 - vw_4\omega_1^2 + 7\omega_2\omega_3vw_1 - 2\omega_3v^2\omega_4^2 - \frac{1}{2}\omega_2\omega_1^2 + \omega_2\omega_3vw_4 + \frac{1}{2}\omega_2\omega_3^2\omega_1 + 2\omega_3v\omega_4^2\omega_1 + 3\omega_3\omega_4 + \frac{1}{2}\omega_2\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_4^2\omega_1 - 6\omega_2vw_1 + \omega_1^2 + \omega_2vw_1^2 - 2v^2\omega_4^2\omega_1 - \omega_3^2vw_4 - \frac{3}{2}\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_1 + 2v^2\omega_4^2 + 2\omega_2\omega_1 - 4\omega_2\omega_3v^2\omega_4\omega_1 + \omega_3^2vw_4\omega_1 - \frac{1}{2}\omega_3\omega_4^2 - 6\omega_2\omega_3v + \frac{1}{2}\omega_3\omega_4^2\omega_1 + 2\omega_2^2v^2 + 2\omega_2^2\omega_3v^2\omega_1 - \omega_3\omega_1^2 + 6vw_4\omega_1 + \frac{1}{2}\omega_2\omega_4 - \omega_2\omega_3vw_1^2 - \omega_2^2\omega_3vw_1 + \omega_2\omega_3^2v - \frac{7}{2}\omega_3\omega_4\omega_1 + 6\omega_3vw_4 + 2\omega_2\omega_3 - 2v\omega_4^2\omega_1 - 4\omega_3 - \omega_2\omega_3vw_4\omega_1 - \frac{1}{2}\omega_4\omega_1^2 + 2vw_4^2 + \omega_2^2\omega_3v + \frac{1}{2}\omega_2\omega_3\omega_1^2 + \omega_3v\omega_4\omega_1^2 + \omega_2v\omega_4\omega_1 - \frac{5}{2}\omega_2\omega_3\omega_1 + 4\omega_2\omega_3v^2\omega_4 - \frac{1}{2}\omega_3^2\omega_4 - 7\omega_3v\omega_4\omega_1 - \omega_2\omega_3^2vw_1 + 3\omega_4\omega_1 - 5vw_4 - 2\omega_2\omega_3v^2 + \omega_3^2 + 2\omega_3v^2\omega_4^2\omega_1 - \frac{5}{2}\omega_4 - 4\omega_2v^2\omega_4 + \frac{1}{2}\omega_3\omega_4\omega_1^2 - \omega_3^2\omega_1 + 5\omega_2v - 4\omega_1 - \frac{1}{2}\omega_2\omega_3\omega_4 - 2\omega_3vw_4^2 - \frac{1}{2}\omega_2\omega_3^2 + \omega_2^2\omega_1,$$

$$\alpha_{x,y}^{[\mu_4],t-4\delta_t} = 2 - 3\omega_2\omega_4\omega_1 + \omega_2^2u^2\omega_3 - 6c_s^2\omega_3\omega_4\omega_1 + u^2\omega_3\omega_4\omega_1^2 + c_s^2\omega_2\omega_3\omega_4^2 - u^2\omega_3^2\omega_1 - \omega_2u^2\omega_3\omega_4^2 + \omega_3\omega_1 + 10\omega_2u^2\omega_1 - \omega_2^2u^2\omega_3\omega_4\omega_1 + 4u^2\omega_3 + 2\omega_2^2u^2\omega_4\omega_1 - c_s^2\omega_3\omega_4^2 - \omega_2\omega_1^2 - c_s^2\omega_3\omega_1^2 + 15\omega_2u^2\omega_3\omega_4\omega_1 + 7c_s^2\omega_2\omega_3\omega_4\omega_1 - c_s^2\omega_2^2\omega_3 + 10u^2\omega_4\omega_1 + \omega_3\omega_4 + \omega_2\omega_3\omega_4\omega_1 + \omega_2u^2\omega_3\omega_1^2 + 5u^2\omega_3^2\omega_4 + c_s^2\omega_2\omega_3\omega_1^2 + c_s^2\omega_3^2 + \omega_1^2 - 14\omega_2u^2\omega_3\omega_1 - 4c_s^2\omega_3^2 - 6c_s^2\omega_2\omega_3\omega_1 - 2\omega_2 + 5c_s^2\omega_3\omega_1 + 3\omega_2\omega_1 - \omega_2u^2\omega_3\omega_4\omega_1^2 - c_s^2\omega_2\omega_3\omega_4\omega_1^2 + 2u^2\omega_4\omega_1^2 + 2\omega_2u^2\omega_1^2 + 2\omega_2u^2\omega_4\omega_1^2 - 5u^2\omega_3^2 + 5c_s^2\omega_3\omega_4 + 2\omega_2\omega_4 + \omega_2\omega_4\omega_1^2 - 14u^2\omega_3\omega_4\omega_1 + c_s^2\omega_3\omega_4\omega_1^2 - 6c_s^2\omega_2\omega_3\omega_4 + 6\omega_2u^2\omega_3\omega_4 - 12\omega_2u^2\omega_4\omega_1 - \omega_3\omega_4\omega_1 - c_s^2\omega_2^2\omega_4 + c_s^2\omega_2^2\omega_3\omega_1 + \omega_2\omega_3 + u^2\omega_3\omega_4\omega_1 - \omega_3 - 5\omega_2u^2\omega_3\omega_4 - u^2\omega_3\omega_1^2 + c_s^2\omega_2\omega_3\omega_4 + c_s^2\omega_2\omega_3\omega_1^2 + u^2\omega_3\omega_4^2 + \omega_2u^2\omega_3\omega_1 - \omega_4\omega_1^2 - c_s^2\omega_2\omega_3\omega_4\omega_1 - 2u^2\omega_1^2 + c_s^2\omega_2^2\omega_3\omega_4 - c_s^2\omega_3^2\omega_1 + u^2\omega_3\omega_4\omega_1 + 5\omega_2u^2\omega_3^2 - c_s^2\omega_2\omega_3^2 - \omega_2u^2\omega_3\omega_4\omega_1 - \omega_2\omega_3\omega_1 - 8u^2\omega_1 + c_s^2\omega_3^2\omega_4\omega_1 - 2u^2\omega_4\omega_1 + 5c_s^2\omega_2\omega_3 - 5\omega_2u^2\omega_3 - c_s^2\omega_2\omega_3\omega_4\omega_1^2 + 3\omega_4\omega_1 - 5u^2\omega_3\omega_4 + \omega_2^2u^2\omega_3\omega_1 - 2\omega_2^2u^2\omega_1 + c_s^2\omega_3\omega_4\omega_1 - \omega_2^2u^2\omega_3\omega_4 - c_s^2\omega_2\omega_3\omega_4\omega_1 - 2\omega_4 + 13u^2\omega_3\omega_1 - \omega_2u^2\omega_3\omega_4\omega_1 - 2\omega_2u^2\omega_4\omega_1^2 - 3\omega_1 - \omega_2\omega_3\omega_4,$$

$$\alpha_{x,y}^{[\mu_4],t-4\delta_t} = -4 + 7\omega_2\omega_4\omega_1 - \omega_4^2 - \omega_2^2\omega_3\omega_1 - 6\omega_3\omega_1 + \omega_2\omega_4^2 - \omega_2\omega_3^2\omega_4 + \omega_2\omega_1^2 - \omega_2\omega_3^2\omega_1 - 6\omega_3\omega_4 - 8\omega_2\omega_3\omega_4\omega_1 + \omega_4^2\omega_1 - \omega_2^2\omega_3\omega_4 - \omega_1^2 - \omega_2^2 + 5\omega_2 - \omega_3^2\omega_4\omega_1 - 6\omega_2\omega_1 + \omega_2\omega_3\omega_4\omega_1^2 + \omega_3\omega_4^2 - \omega_3\omega_4^2\omega_1 + \omega_3\omega_1^2 + \omega_2\omega_3 - 6\omega_2\omega_4 - \omega_2\omega_4\omega_1^2 + 7\omega_3\omega_4\omega_1 + \omega_2^2\omega_4 - \omega_2\omega_3\omega_4^2 - 6\omega_2\omega_3 + 5\omega_3 + \omega_4\omega_1^2 + \omega_2\omega_1 + \omega_2^2\omega_3\omega_4\omega_1 - \omega_2\omega_3\omega_1^2 + 7\omega_2\omega_3\omega_1 + \omega_2\omega_3\omega_4\omega_1 + \omega_3^2\omega_4 - \omega_2^2\omega_4\omega_1 - 6\omega_4\omega_1 - \omega_3^2 + \omega_2\omega_3\omega_4\omega_1 - \omega_2\omega_4\omega_1^2 + 5\omega_4 - \omega_3\omega_4\omega_1^2 + \omega_3^2\omega_1 + 5\omega_1 + 7\omega_2\omega_3\omega_4 + \omega_2\omega_3^2,$$

## 7.6 EFDE for $\mu_5$

$$\mu_{5,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_5],t-\ell\delta_t} \mu_{5,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x,y-\delta_l}^{[\mu_1],t} = 1 - \frac{1}{2}v^2\omega_4 - \frac{1}{2}\omega_2 + \omega_2v^2 + \frac{1}{2}c_s^2\omega_4 + vw_4 - \frac{1}{2}\omega_4 - \frac{1}{2}\omega_2v.$$

$$\alpha_{x,y+\delta_l}^{[\mu_1],t} = 1 - \frac{1}{2}v^2\omega_4 - \frac{1}{2}\omega_2 + \omega_2v^2 + \frac{1}{2}c_s^2\omega_4 - vw_4 - \frac{1}{2}\omega_4 + \frac{1}{2}\omega_2v.$$

$$\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} = -1 + \frac{1}{2}uv\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_3v\omega_4 + \frac{1}{2}\omega_2u^2\omega_1 + \frac{1}{2}uw_3\omega_4 + \frac{1}{2}u^2\omega_3 + \frac{1}{2}u\omega_1 + \omega_2u\omega_3v + \frac{1}{2}\omega_2u\omega_3 + \frac{1}{2}u^2\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_4 - \frac{1}{2}\omega_2vw_1 - \frac{1}{2}c_s^2\omega_3 + \frac{1}{2}\omega_2 - \frac{1}{4}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_3v + \frac{1}{2}vw_4\omega_1 + \frac{1}{4}c_s^2\omega_3\omega_4 + \frac{1}{2}u^2\omega_3vw_4 - \frac{1}{5}\omega_2uvw_1 + \frac{1}{2}\omega_3vw_4 - \frac{1}{4}\omega_2\omega_3 + \frac{1}{2}\omega_3 - u^2\omega_4\omega_1 + \omega_2u^2vw_1 - u^2\omega_1 + \frac{1}{4}c_s^2\omega_2\omega_3 - \frac{1}{4}\omega_2u^2\omega_3 - \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}u^2\omega_3\omega_4 - v\omega_4 - \frac{1}{4}u\omega_4\omega_1 - uw_3vw_4 + \frac{1}{2}c_s^2\omega_2\omega_3v - \frac{1}{2}\omega_2u^2\omega_3v + \frac{1}{2}\omega_4 + \omega_2v - \frac{1}{4}\omega_2u\omega_1 + \frac{1}{2}\omega_1 - uw_3,$$

$$\alpha_{x-\delta_l,y-\delta_l}^{[\mu_5],t-\delta_t} = 1 - uv\omega_4\omega_1 - \frac{1}{2}uw_3\omega_4 - uw_1 - \omega_2u\omega_3v - \frac{1}{2}\omega_2u\omega_3 + \frac{1}{4}\omega_3\omega_4 + \frac{1}{2}\omega_2v\omega_1 - \frac{1}{2}\omega_2 + \frac{1}{4}\omega_2\omega_1 + \frac{1}{2}\omega_2\omega_3v - \frac{1}{2}vw_4\omega_1 - \omega_2uvw_1 - \frac{1}{2}\omega_3vw_4 + \frac{1}{4}\omega_2\omega_3 - \frac{1}{2}\omega_3 + \frac{1}{4}\omega_4\omega_1 + vw_4 + \frac{1}{2}u\omega_4\omega_1 + uw_3vw_4 - \frac{1}{2}\omega_4 - \omega_2v + \frac{1}{2}\omega_2u\omega_1 - \frac{1}{2}\omega_1 + uw_3,$$



$$\begin{aligned}
& \frac{1}{2}uw_3v^2w_4^2 - \frac{1}{4}u^2w_3\omega_4\omega_1 + \frac{1}{2}u^2w_3vw_4 + \frac{1}{2}c_s^2w_3vw_4^2 - \frac{1}{4}c_s^2w_2w_3\omega_4 + 2\omega_2uvw_1 + c_s^2uw_3^2w_4 - \frac{1}{4}c_s^2w_2w_4\omega_1 - \\
& 3\omega_2v^2 - \frac{1}{2}c_s^2uw_4^2\omega_1 - \frac{1}{4}\omega_2w_3^2v - \frac{1}{2}\omega_3vw_4 - \frac{1}{4}c_s^2w_3^2\omega_4 + \frac{1}{4}\omega_2w_3 + c_s^2w_2vw_4 - c_s^2uw_3vw_4^2 + \\
& \frac{3}{4}c_s^2w_4\omega_1 - \frac{1}{2}\omega_3 - u^2vw_4\omega_1 - \frac{5}{2}c_s^2uw_3\omega_4 + \frac{3}{2}\omega_2w_3v^3\omega_4 - uv^3w_4^2\omega_1 - \frac{1}{2}\omega_2uv^2w_4\omega_1 + 5\omega_2uv^2\omega_1 + \frac{1}{4}w_3^2v^2\omega_4 - \\
& \frac{3}{2}c_s^2w_4 - \frac{3}{4}v^2w_4\omega_1 - c_s^2u^2w_3^2\omega_4 - 3\omega_2v^3\omega_4 + \frac{1}{2}c_s^2w_2w_3\omega_4 + w_2u^2vw_1 + \frac{3}{2}\omega_2v^3w_4\omega_1 + 2\omega_2uw_3^2v^2 + \\
& c_s^2w_2u\omega_3vw_4 + \frac{1}{2}uv^2w_4\omega_1^2 + w_2^2uw_3v^2 - w_2u^2vw_1^2 - u^2\omega_1 - \frac{1}{2}c_s^2w_2vw_4\omega_1 - \frac{1}{4}\omega_2w_3v^2\omega_4 + \frac{1}{2}c_s^2w_3vw_4\omega_1 - \\
& uw_3^2v^2\omega_4 - \frac{5}{2}uv^2w_4\omega_1 + \frac{1}{4}c_s^2w_2w_3 + w_2uw_3^2v - \frac{1}{4}\omega_2u^2w_3 + \frac{1}{2}uw_3v^2\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{3}{2}w_2v^2\omega_1 - \frac{1}{4}u^2w_3\omega_4 + \\
& \frac{1}{2}c_s^2w_4^2 + vw_4 - c_s^2u^2w_4\omega_1^2 - \frac{1}{2}\omega_2w_3v^2 + \frac{1}{4}uw_4\omega_1 + c_s^2uvw_4\omega_1 - 2u^2w_3v^2w_4\omega_1 + uw_3vw_4 + \frac{1}{2}c_s^2w_2w_3v - \\
& \frac{1}{2}w_2u^2w_3v - \frac{1}{2}\omega_4 + \frac{1}{2}u^2w_3\omega_1 - c_s^2vw_4^2 + \frac{1}{2}\omega_2v^2w_4 + \frac{1}{2}c_s^2uw_3\omega_4^2 - \frac{1}{2}c_s^2uw_3\omega_4\omega_1 - w_2uv^2\omega_1^2 + \frac{1}{4}uw_3\omega_4\omega_1 + \\
& 2w_2^2uw_3v^3 + 4w_2u^2w_3v^2\omega_1 - w_2^2w_3v^3 - \frac{1}{2}v^3w_4^2\omega_1 - \frac{1}{2}\omega_2w_3^2v^2 - \frac{3}{2}\omega_2v + \frac{1}{4}w_2uw_1 - \frac{1}{2}\omega_1 - \frac{1}{2}w_2w_3v^2\omega_1 + uw_3,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_5], t-2\delta_t} = & -2 + \frac{1}{4}\omega_2w_4\omega_1 + 6uvw_4\omega_1 - \frac{1}{2}w_4^2 + 2\omega_2u^2w_3^2v + 2w_2^2uv^2\omega_1 + \frac{1}{2}uw_4^2\omega_1 + w_2uvw_1^2 - 2\omega_2v^2w_4\omega_1 - w_2vw_4 - \frac{1}{2}w_3\omega_1 - \\
& w_2^2v - 4\omega_2u^2w_3vw_1 + 3uw_3\omega_4 + w_2^2v^2\omega_1 + \frac{1}{2}\omega_2w_3vw_1 + w_3v^2w_4^2 - uw_3vw_4\omega_1 + \frac{1}{2}\omega_2w_3vw_4 + 4uw_1 - uw_3\omega_1 + \\
& 6w_2uw_3v + 2w_2uw_3 + 2uv^2w_2\omega_1 + 4u^2w_3vw_4\omega_1 + 2uw_3^2vw_4 - \frac{3}{2}\omega_3w_4 + \frac{1}{4}w_4^2\omega_1 - 2\omega_2vw_1 + u^2w_3^2\omega_4 - 2w_2u^2w_3\omega_1 + \\
& v^2w_4^2\omega_1 - \frac{1}{2}\omega_3vw_4 + \omega_2 + \frac{1}{2}\omega_2w_4\omega_1 - 2v^2w_4^2 - uw_1^2 + w_2uvw_4\omega_1 - \frac{1}{2}\omega_2w_1 + 4w_2w_3v^2\omega_4 - w_2uw_3^2 + \frac{1}{4}w_3\omega_4^2 + \\
& u^2w_4\omega_1^2 - 3w_2w_3v + w_2u^2w_1^2 - 2w_2^2v^2 + 2vw_4\omega_1 - 2u^2w_3^2 - \frac{1}{2}uw_3w_4^2 - \frac{1}{2}\omega_2w_4 - uvw_4\omega_1^2 - 2uw_3v^2w_4^2 - 2u^2w_3\omega_4\omega_1 - \\
& 6w_2uw_1 + \frac{1}{2}\omega_2uw_1^2 + \frac{1}{2}\omega_2w_3^2v + \frac{1}{4}w_3\omega_4\omega_1 + 3w_3vw_4 + \frac{1}{2}\omega_2uw_3\omega_1 - w_2w_3 + w_2uw_3vw_1 - vw_4^2\omega_1 + 2uw_3^2 + \\
& 2uw_3vw_4^2 + \frac{1}{2}uw_4\omega_1^2 + 2w_3 - 4w_2uv^2w_4\omega_1 + 2vw_4^2 + \frac{1}{2}\omega_2w_3v - w_2uw_3vw_4 - w_2^2uw_3v - \frac{1}{2}\omega_2uw_3\omega_4 - 2u^2w_3^2vw_4 - \\
& 2u^2w_1^2 + w_2u^2w_3^2 + \frac{1}{2}\omega_2w_4\omega_1 - 2w_2^2uw_3v^2 + 2w_2u^2vw_1^2 + \frac{1}{2}\omega_2w_3\omega_1 - 2w_2w_3v^2\omega_4 + \frac{1}{4}w_3\omega_4 - 2w_2uw_3^2v - \\
& \frac{1}{2}w_3vw_4\omega_1 - w_4\omega_1 - 4vw_4 + w_2^2w_3v^2 - 3uw_4\omega_1 - 6uw_3vw_4 + w_2^2uvw_1 - \frac{1}{2}w_3^2 + 2w_4 - 2uvw_4^2\omega_1 + 4u^2w_3\omega_1 + \\
& 4w_2v^2w_4 - 2u^2vw_4\omega_1^2 + \frac{1}{2}uw_3\omega_4\omega_1 + 4w_2v - 2w_2uw_1 + w_1 + \frac{1}{4}w_2w_3\omega_4 - w_3vw_4^2 + \frac{1}{4}w_2w_3^2 + \frac{1}{2}w_2^2vw_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_1], t-2\delta_t} = & 1 + 2w_2u^2w_3^2v + \frac{1}{2}c_s^2w_3\omega_4\omega_1 + c_s^2w_3vw_4 + \omega_3\omega_1 - w_2u^2\omega_1 - 3w_2u^2w_3vw_1 + c_s^2w_2w_3vw_1 - u^2w_3 - \\
& w_2w_3vw_1 + 4w_2u^2v^2w_1^2 - 2u^2v^2w_4\omega_1^2 - u^2w_3vw_4\omega_1 - u^2w_4\omega_1 + \frac{1}{2}w_3\omega_4 + 2w_2vw_1 + \frac{1}{2}v^2\omega_4 - \frac{1}{2}\omega_2vw_1^2 + \\
& \frac{1}{2}w_2u^2w_3\omega_1 + c_s^2w_3 + \frac{1}{2}c_s^2w_2w_3\omega_1 - \frac{1}{2}\omega_2 - c_s^2w_3\omega_1 - 2u^2w_3^2v^2w_4 + \frac{1}{2}\omega_2w_1 + w_2w_3v - vw_4\omega_1 - \frac{1}{2}c_s^2w_3\omega_4 - \\
& 4c_s^2u^2w_3\omega_4\omega_1 + 4w_2u^2w_3^2v^2 + \frac{1}{2}u^2w_3\omega_4\omega_1 - u^2w_3v\omega_4 - w_2v^2 - \frac{1}{2}w_3\omega_4\omega_1 - w_3vw_4 + \frac{1}{2}\omega_2w_3 + c_s^2w_4\omega_1 - \\
& w_3 + 2u^2vw_4\omega_1 - \frac{1}{2}c_s^2w_4 - v^2w_4\omega_1 - w_2v^2w_1^2 + 2c_s^2u^2w_3^2\omega_4 - 2w_2u^2vw_1 + 2w_2u^2vw_1^2 - \frac{1}{2}\omega_2w_3\omega_1 + 2u^2w_1 - \\
& c_s^2w_3vw_4\omega_1 - \frac{1}{2}c_s^2w_2w_3 + w_3vw_4\omega_1 + \frac{1}{2}\omega_2w_2^2w_3 + \frac{1}{2}\omega_4\omega_1 + 2w_2v^2\omega_1 + \frac{1}{2}u^2w_3\omega_4 + \frac{1}{2}v^2w_4\omega_1^2 + vw_4 + \\
& 2c_s^2u^2w_4\omega_1^2 + 4u^2w_3v^2w_4\omega_1 - c_s^2w_2w_3v + w_2u^2w_3v - \frac{1}{2}\omega_4 - \frac{1}{2}c_s^2w_4\omega_1^2 - u^2w_3\omega_1 - 8w_2u^2w_3v^2\omega_1 - \frac{3}{2}\omega_2v - \omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_5], t-2\delta_t} = & -2 - 4w_2u^2w_3^2v - \omega_3\omega_1 + 8w_2u^2w_3vw_1 - vw_4\omega_1^2 + w_2w_3vw_1 + \frac{1}{2}\omega_2w_1^2 - 8u^2w_3vw_4\omega_1 - \frac{1}{2}\omega_3\omega_4 - \\
& 3w_2vw_1 - 2u^2w_3^2\omega_4 - \omega_1^2 + w_2vw_1^2 + 4w_2u^2w_3\omega_1 + \omega_2 - \frac{3}{2}\omega_2\omega_1 - 2u^2w_4\omega_1^2 - w_2w_3v - 2w_2u^2\omega_1^2 + 3vw_4\omega_1 + \\
& 4u^2w_3^2 + 4u^2w_3\omega_4\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_1 + \omega_3vw_4 - \frac{1}{2}\omega_2w_3 + \omega_3 + \frac{1}{2}w_4\omega_1^2 + 4u^2w_3^2vw_4 + 4u^2\omega_1^2 - 2w_2u^2w_3^2 - \\
& 4w_2u^2vw_1^2 + \frac{1}{2}\omega_2w_3\omega_1 - \omega_3vw_4\omega_1 - \frac{3}{2}\omega_4\omega_1 - 2vw_4 + \omega_4 - 8u^2w_3\omega_1 + 4u^2vw_4\omega_1^2 + 2w_2v + 3\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l, y-\delta_l}^{[\mu_1], t-2\delta_t} = & 1 + \frac{1}{2}uvw_4\omega_1 - w_2u^2w_3^2v + \frac{1}{4}w_3v^2w_4\omega_1 - \frac{1}{2}c_s^2w_3\omega_4\omega_1 + w_2uv^2\omega_1 - \frac{5}{2}uw_3v^2\omega_4 + \frac{1}{2}\omega_2uvw_1^2 - \\
& \frac{1}{2}c_s^2w_3vw_4 - \frac{1}{4}\omega_2v^2w_4\omega_1 + \frac{1}{2}c_s^2vw_4^2\omega_1 + 3w_2uw_3v^3\omega_4 + \frac{1}{2}c_s^2uw_4\omega_1^2 + \frac{1}{2}\omega_2w_3v^2 + \frac{3}{2}\omega_2u^2w_3vw_1 + \\
& v^3w_4^2 + \frac{1}{2}uw_3\omega_4 - \frac{1}{2}w_2^2v^2\omega_1 - \frac{1}{2}c_s^2w_2w_3\omega_1 + \frac{1}{2}u^2w_3 - \frac{1}{4}\omega_2w_3vw_1 + \frac{1}{4}w_3v^2w_4^2 + \frac{1}{2}uw_3vw_4\omega_1 - \frac{1}{4}c_s^2w_3\omega_4^2 - \\
& 2w_2u^2v^2\omega_1^2 + \frac{1}{2}uw_1 + \frac{1}{2}uw_3\omega_1 + u^2v^2w_4\omega_1^2 - \frac{1}{2}c_s^2w_2w_3vw_4 + \frac{5}{2}\omega_2uw_3v + \frac{1}{2}\omega_2uw_3 - \frac{1}{2}uv^2w_4^2\omega_1 - \\
& 3w_2uv^3w_4\omega_1 + \frac{1}{2}u^2w_3vw_4\omega_1 + \frac{1}{2}u^2w_4\omega_1 + \frac{1}{4}w_3\omega_4 + \frac{1}{2}c_s^2w_2w_4 - uw_3v^3w_4^2 + \frac{3}{4}\omega_2vw_1 + \frac{3}{2}v^2\omega_4 - \frac{1}{4}\omega_2u^2w_3\omega_1 + \\
& \frac{1}{4}v^2w_4^2\omega_1 - w_2^2v^3\omega_1 - \frac{1}{2}c_s^2w_3\omega_3 - \frac{1}{4}c_s^2w_2w_3\omega_1 - \frac{1}{2}w_3v^3w_4^2 - \frac{1}{2}\omega_2 + \frac{1}{2}c_s^2w_2w_4\omega_1 + 2w_2^2v^3 - \frac{1}{2}v^2w_4^2 + \\
& \frac{1}{4}c_s^2w_3\omega_1 + u^2w_3v^2w_4 + \frac{1}{4}w_2\omega_1 - \frac{1}{2}w_2uw_3v^2w_4 + 5w_2uw_3v^2 + c_s^2w_2uvw_4\omega_1 + 2w_2uv^3\omega_1 + \frac{5}{4}w_2w_3v + w_2^2v^2 - \\
& \frac{5}{2}c_s^2w_4\omega_1 - \frac{1}{2}vw_4\omega_1 + w_2uw_3v^2w_1 + \frac{3}{2}c_s^2w_3\omega_4 - \frac{5}{4}w_3v^2w_4 + 2c_s^2u^2w_3\omega_4\omega_1 - 2w_2u^2w_3^2v^2 - \frac{1}{4}c_s^2w_4^2\omega_1 + \\
& \frac{1}{2}w_3v^2w_4^2 - \frac{1}{4}u^2w_3\omega_4\omega_1 + \frac{1}{2}u^2w_3vw_4 + \frac{1}{2}c_s^2w_3\omega_4^2 - \frac{1}{4}c_s^2w_2w_3\omega_4 - 2w_2uvw_1 - c_s^2w_2w_3^2\omega_4 - \frac{1}{4}c_s^2w_2w_4\omega_1 - \\
& 3w_2v^2 + \frac{1}{2}c_s^2w_2w_4\omega_1 - \frac{1}{4}w_2w_3^2v - \frac{1}{2}w_3vw_4 - \frac{1}{4}c_s^2w_3\omega_4^2 - \frac{1}{4}w_2w_3\omega_1 + \frac{1}{4}w_2w_3 + c_s^2w_2vw_4 + c_s^2uw_3vw_4^2 + \\
& \frac{3}{4}c_s^2w_4\omega_1 - \frac{1}{2}\omega_3 - u^2vw_4\omega_1 + \frac{5}{2}c_s^2w_3\omega_4 + \frac{3}{2}c_s^2w_2w_3\omega_4 + uv^3w_4^2\omega_1 + \frac{1}{2}\omega_2uv^2w_4\omega_1 - 5w_2uv^2\omega_1 + \frac{1}{4}w_3^2v^2\omega_4 - \\
& \frac{3}{2}c_s^2w_4^2 - \frac{3}{4}v^2w_4\omega_1 - c_s^2u^2w_3^2\omega_4 - 3w_2v^3\omega_4 - \frac{1}{2}c_s^2w_2w_3\omega_4 + w_2u^2vw_1 + \frac{3}{2}\omega_2v^3w_4\omega_1 - 2w_2uw_3^2v^2 - \\
& c_s^2w_2uw_3vw_4 - \frac{1}{2}uv^2w_4\omega_1^2 - w_2^2uw_3v^2 - w_2u^2vw_1^2 - u^2\omega_1 - \frac{1}{2}c_s^2w_2vw_4\omega_1 - \frac{1}{4}\omega_2w_3v^2\omega_4 + \frac{1}{2}c_s^2w_3vw_4\omega_1 + \\
& uw_3^2v^2\omega_4 + \frac{5}{2}uv^2w_4\omega_1 + \frac{1}{4}c_s^2w_2w_3 - w_2uw_3^2v - \frac{1}{4}\omega_2u^2w_3 - \frac{1}{2}w_3v^2w_4\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{3}{2}w_2v^2\omega_1 - \frac{1}{4}u^2w_3\omega_4 + \\
& \frac{1}{2}c_s^2w_4^2 + vw_4 - c_s^2u^2w_4\omega_1^2 - \frac{1}{2}w_2^2w_3v^2 - \frac{1}{4}uw_4\omega_1 - c_s^2uvw_4\omega_1 - 2u^2w_3v^2w_4\omega_1 - uw_3vw_4 + \frac{1}{2}c_s^2w_2w_3v -
\end{aligned}$$

$$\begin{aligned} & \frac{1}{2}\omega_2 u^2 \omega_3 v - \frac{1}{2}\omega_4 + \frac{1}{2}u^2 \omega_3 \omega_1 - c_s^2 v \omega_4^2 + \frac{1}{2}\omega_2 v^2 \omega_4 - \frac{1}{2}c_s^2 u \omega_3 \omega_4^2 + \frac{1}{2}c_s^2 u \omega_3 \omega_4 \omega_1 + \omega_2 u v^2 \omega_1^2 - \frac{1}{4}u \omega_3 \omega_4 \omega_1 - \\ & 2\omega_2^2 u \omega_3 v^3 + 4\omega_2 u^2 \omega_3 v^2 \omega_1 - \omega_2^2 \omega_3 v^3 - \frac{1}{2}v^3 \omega_4^2 \omega_1 - \frac{1}{2}\omega_2 \omega_3^2 v^2 - \frac{3}{2}\omega_2 v - \frac{1}{4}\omega_2 u \omega_1 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_2 \omega_3 v^2 \omega_1 - u \omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_l, y-\delta_l}^{[\mu_5], t-2\delta_t} = & -2 + \frac{1}{4}\omega_2 \omega_4 \omega_1 - 6u v w_4 \omega_1 - \frac{1}{2}\omega_4^2 + 2\omega_2 u^2 \omega_3^2 v - 2\omega_2^2 u v^2 \omega_1 - \frac{1}{2}u \omega_4^2 \omega_1 - \omega_2 u v \omega_1^2 - 2\omega_2 v^2 \omega_4 \omega_1 - \omega_2 v \omega_4 - \frac{1}{2}\omega_3 \omega_1 - \\ & \omega_2^2 v - 4\omega_2 u^2 \omega_3 v \omega_1 - 3u \omega_3 \omega_4 + \omega_2^2 v^2 \omega_1 + \frac{1}{2}\omega_2 \omega_3 v \omega_1 + \omega_3 v^2 \omega_4^2 + u \omega_3 v \omega_4 \omega_1 + \frac{1}{2}\omega_2 \omega_3 v \omega_4 - 4u \omega_1 + u \omega_3 \omega_1 - \\ & 6\omega_2 u \omega_3 v - 2\omega_2 u \omega_3 - 2u v^2 \omega_2^2 \omega_1 + 4u^2 \omega_3 v \omega_4 \omega_1 - 2u \omega_3^2 v \omega_4 - \frac{3}{2}\omega_3 \omega_4 + \frac{1}{4}\omega_4^2 \omega_1 - 2\omega_2 v \omega_1 + u^2 \omega_3^2 \omega_4 - 2\omega_2 u^2 \omega_3 \omega_1 + \\ & v^2 \omega_4^2 \omega_1 - \frac{1}{2}\omega_3^2 v \omega_4 + \omega_2 - \frac{1}{2}\omega_2 u \omega_4 \omega_1 - 2v^2 \omega_4^2 + u \omega_1^2 - \omega_2 u v \omega_4 \omega_1 - \frac{1}{2}\omega_2 \omega_1 - 4\omega_2 u \omega_3 v^2 \omega_4 + \omega_2 u \omega_3^2 + \frac{1}{4}\omega_3 \omega_4^2 + \\ & u^2 \omega_4 \omega_1^2 - 3\omega_2 \omega_3 v + \omega_2 u^2 \omega_1^2 - 2\omega_2^2 v^2 + 2v \omega_4 \omega_1 - 2u^2 \omega_3^2 + \frac{1}{2}u \omega_3 \omega_4^2 - \frac{1}{2}\omega_2 \omega_4 + u v \omega_4 \omega_1^2 + 2u \omega_3 v^2 \omega_4^2 - 2u^2 \omega_3 \omega_4 \omega_1 + \\ & 6\omega_2 u v \omega_1 - \frac{1}{2}\omega_2 u \omega_1^2 + \frac{1}{2}\omega_2 \omega_3^2 v + \frac{1}{4}\omega_3 \omega_4 \omega_1 + 3\omega_3 v \omega_4 - \frac{1}{2}\omega_2 u \omega_3 \omega_1 - \omega_2 \omega_3 - \omega_2 u \omega_3 v \omega_1 - v \omega_4^2 \omega_1 - 2u \omega_3^2 - \\ & 2u \omega_3 v \omega_4^2 - \frac{1}{2}\omega_2 \omega_4 \omega_1^2 + 2\omega_3 + 4\omega_2 u v^2 \omega_4 \omega_1 + 2v \omega_4^2 + \frac{1}{2}\omega_2 \omega_3 v + \omega_2 u \omega_3 v \omega_4 + \omega_2^2 u \omega_3 v + \frac{1}{2}\omega_2 u \omega_3 \omega_4 - 2u^2 \omega_3^2 v \omega_4 - \\ & 2u^2 \omega_1^2 + \omega_2 u^2 \omega_3^2 + \frac{1}{2}\omega_2 v \omega_4 \omega_1 + 2\omega_2^2 u \omega_3 v^2 + 2\omega_2 u^2 v \omega_1^2 + \frac{1}{2}\omega_2 \omega_3 \omega_1 - 2\omega_2 \omega_3 v^2 \omega_4 + \frac{1}{4}\omega_3 \omega_4 + 2\omega_2 u \omega_3^2 v - \\ & \frac{1}{2}\omega_3 v \omega_4 \omega_1 - \omega_4 \omega_1 - 4v \omega_4 + \omega_2^2 \omega_3 v^2 + 3u \omega_4 \omega_1 + 6u \omega_3 v \omega_4 - \omega_2^2 u v \omega_1 - \frac{1}{2}\omega_3^2 + 2\omega_4 + 2u v \omega_4^2 \omega_1 + 4u^2 \omega_3 \omega_1 + \\ & 4\omega_2 v^2 \omega_4 - 2u^2 v \omega_4 \omega_1^2 - \frac{1}{2}u \omega_3 \omega_4 \omega_1 + 4\omega_2 v + 2\omega_2 u \omega_1 + \omega_1 + \frac{1}{4}\omega_2 \omega_3 \omega_4 - \omega_3 v \omega_4^2 + 4u \omega_3 + u \omega_3^2 \omega_4 + \frac{1}{4}\omega_2 \omega_3^2 + \frac{1}{2}\omega_2^2 v \omega_1, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_l, y}^{[\mu_1], t-2\delta_t} = & 2 - \frac{1}{2}\omega_2 \omega_4 \omega_1 - \frac{1}{2}\omega_2^2 u^2 \omega_3 + 8\omega_2 u^2 v^2 \omega_4 \omega_1 + 2\omega_2^2 u v^2 \omega_1 - 4\omega_2 v^2 \omega_4 \omega_1 + 2\omega_2^2 u^2 \omega_3 v^2 - 3\omega_2 u^2 \omega_1 - \\ & u \omega_3 \omega_4 + 2\omega_2^2 v^2 \omega_1 - u^2 \omega_3 + 2\omega_3 v^2 \omega_4^2 - u \omega_1 - 3\omega_2 u \omega_3 + 2u v^2 \omega_4^2 \omega_1 + \frac{1}{2}c_s^2 \omega_2^2 \omega_3 - u^2 \omega_4 \omega_1 + \frac{1}{2}\omega_3 \omega_4 - \\ & \frac{1}{2}\omega_2^2 u \omega_1 + 2v^2 \omega_4^2 \omega_1 + \omega_2^2 + c_s^2 \omega_3 - 3\omega_2 - \frac{1}{2}\omega_2 u \omega_4 \omega_1 - 4v^2 \omega_4^2 + \frac{3}{2}\omega_2 \omega_1 + 8\omega_2 u \omega_3 v^2 \omega_4 - 2c_s^2 \omega_2^2 \omega_3 v^2 - \\ & 4\omega_2^2 v^2 - \frac{1}{2}\omega_2^2 \omega_3 - \frac{1}{2}c_s^2 \omega_3 \omega_4 + \omega_2 \omega_4 - 4u \omega_3 v^2 \omega_4^2 + \frac{1}{2}c_s^2 \omega_2 \omega_3 \omega_4 - \frac{1}{2}\omega_2 u^2 \omega_3 \omega_4 + \omega_2 u^2 \omega_4 \omega_1 + \frac{3}{2}\omega_2 \omega_3 - \omega_3 - \\ & 4\omega_2 u v^2 \omega_4 \omega_1 - 2c_s^2 \omega_3 v^2 \omega_4^2 + \omega_2 u \omega_3 \omega_4 - 4u^2 v^2 \omega_4^2 \omega_1 - \frac{1}{2}\omega_2^2 \omega_1 + 4c_s^2 \omega_2 \omega_3 v^2 \omega_4 - 4\omega_2^2 u \omega_3 v^2 + 2u^2 \omega_1 - \\ & 4\omega_2 \omega_3 v^2 \omega_4 - 4\omega_2^2 u^2 v^2 \omega_1 - \frac{3}{2}c_s^2 \omega_2 \omega_3 + \frac{3}{2}\omega_2 u^2 \omega_3 - 4\omega_2 u^2 \omega_3 v^2 \omega_4 + \frac{1}{2}\omega_4 \omega_1 + \frac{1}{2}u^2 \omega_3 \omega_4 + \omega_2^2 u^2 \omega_1 + \\ & 2\omega_2^2 \omega_3 v^2 + \frac{1}{2}u \omega_4 \omega_1 + \omega_2^2 u \omega_3 - \omega_4 + 8\omega_2 v^2 \omega_4 + 2u^2 \omega_3 v^2 \omega_4^2 + \frac{3}{2}\omega_2 u \omega_1 - \omega_1 - \frac{1}{2}\omega_2 \omega_3 \omega_4 + 2u \omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_l, y}^{[\mu_5], t-2\delta_t} = & -2 + \frac{1}{2}\omega_2 \omega_4 \omega_1 - 4\omega_2^2 u v^2 \omega_1 + 4\omega_2 v^2 \omega_4 \omega_1 + u \omega_3 \omega_4 - 2\omega_2^2 v^2 \omega_1 - 2\omega_3 v^2 \omega_4^2 + 2u \omega_1 + 3\omega_2 u \omega_3 - \\ & 4u v^2 \omega_4^2 \omega_1 - \frac{1}{2}\omega_3 \omega_4 + \omega_2^2 u \omega_1 - 2v^2 \omega_4^2 \omega_1 - \omega_2^2 + 3\omega_2 + \omega_2 u \omega_4 \omega_1 + 4v^2 \omega_4^2 - \frac{3}{2}\omega_2 \omega_1 - 8\omega_2 u \omega_3 v^2 \omega_4 + 4\omega_2^2 v^2 + \\ & \frac{1}{2}\omega_2^2 \omega_3 - \omega_2 \omega_4 + 4u \omega_3 v^2 \omega_4^2 - \frac{3}{2}\omega_2 \omega_3 + \omega_3 + 8\omega_2 u v^2 \omega_4 \omega_1 - \omega_2 u \omega_3 \omega_4 + \frac{1}{2}\omega_2^2 \omega_1 + 4\omega_2^2 u \omega_3 v^2 + 4\omega_2 \omega_3 v^2 \omega_4 - \\ & \frac{1}{2}\omega_4 \omega_1 - 2\omega_2^2 \omega_3 v^2 - u \omega_4 \omega_1 - \omega_2^2 u \omega_3 + \omega_4 - 8\omega_2 v^2 \omega_4 - 3\omega_2 u \omega_1 + \omega_1 + \frac{1}{2}\omega_2 \omega_3 \omega_4 - 2u \omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x, y}^{[\mu_1], t-2\delta_t} = & 2 + \omega_2^2 u^2 \omega_3 - 16\omega_2 u^2 v^2 \omega_4 \omega_1 - 4\omega_2^2 u^2 \omega_3 v^2 + 6\omega_2 u^2 \omega_1 + 2u^2 \omega_3 - \omega_2^2 v^2 \omega_4 - c_s^2 \omega_2^2 \omega_3 + 2u^2 \omega_4 \omega_1 + 3c_s^2 \omega_2 \omega_4 + \\ & 2v^2 \omega_4 + \omega_2^2 - 2c_s^2 \omega_3 - 3\omega_2 - 5v^2 \omega_4^2 + 4c_s^2 \omega_2^2 \omega_3 v^2 - c_s^2 \omega_2 \omega_4^2 - 2\omega_2^2 v^2 + c_s^2 \omega_3 \omega_4 + \omega_2 \omega_4 - c_s^2 \omega_2 \omega_3 \omega_4 + \omega_2 u^2 \omega_3 \omega_4 - \\ & 2\omega_2 u^2 \omega_4 \omega_1 - 4\omega_2 v^2 - \omega_2 v^2 \omega_4^2 + 4c_s^2 \omega_3 v^2 \omega_4^2 - 2c_s^2 \omega_4 + 8u^2 v^2 \omega_4^2 \omega_1 - 8c_s^2 \omega_2 \omega_3 v^2 \omega_4 - 4u^2 \omega_1 + 8\omega_2^2 u^2 v^2 \omega_1 - \\ & c_s^2 \omega_2 \omega_4 + 3c_s^2 \omega_2 \omega_3 - 3\omega_2 u^2 \omega_3 + 8\omega_2 u^2 \omega_3 v^2 \omega_4 - u^2 \omega_3 \omega_4 + c_s^2 \omega_4^2 - 2\omega_2^2 u^2 \omega_1 - \omega_4 + 11\omega_2 v^2 \omega_4 - 4u^2 \omega_3 v^2 \omega_4^2, \end{aligned}$$

$$\alpha_{x, y}^{[\mu_5], t-2\delta_t} = -4 - \omega_4^2 - 4\omega_3 \omega_1 + \omega_2 \omega_4^2 - \omega_1^2 - \omega_2^2 + 3\omega_2 + \omega_3 \omega_1^2 - 4\omega_2 \omega_4 + \omega_2^2 \omega_4 + 3\omega_3 - \omega_3^2 + 3\omega_4 + \omega_3^2 \omega_1 + 3\omega_1,$$

$$\begin{aligned} \alpha_{x+\delta_l, y}^{[\mu_1], t-2\delta_t} = & 2 - \frac{1}{2}\omega_2 \omega_4 \omega_1 - \frac{1}{2}\omega_2^2 u^2 \omega_3 + 8\omega_2 u^2 v^2 \omega_4 \omega_1 - 2\omega_2^2 u v^2 \omega_1 - 4\omega_2 v^2 \omega_4 \omega_1 + 2\omega_2^2 u^2 \omega_3 v^2 - 3\omega_2 u^2 \omega_1 + \\ & u \omega_3 \omega_4 + 2\omega_2^2 v^2 \omega_1 - u^2 \omega_3 + 2\omega_3 v^2 \omega_4^2 + u \omega_1 + 3\omega_2 u \omega_3 - 2u v^2 \omega_4^2 \omega_1 + \frac{1}{2}c_s^2 \omega_2^2 \omega_3 - u^2 \omega_4 \omega_1 + \frac{1}{2}\omega_3 \omega_4 + \\ & \frac{1}{2}\omega_2^2 u \omega_1 + 2v^2 \omega_4^2 \omega_1 + \omega_2^2 + c_s^2 \omega_3 - 3\omega_2 + \frac{1}{2}\omega_2 u \omega_4 \omega_1 - 4v^2 \omega_4^2 + \frac{3}{2}\omega_2 \omega_1 - 8\omega_2 u \omega_3 v^2 \omega_4 - 2c_s^2 \omega_2^2 \omega_3 v^2 - \\ & 4\omega_2^2 v^2 - \frac{1}{2}\omega_2^2 \omega_3 - \frac{1}{2}c_s^2 \omega_3 \omega_4 + \omega_2 \omega_4 + 4u \omega_3 v^2 \omega_4^2 + \frac{1}{2}c_s^2 \omega_2 \omega_3 \omega_4 - \frac{1}{2}\omega_2 u^2 \omega_3 \omega_4 + \omega_2 u^2 \omega_4 \omega_1 + \frac{3}{2}\omega_2 \omega_3 - \omega_3 + \\ & 4\omega_2 u v^2 \omega_4 \omega_1 - 2c_s^2 \omega_3 v^2 \omega_4^2 - \omega_2 u \omega_3 \omega_4 - 4u^2 v^2 \omega_4^2 \omega_1 - \frac{1}{2}\omega_2^2 \omega_1 + 4c_s^2 \omega_2 \omega_3 v^2 \omega_4 + 4\omega_2^2 u \omega_3 v^2 + 2u^2 \omega_1 - \\ & 4\omega_2 \omega_3 v^2 \omega_4 - 4\omega_2^2 u^2 v^2 \omega_1 - \frac{3}{2}c_s^2 \omega_2 \omega_3 + \frac{3}{2}\omega_2 u^2 \omega_3 - 4\omega_2 u^2 \omega_3 v^2 \omega_4 + \frac{1}{2}\omega_4 \omega_1 + \frac{1}{2}u^2 \omega_3 \omega_4 + \omega_2^2 u^2 \omega_1 + \\ & 2\omega_2^2 \omega_3 v^2 - \frac{1}{2}u \omega_4 \omega_1 - \omega_2^2 u \omega_3 - \omega_4 + 8\omega_2 v^2 \omega_4 + 2u^2 \omega_3 v^2 \omega_4^2 - \frac{3}{2}\omega_2 u \omega_1 - \omega_1 - \frac{1}{2}\omega_2 \omega_3 \omega_4 - 2u \omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_l, y}^{[\mu_5], t-2\delta_t} = & -2 + \frac{1}{2}\omega_2 \omega_4 \omega_1 + 4\omega_2^2 u v^2 \omega_1 + 4\omega_2 v^2 \omega_4 \omega_1 - u \omega_3 \omega_4 - 2\omega_2^2 v^2 \omega_1 - 2\omega_3 v^2 \omega_4^2 - 2u \omega_1 - 3\omega_2 u \omega_3 + \\ & 4u v^2 \omega_4^2 \omega_1 - \frac{1}{2}\omega_3 \omega_4 - \omega_2^2 u \omega_1 - 2v^2 \omega_4^2 \omega_1 - \omega_2^2 + 3\omega_2 - \omega_2 u \omega_4 \omega_1 + 4v^2 \omega_4^2 - \frac{3}{2}\omega_2 \omega_1 + 8\omega_2 u \omega_3 v^2 \omega_4 + 4\omega_2^2 v^2 + \\ & \frac{1}{2}\omega_2^2 \omega_3 - \omega_2 \omega_4 - 4u \omega_3 v^2 \omega_4^2 - \frac{3}{2}\omega_2 \omega_3 + \omega_3 - 8\omega_2 u v^2 \omega_4 \omega_1 + \omega_2 u \omega_3 \omega_4 + \frac{1}{2}\omega_2^2 \omega_1 - 4\omega_2^2 u \omega_3 v^2 + 4\omega_2 \omega_3 v^2 \omega_4 - \\ & \frac{1}{2}\omega_4 \omega_1 - 2\omega_2^2 \omega_3 v^2 + u \omega_4 \omega_1 + \omega_2^2 u \omega_3 + \omega_4 - 8\omega_2 v^2 \omega_4 + 3\omega_2 u \omega_1 + \omega_1 + \frac{1}{2}\omega_2 \omega_3 \omega_4 + 2u \omega_3, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_l, y+\delta_l}^{[\mu_1], t-2\delta_t} = & 1 + \frac{1}{2}u v w_4 \omega_1 + \omega_2 u^2 \omega_3^2 v + \frac{1}{4}\omega_3 v^2 \omega_4 \omega_1 - \frac{1}{2}c_s^2 \omega_3 \omega_4 \omega_1 - \omega_2^2 u v^2 \omega_1 + \frac{5}{2}u \omega_3 v^2 \omega_4 + \frac{1}{2}\omega_2 u v \omega_1^2 + \\ & \frac{1}{2}c_s^2 \omega_3 v \omega_4 - \frac{1}{4}\omega_2 v^2 \omega_4 \omega_1 - \frac{1}{2}c_s^2 v \omega_4^2 \omega_1 + 3\omega_2 u \omega_3 v^3 \omega_4 - \frac{1}{2}c_s^2 u \omega_4 \omega_1^2 + \frac{1}{2}\omega_2 u^2 \omega_1 + \frac{5}{2}\omega_2 \omega_3 v^2 - \frac{3}{2}\omega_2 u^2 \omega_3 v \omega_1 - \end{aligned}$$

$$\begin{aligned}
& v^3 \omega_4^2 - \frac{1}{2} u \omega_3 \omega_4 - \frac{1}{2} \omega_2^2 v^2 \omega_1 + \frac{1}{2} c_s^2 \omega_2 \omega_3 v \omega_1 + \frac{1}{2} u^2 \omega_3 + \frac{1}{4} \omega_2 \omega_3 v \omega_1 + \frac{1}{4} \omega_3 v^2 \omega_4^2 + \frac{1}{2} u \omega_3 v \omega_4 - \frac{1}{4} c_s^2 \omega_3 \omega_4^2 - \\
& 2 \omega_2 u^2 v^2 \omega_1^2 - \frac{1}{2} u \omega_1 - \frac{1}{2} u \omega_3 \omega_1 + u^2 v^2 \omega_4 \omega_1^2 + \frac{1}{2} c_s^2 \omega_2 \omega_3 v \omega_4 + \frac{5}{2} \omega_2 u \omega_3 v - \frac{1}{2} \omega_2 u \omega_3 + \frac{1}{2} u v^2 \omega_4^2 \omega_1 - \\
& 3 \omega_2 u v^3 \omega_4 \omega_1 - \frac{1}{2} u^2 \omega_3 v \omega_4 \omega_1 + \frac{1}{2} u^2 \omega_4 \omega_1 + \frac{1}{4} \omega_3 \omega_4 + \frac{1}{2} c_s^2 \omega_2 \omega_4 - u \omega_3 v^3 \omega_4^2 - \frac{3}{4} \omega_2 v \omega_1 + \frac{3}{2} v^2 \omega_4 - \frac{1}{4} \omega_2 u^2 \omega_3 \omega_1 + \\
& \frac{1}{4} v^2 \omega_4^2 \omega_1 + \omega_2^2 v^3 \omega_1 - \frac{1}{2} c_s^2 \omega_3 - \frac{1}{4} c_s^2 \omega_2 \omega_3 \omega_1 + \frac{1}{2} \omega_3 v^3 \omega_4^2 - \frac{1}{2} \omega_2 - \frac{1}{2} c_s^2 \omega_2 u \omega_4 \omega_1 - 2 \omega_2^2 v^3 - \frac{1}{2} v^2 \omega_4^2 + \\
& \frac{1}{2} c_s^2 \omega_3 \omega_1 + u^2 \omega_2^2 v^2 \omega_4 + \frac{1}{4} \omega_2 \omega_1 + \frac{1}{2} \omega_2 u \omega_3 v^2 \omega_4 - 5 \omega_2 u \omega_3 v^2 + c_s^2 \omega_2 u v \omega_4 \omega_1 + 2 \omega_2^2 u v^3 \omega_1 - \frac{5}{4} \omega_2 \omega_3 v + \omega_2^2 v^2 + \\
& \frac{5}{2} c_s^2 u \omega_4 \omega_1 + \frac{1}{2} v \omega_4 \omega_1 - w_2 u \omega_3 v^2 \omega_1 + \frac{3}{2} c_s^2 \omega_3 \omega_4 - \frac{5}{4} \omega_3 v^2 \omega_4 + 2 c_s^2 u^2 \omega_3 \omega_4 \omega_1 - 2 \omega_2 u^2 \omega_3 v^2 - \frac{1}{4} c_s^2 \omega_4^2 \omega_1 - \\
& \frac{1}{2} u \omega_3 v^2 \omega_4^2 - \frac{1}{4} u^2 \omega_3 \omega_4 \omega_1 - \frac{1}{2} u^2 \omega_3 v \omega_4 - \frac{1}{2} c_s^2 \omega_3 v \omega_4^2 - \frac{1}{4} c_s^2 \omega_2 \omega_3 \omega_4 - 2 \omega_2 u v \omega_1 + c_s^2 u \omega_3^2 \omega_4 - \frac{1}{4} c_s^2 \omega_2 \omega_4 \omega_1 - \\
& 3 \omega_2 v^2 - \frac{1}{2} c_s^2 u \omega_4^2 \omega_1 + \frac{1}{4} \omega_2 \omega_3^2 v + \frac{1}{2} \omega_3 v \omega_4 - \frac{1}{4} c_s^2 \omega_3^2 \omega_4 + \frac{1}{4} \omega_2 u \omega_3 \omega_1 + \frac{1}{4} \omega_2 \omega_3 - c_s^2 \omega_2 v \omega_4 + c_s^2 u \omega_3 v \omega_4^2 + \\
& \frac{3}{4} c_s^2 \omega_4 \omega_1 - \frac{1}{2} \omega_3 + u^2 v \omega_4 \omega_1 - \frac{5}{2} c_s^2 u \omega_3 \omega_4 - \frac{3}{2} \omega_2 \omega_3 v^3 \omega_4 + u v^3 \omega_4^2 \omega_1 - \frac{1}{2} \omega_2 u v^2 \omega_4 \omega_1 + 5 \omega_2 u v^2 \omega_1 + \frac{1}{4} \omega_3^2 v^2 \omega_4 - \\
& \frac{3}{2} c_s^2 \omega_4 - \frac{3}{4} v^2 \omega_4 \omega_1 - c_s^2 u^2 \omega_3^2 \omega_4 + 3 \omega_2 v^3 \omega_4 + \frac{1}{2} c_s^2 \omega_2 u \omega_3 \omega_4 - \omega_2 u^2 v \omega_1 - \frac{3}{2} \omega_2 v^3 \omega_4 \omega_1 + 2 \omega_2 u \omega_3^2 v^2 - \\
& c_s^2 \omega_2 u \omega_3 v \omega_4 + \frac{1}{2} u v^2 \omega_4 \omega_1^2 + \omega_2^2 u \omega_3 v^2 + \omega_2 u^2 v \omega_1^2 - u^2 \omega_1 + \frac{1}{2} c_s^2 \omega_2 v \omega_4 \omega_1 - \frac{1}{4} \omega_2 \omega_3 v^2 \omega_4 - \frac{1}{2} c_s^2 \omega_3 v \omega_4 \omega_1 - \\
& u \omega_3^2 v^2 \omega_4 - \frac{5}{2} u v^2 \omega_4 \omega_1 + \frac{1}{4} c_s^2 \omega_2 \omega_3 - \omega_2 u \omega_3^2 v - \frac{1}{4} \omega_2 u^2 \omega_3 + \frac{1}{2} u \omega_3 v^2 \omega_4 \omega_1 + \frac{1}{4} \omega_4 \omega_1 + \frac{3}{2} \omega_2 v^2 \omega_1 - \frac{1}{4} u^2 \omega_3 \omega_4 + \\
& \frac{1}{2} c_s^2 \omega_4^2 - v \omega_4 - c_s^2 u^2 \omega_4 \omega_1^2 - \frac{1}{2} \omega_2^2 \omega_3 v^2 + \frac{1}{4} u \omega_4 \omega_1 - c_s^2 u v \omega_4 \omega_1 - 2 u^2 \omega_3^2 v \omega_4 \omega_1 - u \omega_3 v \omega_4 - \frac{1}{2} c_s^2 \omega_2 \omega_3 v + \\
& \frac{1}{2} \omega_2 u^2 \omega_3 v - \frac{1}{2} \omega_4 + \frac{1}{2} u^2 \omega_3 \omega_1 + c_s^2 v \omega_4^2 + \frac{1}{2} \omega_2 v^2 \omega_4 + \frac{1}{2} c_s^2 u \omega_3 \omega_4^2 - \frac{1}{2} c_s^2 u \omega_3 \omega_4 \omega_1 - \omega_2 u v^2 \omega_1^2 + \frac{1}{4} u \omega_3 \omega_4 \omega_1 - \\
& 2 \omega_2^2 u \omega_3 v^3 + 4 \omega_2 u^2 \omega_3 v^2 \omega_1 + \omega_2^2 \omega_3 v^3 + \frac{1}{2} v^3 \omega_4^2 \omega_1 - \frac{1}{2} \omega_2 \omega_3^2 v^2 + \frac{3}{2} \omega_2 v \omega_1 - \frac{1}{2} \omega_1 - \frac{1}{2} \omega_2 \omega_3 v^2 \omega_1 + u \omega_3, \\
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l, y+\delta_l}^{[\mu_5], t-2\delta_t} = & -2 + \frac{1}{4} \omega_2 \omega_4 \omega_1 - 6 u v \omega_4 \omega_1 - \frac{1}{2} \omega_4^2 - 2 \omega_2 u^2 \omega_3^2 v + 2 \omega_2^2 u v^2 \omega_1 + \frac{1}{2} u \omega_4^2 \omega_1 - \omega_2 u v \omega_1^2 - 2 \omega_2 v^2 \omega_4 \omega_1 + \omega_2 v \omega_4 - \frac{1}{2} \omega_3 \omega_1 + \\
& \omega_2^2 v + 4 \omega_2 u^2 \omega_3 v \omega_1 + 3 u \omega_3 \omega_4 + \omega_2^2 v^2 \omega_1 - \frac{1}{2} \omega_2 \omega_3 v \omega_1 + \omega_3 v^2 \omega_4^2 + u \omega_3 v \omega_4 \omega_1 - \frac{1}{2} \omega_2 \omega_3 v \omega_4 + 4 u \omega_1 - u \omega_3 \omega_1 - \\
& 6 \omega_2 u \omega_3 v + 2 \omega_2 u \omega_3 + 2 u v^2 \omega_4^2 \omega_1 - 4 u^2 \omega_3 v \omega_4 \omega_1 - 2 u \omega_3^2 v \omega_4 - \frac{3}{2} \omega_3 \omega_4 + \frac{1}{4} \omega_4^2 \omega_1 + 2 \omega_2 v \omega_1 + u^2 \omega_3^2 \omega_4 - 2 \omega_2 u^2 \omega_3 \omega_1 + \\
& v^2 \omega_4^2 \omega_1 + \frac{1}{2} \omega_2^2 v \omega_4 + \omega_2 + \frac{1}{2} \omega_2 u \omega_4 \omega_1 - 2 v^2 \omega_4^2 - u \omega_1^2 - \omega_2 u v \omega_4 \omega_1 - \frac{1}{2} \omega_2 \omega_1 + 4 \omega_2 u \omega_3 v^2 \omega_4 - \omega_2 u \omega_3^2 + \frac{1}{4} \omega_3 \omega_4^2 + \\
& u^2 \omega_4^2 \omega_1 + 3 \omega_2 \omega_3 v + \omega_2 u^2 \omega_2^2 - 2 \omega_2^2 v^2 - 2 v \omega_4 \omega_1 - 2 u^2 \omega_3^2 - \frac{1}{2} u \omega_3 \omega_4 - \frac{1}{2} \omega_2 \omega_4 + u v \omega_4 \omega_1^2 - 2 u \omega_3 v^2 \omega_4^2 - 2 u^2 \omega_3 \omega_4 \omega_1 + \\
& 6 \omega_2 u v \omega_1 + \frac{1}{2} \omega_2 u \omega_1^2 - \frac{1}{2} \omega_2 \omega_3^2 v + \frac{1}{4} \omega_3 \omega_4 \omega_1 - 3 \omega_3 v \omega_4 + \frac{1}{2} \omega_2 u \omega_3 \omega_1 - \omega_2 \omega_3 - \omega_2 u \omega_3 v \omega_1 + v \omega_4^2 \omega_1 + 2 u \omega_3^2 - \\
& 2 u \omega_3 v \omega_4^2 + \frac{1}{2} u \omega_4 \omega_1^2 + 2 \omega_3 - 4 \omega_2 u v^2 \omega_4 \omega_1 - 2 v \omega_4^2 - \frac{1}{2} \omega_2 \omega_3 v + \omega_2 u \omega_3 v \omega_4 + \omega_2^2 u \omega_3 v - \frac{1}{2} \omega_2 u \omega_3 \omega_4 + 2 u^2 \omega_3^2 v \omega_4 - \\
& 2 u^2 \omega_1^2 + \omega_2 u^2 \omega_3^2 - \frac{1}{2} \omega_2 v \omega_4 \omega_1 - 2 \omega_2^2 u \omega_3 v^2 - 2 \omega_2 u^2 v \omega_1^2 + \frac{1}{4} \omega_2 \omega_3 \omega_1 - 2 \omega_2 u \omega_3 v^2 \omega_4 + \frac{1}{4} \omega_3 \omega_4 + 2 \omega_2 u \omega_3^2 v + \\
& \frac{1}{2} \omega_3 v \omega_4 \omega_1 - \omega_4 \omega_1 + 4 v \omega_4 + \omega_2^2 \omega_3 v^2 - 3 u \omega_4 \omega_1 + 6 u \omega_3 v \omega_4 - \omega_2^2 u v \omega_1 - \frac{1}{2} \omega_3^2 + 2 \omega_4 + 2 u v \omega_4^2 \omega_1 + 4 u^2 \omega_3 \omega_1 + \\
& 4 \omega_2 v^2 \omega_4 + 2 u^2 v \omega_4 \omega_1^2 + \frac{1}{2} u \omega_3 \omega_4 \omega_1 - 4 \omega_2 v - 2 \omega_2 u \omega_1 + \omega_1 + \frac{1}{4} \omega_2 \omega_3 \omega_4 + \omega_3 v \omega_4^2 - 4 u \omega_3 - u \omega_3^2 \omega_4 + \frac{1}{4} \omega_2 \omega_3^2 - \frac{1}{2} \omega_2^2 v \omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y+\delta_l}^{[\mu_1], t-2\delta_t} = & 1 - 2 \omega_2 u^2 \omega_3^2 v + \frac{1}{2} c_s^2 \omega_3 \omega_4 \omega_1 - c_s^2 \omega_3 v \omega_4 + \omega_3 \omega_1 - \omega_2 u^2 \omega_1 + 3 \omega_2 u^2 \omega_3 v \omega_1 - c_s^2 \omega_2 \omega_3 v \omega_1 - u^2 \omega_3 + \\
& \omega_2 \omega_3 v \omega_1 + 4 \omega_2 u^2 v^2 \omega_1^2 - 2 u^2 v^2 \omega_4 \omega_1^2 + u^2 \omega_3 v \omega_4 \omega_1 - u^2 \omega_4 \omega_1 + \frac{1}{2} \omega_3 \omega_4 - 2 \omega_2 v \omega_1 + \frac{1}{2} v^2 \omega_4 + \frac{1}{2} \omega_2 v \omega_1^2 + \\
& \frac{1}{2} \omega_2 u^2 \omega_3 \omega_1 + c_s^2 \omega_3 + \frac{1}{2} c_s^2 \omega_2 \omega_3 \omega_1 - \frac{1}{2} \omega_2 - c_s^2 \omega_3 \omega_1 - 2 u^2 \omega_3^2 v \omega_4 + \frac{1}{2} \omega_2 \omega_1 - \omega_2 \omega_3 v + v \omega_4 \omega_1 - \frac{1}{2} c_s^2 \omega_3 \omega_4 - \\
& 4 c_s^2 u^2 \omega_3 \omega_4 \omega_1 + 4 \omega_2 u^2 \omega_3^2 v^2 + \frac{1}{2} u^2 \omega_3 \omega_4 \omega_1 + u^2 \omega_3 v \omega_4 - \omega_2 v^2 - \frac{1}{2} \omega_3 \omega_4 \omega_1 + \omega_3 v \omega_4 + \frac{1}{2} \omega_2 \omega_3 + c_s^2 \omega_4 \omega_1 - \\
& \omega_3 - 2 u^2 v \omega_4 \omega_1 - \frac{1}{2} c_s^2 \omega_4 - v^2 \omega_4 \omega_1 - \omega_2 v^2 \omega_1^2 + 2 c_s^2 u^2 \omega_3 \omega_4 + 2 \omega_2 u^2 v \omega_1 - 2 \omega_2 u^2 v \omega_1^2 - \frac{1}{2} \omega_2 \omega_3 \omega_1 + 2 u^2 \omega_1 + \\
& c_s^2 \omega_3 v \omega_4 \omega_1 - \frac{1}{2} c_s^2 \omega_2 \omega_3 - \omega_3 v \omega_4 \omega_1 + \frac{1}{2} \omega_2 u^2 \omega_3 + \frac{1}{2} \omega_4 \omega_1 + 2 \omega_2 v^2 \omega_1 + \frac{1}{2} u^2 \omega_3 \omega_4 + \frac{1}{2} v^2 \omega_4 \omega_1^2 - v \omega_4 + \\
& 2 c_s^2 u^2 \omega_4 \omega_1^2 + 4 u^2 \omega_3 v^2 \omega_4 \omega_1 + c_s^2 \omega_2 \omega_3 v - \omega_2 u^2 \omega_3 v - \frac{1}{2} \omega_4 - \frac{1}{2} c_s^2 \omega_4 \omega_1^2 - u^2 \omega_3 \omega_1 - 8 \omega_2 u^2 \omega_3 v^2 \omega_1 + \frac{3}{2} \omega_2 v - \omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y+\delta_l}^{[\mu_5], t-2\delta_t} = & -2 + 4 \omega_2 u^2 \omega_3^2 v - \omega_3 \omega_1 - 8 \omega_2 u^2 \omega_3 v \omega_1 + v \omega_4 \omega_1^2 - \omega_2 \omega_3 v \omega_1 + \frac{1}{2} \omega_2 \omega_1^2 + 8 u^2 \omega_3 v \omega_4 \omega_1 - \frac{1}{2} \omega_3 \omega_4 + \\
& 3 \omega_2 v \omega_1 - 2 u^2 \omega_3^2 \omega_4 - \omega_1^2 - \omega_2 v \omega_1^2 + 4 \omega_2 u^2 \omega_3 \omega_1 + \omega_2 - \frac{3}{2} \omega_2 \omega_1 - 2 u^2 \omega_4 \omega_1^2 + \omega_2 \omega_3 v - 2 \omega_2 u^2 \omega_1^2 - 3 v \omega_4 \omega_1 + \\
& 4 u^2 \omega_3^2 + 4 u^2 \omega_3 \omega_4 \omega_1 + \frac{1}{2} \omega_3 \omega_4 \omega_1 - \omega_3 v \omega_4 - \frac{1}{2} \omega_2 \omega_3 + \omega_3 + \frac{1}{2} \omega_4 \omega_1^2 - 4 u^2 \omega_3^2 v \omega_4 + 4 u^2 \omega_1^2 - 2 \omega_2 u^2 \omega_3^2 + \\
& 4 \omega_2 u^2 v \omega_1^2 + \frac{1}{2} \omega_2 \omega_3 \omega_1 + \omega_3 v \omega_4 \omega_1 - \frac{3}{2} \omega_4 \omega_1 + 2 v \omega_4 + \omega_4 - 8 u^2 \omega_3 \omega_1 - 4 u^2 v \omega_4 \omega_1^2 - 2 \omega_2 v + 3 \omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l, y+\delta_l}^{[\mu_1], t-2\delta_t} = & 1 - \frac{1}{2} u v \omega_4 \omega_1 + \omega_2 u^2 \omega_3^2 v + \frac{1}{4} \omega_3 v^2 \omega_4 \omega_1 - \frac{1}{2} c_s^2 \omega_3 \omega_4 \omega_1 + \omega_2^2 u v \omega_1 - \frac{5}{2} u \omega_3 v^2 \omega_4 - \frac{1}{2} \omega_2 u v \omega_1^2 + \\
& \frac{1}{2} c_s^2 \omega_3 v \omega_4 - \frac{1}{4} \omega_2 v^2 \omega_4 \omega_1 - \frac{1}{2} c_s^2 v \omega_4 \omega_1 - 3 \omega_2 u \omega_3 v^3 \omega_4 + \frac{1}{2} c_s^2 u \omega_4 \omega_1^2 + \frac{1}{2} \omega_2 u^2 \omega_1 + \frac{5}{2} \omega_2 \omega_3 v^2 - \frac{3}{2} \omega_2 u^2 \omega_3 v \omega_1 - \\
& v^3 \omega_4^2 + \frac{1}{2} u \omega_3 \omega_4 - \frac{1}{2} \omega_2^2 v^2 \omega_1 + \frac{1}{2} c_s^2 \omega_2 \omega_3 v \omega_1 + \frac{1}{2} u^2 \omega_3 + \frac{1}{4} \omega_2 \omega_3 v \omega_1 + \frac{1}{4} \omega_3 v^2 \omega_4^2 - \frac{1}{2} u \omega_3 v \omega_4 \omega_1 - \frac{1}{4} c_s^2 \omega_3 \omega_4^2 - \\
& 2 \omega_2 u^2 v \omega_1^2 + \frac{1}{2} u \omega_1 + \frac{1}{2} u \omega_3 \omega_1 + u^2 v^2 \omega_4 \omega_1^2 + \frac{1}{2} c_s^2 \omega_2 \omega_3 v \omega_4 - \frac{5}{2} \omega_2 u \omega_3 v + \frac{1}{2} \omega_2 u \omega_3 - \frac{1}{2} u v^2 \omega_4 \omega_1 + \\
& 3 \omega_2 u v \omega_4 \omega_1 - \frac{1}{2} u^2 \omega_3 v \omega_4 \omega_1 + \frac{1}{2} u^2 \omega_4 \omega_1 + \frac{1}{4} \omega_3 \omega_4 + \frac{1}{2} c_s^2 \omega_2 \omega_4 + u \omega_3 v^3 \omega_4^2 - \frac{3}{4} \omega_2 v \omega_1 + \frac{3}{2} v^2 \omega_4 - \frac{1}{4} \omega_2 u^2 \omega_3 \omega_1 + \\
& \frac{1}{2} v^2 \omega_4 \omega_1 + \omega_2^2 v^3 \omega_1 - \frac{1}{2} c_s^2 \omega_3 \omega_1 + \frac{1}{4} c_s^2 \omega_2 \omega_3 \omega_1 + \frac{1}{2} \omega_3 v^3 \omega_4^2 - \frac{1}{2} \omega_2 \omega_1 + \frac{1}{2} c_s^2 \omega_2 u \omega_4 \omega_1 - 2 \omega_2^2 v^3 - \frac{1}{2} v^2 \omega_4^2 + \\
& \frac{1}{2} c_s^2 \omega_3 \omega_1 + u^2 \omega_2^2 v^2 \omega_4 + \frac{1}{4} \omega_2 \omega_1 - \frac{1}{2} \omega_2 u \omega_3 v^2 \omega_4 + 5 \omega_2 u \omega_3 v^2 - c_s^2 \omega_2 u v \omega_4 \omega_1 - 2 \omega_2 u^2 v \omega_1^2 - \frac{5}{4} \omega_2 \omega_3 v + \omega_2^2 v^2 - \\
& \frac{5}{2} c_s^2 u \omega_4 \omega_1 + \frac{1}{2} v \omega_4 \omega_1 + \omega_2 u \omega_3 v^2 \omega_1 + \frac{3}{2} c_s^2 \omega_3 \omega_4 - \frac{5}{4} \omega_3 v^2 \omega_4 + 2 c_s^2 u^2 \omega_3 \omega_4 \omega_1 - 2 \omega_2 u^2 \omega_3 v^2 - \frac{1}{4} c_s^2 \omega_4^2 \omega_1 + \\
& \frac{1}{2} u \omega_3 v^2 \omega_4^2 - \frac{1}{4} u^2 \omega_3 \omega_4 \omega_1 - \frac{1}{2} u^2 \omega_3 v \omega_4 - \frac{1}{2} c_s^2 \omega_3 v \omega_4^2 - \frac{1}{4} c_s^2 \omega_2 \omega_3 \omega_4 + 2 \omega_2 u v \omega_1 - c_s^2 u \omega_3^2 \omega_4 - \frac{1}{4} c_s^2 \omega_2 \omega_4 \omega_1 -
\end{aligned}$$

$$\begin{aligned}
& 3\omega_2v^2 + \frac{1}{2}c_s^2u\omega_4^2\omega_1 + \frac{1}{4}\omega_2\omega_3^2v + \frac{1}{2}\omega_3vw_4 - \frac{1}{4}c_s^2\omega_3^2\omega_4 - \frac{1}{4}\omega_2\omega_3\omega_1 + \frac{1}{4}\omega_2\omega_3 - c_s^2\omega_2vw_4 - c_s^2u\omega_3v\omega_4^2 + \\
& \frac{3}{4}c_s^2\omega_4\omega_1 - \frac{1}{2}\omega_3 + u^2v\omega_4\omega_1 + \frac{5}{2}c_s^2u\omega_3\omega_4 - \frac{3}{2}\omega_2\omega_3v^3\omega_4 - uv^3\omega_4^2\omega_1 + \frac{1}{2}\omega_2uv^2\omega_4\omega_1 - 5\omega_2uv^2\omega_1 + \frac{1}{4}\omega_3^2v^2\omega_4 - \\
& \frac{3}{2}c_s^2\omega_4 - \frac{3}{4}v^2\omega_4\omega_1 - c_s^2u^2\omega_3^2\omega_4 + 3\omega_2v^3\omega_4 - \frac{1}{2}c_s^2\omega_2u\omega_3\omega_4 - \omega_2u^2v\omega_1 - \frac{3}{2}\omega_2v^3\omega_4\omega_1 - 2\omega_2u\omega_3^2v^2 + \\
& c_s^2\omega_2u\omega_3v\omega_4 - \frac{1}{2}uv^2\omega_4\omega_1^2 - \omega_2^2u\omega_3v^2 + \omega_2u^2v\omega_1^2 - u^2\omega_1 + \frac{1}{2}c_s^2\omega_2v\omega_4\omega_1 - \frac{1}{4}\omega_2\omega_3v^2\omega_4 - \frac{1}{2}c_s^2\omega_3v\omega_4\omega_1 + \\
& u\omega_3^2v^2\omega_4 + \frac{5}{2}uv^2\omega_4\omega_1 + \frac{1}{4}c_s^2\omega_2\omega_3 + \omega_2u\omega_3^2v - \frac{1}{4}\omega_2u^2\omega_3 - \frac{1}{2}u\omega_3v^2\omega_4\omega_1 + \frac{1}{4}\omega_4\omega_1 + \frac{3}{2}\omega_2v^2\omega_1 - \frac{1}{4}u^2\omega_3\omega_4 + \\
& \frac{1}{2}c_s^2\omega_4^2 - v\omega_4 - c_s^2u^2\omega_4\omega_1^2 - \frac{1}{2}\omega_2^2\omega_3v^2 - \frac{1}{4}u\omega_4\omega_1 + c_s^2uv\omega_4^2\omega_1 - 2u^2\omega_3v^2\omega_4\omega_1 + u\omega_3v\omega_4 - \frac{1}{2}c_s^2\omega_2\omega_3v + \\
& \frac{1}{2}\omega_2u^2\omega_3v - \frac{1}{2}\omega_4 + \frac{1}{2}u^2\omega_3\omega_1 + c_s^2v\omega_4^2 + \frac{1}{2}\omega_2v^2\omega_4 - \frac{1}{2}c_s^2u\omega_3\omega_4\omega_1 + \omega_2uv^2\omega_1^2 - \frac{1}{4}u\omega_3\omega_4\omega_1 + \\
& 2\omega_2^2u\omega_3v^3 + 4\omega_2u^2\omega_3v^2\omega_1 + \omega_2^2\omega_3v^3 + \frac{1}{2}v^3\omega_4^2\omega_1 - \frac{1}{2}\omega_2\omega_3^2v^2 + \frac{3}{2}\omega_2v - \frac{1}{4}\omega_2u\omega_1 - \frac{1}{2}\omega_2\omega_3v^2\omega_1 - u\omega_3,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l,y+\delta_l}^{[\mu_5],t-2\delta_t} = & -2 + \frac{1}{4}\omega_2\omega_4\omega_1 + 6uv\omega_4\omega_1 - \frac{1}{2}\omega_4^2 - 2\omega_2u^2\omega_3^2v - 2\omega_2^2uv^2\omega_1 - \frac{1}{2}u\omega_4^2\omega_1 + \omega_2uv\omega_1^2 - 2\omega_2v^2\omega_4\omega_1 + \omega_2v\omega_4 - \frac{1}{2}\omega_3\omega_1 + \\
& \omega_2^2v + 4\omega_2u^2\omega_3v\omega_1 - 3u\omega_3\omega_4 + \omega_2^2v^2\omega_1 - \frac{1}{2}\omega_2\omega_3v\omega_1 + \omega_3v^2\omega_4^2 - u\omega_3v\omega_4\omega_1 - \frac{1}{2}\omega_2\omega_3v\omega_4 - 4u\omega_1 + u\omega_3\omega_1 + \\
& 6\omega_2u\omega_3v - 2\omega_2u\omega_3 - 2uv^2\omega_4^2\omega_1 - 4u^2\omega_3v\omega_4\omega_1 + 2u\omega_3^2v\omega_4 - \frac{3}{2}\omega_3\omega_4 + \frac{1}{4}\omega_4^2\omega_1 + 2\omega_2v\omega_1 + u^2\omega_3^2\omega_4 - 2\omega_2u^2\omega_3\omega_1 + \\
& v^2\omega_4^2\omega_1 + \frac{1}{2}\omega_3^2v\omega_4 + \omega_2 - \frac{1}{2}\omega_2u\omega_4\omega_1 - 2v^2\omega_4^2 + u\omega_1^2 + \omega_2uv\omega_4\omega_1 - \frac{1}{2}\omega_2\omega_1 - 4\omega_2u\omega_3v^2\omega_4 + \omega_2u\omega_3^2 + \frac{1}{4}\omega_3\omega_4^2 + \\
& u^2\omega_4\omega_1^2 + 3\omega_2\omega_3v + \omega_2u^2\omega_1^2 - 2\omega_2^2v^2 - 2v\omega_4\omega_1 - 2u^2\omega_3^2 + \frac{1}{2}u\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_4 - uv\omega_4\omega_1^2 + 2u\omega_3v^2\omega_4^2 - 2u^2\omega_3\omega_4\omega_1 - \\
& 6\omega_2u\omega_1 - \frac{1}{2}\omega_2u\omega_1^2 - \frac{1}{2}\omega_2\omega_3^2v + \frac{1}{4}\omega_3\omega_4\omega_1 - 3\omega_3v\omega_4 - \frac{1}{2}\omega_2u\omega_3\omega_1 - \omega_2\omega_3 + \omega_2u\omega_3v\omega_1 + v\omega_4^2\omega_1 - 2u\omega_3^2 + \\
& 2u\omega_3v\omega_4^2 - \frac{1}{2}u\omega_4\omega_1^2 + 2\omega_3 + 4\omega_2uv\omega_4\omega_1 - 2v\omega_4^2 - \frac{1}{2}\omega_2\omega_3v - \omega_2u\omega_3v\omega_4 - \omega_2^2u\omega_3v + \frac{1}{2}\omega_2u\omega_3\omega_4 + 2u^2\omega_3^2v\omega_4 - \\
& 2u^2\omega_1^2 + \omega_2u^2\omega_3^2 - \frac{1}{2}\omega_2v\omega_4\omega_1 + 2\omega_2^2u\omega_3v^2 - 2\omega_2u^2v\omega_1^2 + \frac{1}{4}\omega_2\omega_3\omega_1 - 2\omega_2u\omega_3v^2\omega_4 + \frac{1}{4}\omega_3\omega_4 - 2\omega_2u\omega_3^2v + \\
& \frac{1}{2}\omega_3v\omega_4\omega_1 - \omega_4\omega_1 + 4v\omega_4 + \omega_2^2\omega_3v^2 + 3u\omega_4\omega_1 - 6u\omega_3v\omega_4 + \omega_2^2uv\omega_1 - \frac{1}{2}\omega_3^2 + 2\omega_4 - 2uv\omega_4^2\omega_1 + 4u^2\omega_3\omega_1 + \\
& 4\omega_2v^2\omega_4 + 2u^2v\omega_4\omega_1^2 - \frac{1}{2}u\omega_3\omega_4\omega_1 - 4\omega_2v + 2\omega_2u\omega_1 + \omega_1 + \frac{1}{4}\omega_2\omega_3\omega_4 + \omega_3v\omega_4^2 + 4u\omega_3 + u\omega_3^2\omega_4 + \frac{1}{4}\omega_2\omega_3^2 - \frac{1}{2}\omega_2^2v\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_1],t-3\delta_t} = & -1 - 3\omega_3v^2\omega_4\omega_1 + 3c_s^2\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_2v^2\omega_4\omega_1 - c_s^2v\omega_4^2\omega_1 - \omega_3\omega_1 - 5\omega_2\omega_3v^2 - v^3\omega_4^2 + \omega_2^2v^2\omega_1 + \\
& 3\omega_2\omega_3v\omega_1 - \frac{1}{2}\omega_3v^2\omega_4^2 + \frac{1}{2}c_s^2\omega_3\omega_4^2 + c_s^2\omega_2\omega_3v\omega_4 - \frac{1}{2}c_s^2\omega_2\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4 + c_s^2\omega_3v\omega_4^2\omega_1 - \frac{1}{2}c_s^2\omega_2\omega_4 - \\
& \frac{5}{2}\omega_2v\omega_1 - \omega_2\omega_3^2v^2\omega_1 - 2\omega_2^2\omega_3v^3\omega_1 - 2v^2\omega_4 + \frac{1}{2}\omega_2v\omega_1^2 - \frac{1}{2}v^2\omega_4^2\omega_1 + 2\omega_2^2v^3\omega_1 + \omega_3v^3\omega_4^2 + \frac{1}{2}\omega_2 - 2\omega_2^2v^3 + \\
& \frac{1}{2}v^2\omega_4^2 - \omega_3v^3\omega_4^2\omega_1 - \frac{1}{2}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_3v^2\omega_4\omega_1 - \frac{5}{2}\omega_2\omega_3v - \omega_2^2v^2 - \omega_2^2\omega_3v^2\omega_1 + v\omega_4\omega_1 - \frac{5}{2}c_s^2\omega_3\omega_4 + \\
& \frac{5}{2}\omega_3v^2\omega_4 - \frac{1}{2}\omega_2\omega_3v\omega_1^2 + \frac{1}{2}\omega_3v^2\omega_4\omega_1^2 + \frac{1}{2}c_s^2\omega_4^2\omega_1 - \frac{1}{2}c_s^2\omega_3\omega_4\omega_1^2 - c_s^2\omega_3v\omega_4^2 + \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 + \\
& \frac{1}{2}c_s^2\omega_2\omega_4\omega_1 + 4\omega_2v^2 + \frac{1}{2}\omega_2\omega_3^2v + \frac{1}{2}\omega_3\omega_4\omega_1 + \omega_3v\omega_4 - \omega_2\omega_3v^2\omega_1^2 + \frac{1}{2}c_s^2\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_3 - c_s^2\omega_2v\omega_4 - \\
& c_s^2\omega_2\omega_3v\omega_4\omega_1 - \frac{5}{2}c_s^2\omega_4\omega_1 + \omega_3 + \frac{1}{2}\omega_3v^2\omega_4\omega_1 - 3\omega_2\omega_3v^3\omega_4 - \frac{1}{2}\omega_3^2v^2\omega_4 + 2c_s^2\omega_4 + \frac{5}{2}v^2\omega_4\omega_1 + \omega_2v^2\omega_1^2 + \\
& 3\omega_2v^3\omega_4 - 3\omega_2v^3\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_3\omega_1 + c_s^2\omega_2v\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_3v^2\omega_4 - \frac{1}{2}c_s^2\omega_3^2\omega_4\omega_1 - \omega_3v\omega_4\omega_1 - \frac{1}{2}\omega_2\omega_3^2v\omega_1 - \\
& \frac{1}{2}\omega_4\omega_1 - 5\omega_2v^2\omega_1 - \frac{1}{2}c_s^2\omega_4^2 - \frac{1}{2}v^2\omega_4\omega_1^2 - v\omega_4 + \omega_2^2\omega_3v^2 - \frac{1}{2}c_s^2\omega_3\omega_4^2\omega_1 + \frac{1}{2}\omega_3v^2\omega_4^2\omega_1 + 3\omega_2\omega_3v^3\omega_4\omega_1 + \\
& \frac{1}{2}\omega_4 + \frac{1}{2}c_s^2\omega_4\omega_1^2 + c_s^2v\omega_4^2 - \frac{1}{2}\omega_2v^2\omega_4 + 2\omega_2^2\omega_3v^3 + v^3\omega_4^2\omega_1 + \omega_2\omega_3^2v^2 + 2\omega_2v + \omega_1 + 6\omega_2\omega_3v^2\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_5],t-3\delta_t} = & 3 - \frac{1}{2}\omega_2\omega_4\omega_1 + \frac{1}{2}\omega_4^2 + 4\omega_2v^2\omega_4\omega_1 + \omega_2v\omega_4 + 5\omega_3\omega_1 + \omega_2^2v - 2\omega_2^2v^2\omega_1 + v\omega_4\omega_1^2 - 7\omega_2\omega_3v\omega_1 - \\
& 2\omega_3v^2\omega_4^2 - \frac{1}{2}\omega_2\omega_1^2 - \omega_2\omega_3v\omega_4 + \frac{1}{2}\omega_2\omega_3^2\omega_1 - 2\omega_3v\omega_4^2\omega_1 + 3\omega_3\omega_4 + \frac{1}{2}\omega_2\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_4^2\omega_1 + 6\omega_2v\omega_1 + \omega_1^2 - \\
& \omega_2v\omega_1^2 - 2v^2\omega_4^2\omega_1 + \omega_2^2v\omega_4 - \frac{3}{2}\omega_2 + \frac{1}{2}\omega_3v\omega_4\omega_1 + 2v^2\omega_4^2 + 2\omega_2\omega_1 - 4\omega_2\omega_3v^2\omega_4\omega_1 - \omega_2^2v\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4^2 + \\
& 6\omega_2\omega_3v + \frac{1}{2}\omega_3\omega_4^2\omega_1 + 2\omega_2^2v^2 + 2\omega_2^2\omega_3v^2\omega_1 - \omega_3\omega_1^2 - 6v\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_4 + \omega_2\omega_3v\omega_1^2 + \omega_2^2\omega_3v\omega_1 - \omega_2\omega_3^2v - \\
& \frac{7}{2}\omega_3\omega_4\omega_1 - 6\omega_3v\omega_4 + 2\omega_2\omega_3 + 2v\omega_4\omega_1 - 4\omega_3 + \omega_2\omega_3v\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_1^2 - 2v\omega_4^2 - \omega_2^2\omega_3v + \frac{1}{2}\omega_2\omega_3\omega_1^2 - \\
& \omega_3v\omega_4\omega_1^2 - \omega_2v\omega_4\omega_1 - \frac{5}{2}\omega_2\omega_3\omega_1 + 4\omega_2\omega_3v^2\omega_4 - \frac{1}{2}\omega_3^2\omega_4 + 7\omega_3v\omega_4\omega_1 + \omega_2\omega_3^2v\omega_1 + 3\omega_4\omega_1 + 5v\omega_4 - 2\omega_2^2\omega_3v^2 + \\
& \omega_3^2 + 2\omega_3v^2\omega_4\omega_1 - \frac{5}{2}\omega_4 - 4\omega_2v^2\omega_4 + \frac{1}{2}\omega_3\omega_4\omega_1^2 - \omega_3\omega_1 - 5\omega_2v - 4\omega_1 - \frac{1}{2}\omega_2\omega_3\omega_4 + 2\omega_3v\omega_4^2 - \frac{1}{2}\omega_2\omega_3^2 - \omega_2^2v\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l,y}^{[\mu_1],t-3\delta_t} = & -2 + \frac{1}{2}\omega_2\omega_4\omega_1 - \frac{1}{2}\omega_2^2u^2\omega_3 - \frac{1}{2}\omega_3v^2\omega_4\omega_1 - 2\omega_2u^2\omega_3^2v^2\omega_4 + c_s^2\omega_3\omega_4\omega_1 + 8\omega_2u^2v^2\omega_4\omega_1 + 2u^2\omega_3v^2\omega_4^2\omega_1 - \\
& 5u\omega_3v^2\omega_4 - \frac{1}{2}c_s^2\omega_2\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_3^2v^2\omega_4 + 6\omega_2v^2\omega_4\omega_1 + 2\omega_2^2u^2\omega_3v^2 + c_s^2u\omega_4\omega_1^2 - 3\omega_2v^2\omega_1 - 5\omega_2\omega_3v^2 + \\
& \frac{1}{2}\omega_2^2u\omega_3\omega_1 + u\omega_3\omega_4 - \omega_2^2v\omega_1 - u^2\omega_3 - \frac{5}{2}\omega_3v^2\omega_4^2 + \frac{1}{2}c_s^2\omega_3\omega_4^2 + 4\omega_2u^2v^2\omega_1^2 + u\omega_1 + \omega_2^2v^2\omega_4 + u\omega_3\omega_1 + \\
& \omega_2u\omega_3v^2\omega_4^2 - 2u^2v^2\omega_4\omega_1^2 - \frac{1}{2}\omega_2u^2\omega_3\omega_4\omega_1 + 3\omega_2\omega_3 - c_s^2\omega_2\omega_3\omega_4\omega_1 - 3uv^2\omega_4\omega_1 + 4c_s^2\omega_2u^2\omega_3\omega_4\omega_1 + \\
& \frac{1}{2}c_s^2\omega_2\omega_3 - u^2\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4 + c_s^2\omega_2^2\omega_3\omega_4 - 4c_s^2\omega_2\omega_4 - 2u\omega_3v^2\omega_4\omega_1 + \frac{1}{2}\omega_2^2u\omega_1 - 3v^2\omega_4 - c_s^2\omega_2\omega_4\omega_1^2 + \\
& \frac{3}{2}\omega_2u^2\omega_3\omega_1 - \frac{5}{2}v^2\omega_4\omega_1 - \omega_2^2 + c_s^2\omega_3 + \frac{3}{2}c_s^2\omega_2\omega_3\omega_1 + 3\omega_2 + \frac{1}{2}\omega_2u\omega_4\omega_1 + 6c_s^2\omega_2u\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_2^2\omega_4\omega_1 + \\
& 5v^2\omega_4^2 - c_s^2\omega_3\omega_1 + 2c_s^2\omega_2\omega_3\omega_4^2 - 2u^2\omega_3^2v^2\omega_4 - \frac{3}{2}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_3v^2\omega_4\omega_1 - 14\omega_2u\omega_3v^2\omega_4 - 2\omega_2^2u\omega_3v^2\omega_1 + \\
& 10\omega_2u\omega_3v^2 - 2c_s^2\omega_2^2\omega_3v^2 + c_s^2\omega_2\omega_4^2 - \frac{1}{2}\omega_2\omega_3v^2\omega_4 - 4c_s^2\omega_2\omega_3v^2\omega_4\omega_1 + 2\omega_2^2v^2 - 5c_s^2u\omega_4\omega_1 + \omega_2^2u\omega_3v^2\omega_4 - \\
& \frac{1}{2}c_s^2\omega_2\omega_4\omega_1 + 2c_s^2\omega_2^2\omega_3v^2\omega_1 + \frac{1}{2}\omega_2^2\omega_3 + 2\omega_2u\omega_3v^2\omega_1 - 3c_s^2\omega_3\omega_4 - \omega_2\omega_4 + \frac{5}{2}\omega_3v^2\omega_4 - 4c_s^2u^2\omega_3\omega_4\omega_1 + \\
& 3\omega_2u\omega_3v^2\omega_4\omega_1 + 4\omega_2u^2\omega_3^2v^2 + \frac{1}{2}c_s^2\omega_4\omega_1 + 5u\omega_3v^2\omega_4^2 + \frac{1}{2}u^2\omega_3\omega_4\omega_1 - 2\omega_2u^2v^2\omega_4\omega_1 + \frac{7}{2}c_s^2\omega_2\omega_3\omega_4\omega_1 -
\end{aligned}$$

$$\begin{aligned}
& w_2uv^2\omega_4^2\omega_1 - 2c_s^2u\omega_3^2\omega_4 - \frac{1}{2}\omega_2u^2\omega_3\omega_4 + 2c_s^2\omega_2\omega_4\omega_1 + \omega_2u^2\omega_4\omega_1 + 6\omega_2v^2 + c_s^2u\omega_4^2\omega_1 + \frac{1}{2}c_s^2\omega_3^2\omega_4 - \\
& \frac{1}{2}c_s^2\omega_2^2\omega_3\omega_1 - \frac{3}{2}\omega_2u\omega_3\omega_1 - \frac{3}{2}\omega_2w_3 - \frac{1}{2}\omega_2^2v^2\omega_4\omega_1 - \frac{3}{2}c_s^2\omega_4\omega_1 + \omega_3 + 5c_s^2u\omega_3\omega_4 + 2\omega_2u\omega_3^2v^2\omega_4 + \omega_2v^2\omega_4^2 - \\
& \frac{1}{2}c_s^2\omega_2\omega_3^2\omega_4 + 10\omega_2uv^2\omega_4\omega_1 - 10\omega_2uv^2\omega_1 - 2c_s^2\omega_2u^2\omega_3^2\omega_4 - 2c_s^2\omega_3v^2\omega_4^2 - \frac{1}{2}\omega_3^2v^2\omega_4 + 3c_s^2\omega_4 - \frac{3}{2}v^2\omega_4\omega_1 - \\
& c_s^2\omega_2u\omega_4^2\omega_1 - \omega_2^2uv^2\omega_4\omega_1 + 2c_s^2u^2\omega_3^2\omega_4 - \omega_2u\omega_3\omega_4 - 4u^2v^2\omega_4^2\omega_1 - c_s^2\omega_2u\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_2\omega_3v^2\omega_4^2 + \frac{1}{2}\omega_2^2\omega_1 - \\
& \frac{1}{2}c_s^2\omega_2^2\omega_3\omega_4 - 6c_s^2\omega_2u\omega_3\omega_4 - 4\omega_2u\omega_3^2v^2 + \frac{1}{2}\omega_2u\omega_3\omega_4\omega_1 - uv^2\omega_4\omega_1^2 + 2\omega_2^2u^2\omega_3v^2\omega_1 + 4c_s^2\omega_2\omega_3v^2\omega_4 + \\
& 2\omega_2^2u\omega_3v^2 + c_s^2\omega_2u\omega_3\omega_4^2 + 2u^2\omega_1 + 7\omega_2\omega_3v^2\omega_4 - 4\omega_2^2u^2v^2\omega_1 + c_s^2\omega_2^2\omega_4 + 2u\omega_3^2v^2\omega_4 + 5uv^2\omega_4\omega_1 - \\
& \frac{3}{2}c_s^2\omega_2\omega_3 + \frac{3}{2}\omega_2u^2\omega_3 - 4\omega_2u^2\omega_3v^2\omega_4 - u\omega_3v^2\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_1 - 3\omega_2v^2\omega_1 + \frac{1}{2}u^2\omega_3\omega_4 - c_s^2\omega_2^2u\omega_4\omega_1 - c_s^2\omega_4^2 - \\
& \frac{1}{2}\omega_2^2u^2\omega_3\omega_1 + 2c_s^2u^2\omega_4\omega_1^2 + \omega_2^2u^2\omega_1 - \omega_2^2\omega_3v^2 - \frac{1}{2}\omega_4\omega_1 + 4u^2\omega_3v^2\omega_4\omega_1 + 2c_s^2\omega_3v^2\omega_4^2\omega_1 - \omega_2^2u\omega_3 + \omega_4 - \\
& u^2\omega_3\omega_1 - 12\omega_2v^2\omega_4 - c_s^2u\omega_3\omega_4^2 + c_s^2u\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_2v^2\omega_4^2\omega_1 + 2u^2\omega_3v^2\omega_4^2 - \omega_2uv^2\omega_4\omega_1^2 + 2\omega_2uv^2\omega_1^2 - \\
& \frac{1}{2}u\omega_3\omega_4\omega_1 - 2c_s^2\omega_2u^2\omega_4\omega_1^2 - 8\omega_2u^2\omega_3v^2\omega_1 + \omega_2\omega_3^2v^2 - \frac{3}{2}\omega_2u\omega_1 + \omega_1 + \frac{1}{2}\omega_2\omega_3\omega_4 + \omega_2\omega_3v^2\omega_1 - 2u\omega_3,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_t,y}^{[\mu_5],t-3\delta_t} = & 3 - \frac{5}{2}\omega_2\omega_4\omega_1 + \omega_4^2 - u\omega_4^2\omega_1 + \frac{1}{2}\omega_3\omega_1 - 6u\omega_3\omega_4 - \omega_2\omega_4^2 + \frac{1}{2}\omega_2\omega_3^2\omega_4 - 5u\omega_1 + u\omega_3\omega_1 - 4\omega_2u^2\omega_3\omega_4\omega_1 - \\
& \omega_2^2u\omega_3\omega_4 - 6\omega_2u\omega_3 + 3\omega_3\omega_4 + \frac{1}{2}\omega_2\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_4^2\omega_1 - 2u^2\omega_3^2\omega_4 + \frac{1}{2}\omega_2^2\omega_3\omega_4 + \omega_2u\omega_4\omega_1^2 - \omega_2^2u\omega_1 + \\
& 4\omega_2u^2\omega_3\omega_1 + \omega_2^2 - 4\omega_2 - 7\omega_2u\omega_4\omega_1 + \omega_2^2 + 2\omega_2\omega_1 - 2\omega_2u\omega_3\omega_4 + 2\omega_2u\omega_3^2 - \frac{1}{2}\omega_3\omega_4^2 - 2u^2\omega_4\omega_1^2 - 2\omega_2u^2\omega_1^2 + \\
& 2u^2\omega_3^2 + u\omega_3\omega_4^2 - \frac{1}{2}\omega_2^2\omega_3 + 5\omega_2\omega_4 + 4u^2\omega_3\omega_4\omega_1 - \omega_2u\omega_1^2 - \frac{1}{2}\omega_3\omega_4\omega_1 - \omega_2^2\omega_4 + \frac{1}{2}\omega_2\omega_3\omega_4^2 - \omega_2u\omega_3\omega_1 + \\
& 3\omega_2\omega_3 - 2u\omega_3^2 - u\omega_4\omega_1^2 - \frac{5}{2}\omega_3 + 2\omega_2u^2\omega_3^2\omega_4 + \omega_2u\omega_4\omega_1 + 7\omega_2u\omega_3\omega_4 - \frac{1}{2}\omega_2^2\omega_1 + 2u^2\omega_1^2 - 2\omega_2u^2\omega_3^2 + \\
& \omega_2u\omega_3\omega_4\omega_1 - \omega_2u\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_3\omega_1 - \frac{1}{2}\omega_3^2\omega_4 + \frac{1}{2}\omega_2^2\omega_4\omega_1 + \omega_2^2u\omega_4\omega_1 + 2\omega_4\omega_1 + 6u\omega_4\omega_1 + \frac{1}{2}\omega_3^2 + \omega_2^2u\omega_3 + \\
& \frac{1}{2}\omega_2\omega_4^2\omega_1 - 4\omega_4 - 4u^2\omega_3\omega_1 - u\omega_3\omega_4\omega_1 + 2\omega_2u^2\omega_4\omega_1^2 + 6\omega_2u\omega_1 - \frac{3}{2}\omega_1 - \frac{7}{2}\omega_2\omega_3\omega_4 + 5u\omega_3 + 2u\omega_3^2\omega_4 - \frac{1}{2}\omega_2\omega_3^2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_1],t-3\delta_t} = & -2 + \omega_2\omega_4\omega_1 + \omega_2^2u^2\omega_3 + 4\omega_2u^2\omega_3^2v^2\omega_4 - c_s^2\omega_3\omega_4\omega_1 - 16\omega_2u^2v^2\omega_4\omega_1 - 4u^2\omega_3v^2\omega_4^2\omega_1 - \omega_2^2\omega_3\omega_1 + 10\omega_2v^2\omega_4\omega_1 - \\
& 4\omega_2^2u^2\omega_3v^2 - 2\omega_3\omega_1 + 6\omega_2u^2\omega_1 - 4\omega_2^2v^2\omega_1 + 2u^2\omega_3 - 4\omega_3v^2\omega_4^2 - 8\omega_2u^2v^2\omega_1^2 + 4u^2v^2\omega_4\omega_1^2 + \omega_2u^2\omega_3\omega_4\omega_1 + \\
& c_s^2\omega_2\omega_3\omega_4\omega_1 - 8c_s^2\omega_2u^2\omega_3\omega_4\omega_1 - c_s^2\omega_2^2\omega_3 + 2u^2\omega_4\omega_1 - \omega_3\omega_4 - c_s^2\omega_2\omega_4 - \omega_2\omega_3\omega_4\omega_1 - v^2\omega_4 - 3\omega_2u^2\omega_3\omega_1 - \\
& 4v^2\omega_2^2\omega_1 - \omega_2^2 - 2c_s^2\omega_3 - 3c_s^2\omega_2\omega_3\omega_1 + 3\omega_2 + 4v^2\omega_4^2 + 2c_s^2\omega_3\omega_1 + 4u^2\omega_3^2v^2\omega_4 - 3\omega_2\omega_1 - 8\omega_2\omega_3v^2\omega_4\omega_1 + \\
& 4c_s^2\omega_2^2\omega_3v^2 + 8c_s^2\omega_2\omega_3v^2\omega_4\omega_1 + 4\omega_2^2v^2 + 4\omega_2^2\omega_3v^2\omega_1 - 4c_s^2\omega_2^2\omega_3v^2\omega_1 + \omega_2^2\omega_3 + c_s^2\omega_3\omega_4 - \omega_2\omega_4 + \\
& 8c_s^2u^2\omega_3\omega_4\omega_1 - 8\omega_2u^2\omega_3^2v^2 - u^2\omega_3\omega_4\omega_1 + 4\omega_2u^2v^2\omega_4\omega_1^2 - c_s^2\omega_2\omega_3\omega_4 + \omega_2u^2\omega_3\omega_4 - \omega_2v^2\omega_4\omega_1^2 + 2c_s^2\omega_2\omega_4\omega_1 - \\
& 2\omega_2u^2\omega_4\omega_1 + 2\omega_2v^2 + \omega_3\omega_4\omega_1 + c_s^2\omega_2^2\omega_3\omega_1 - 3\omega_2\omega_3 - 2c_s^2\omega_4\omega_1 + 2\omega_3 + 4c_s^2\omega_2u^2\omega_3^2\omega_4 + 4c_s^2\omega_3v^2\omega_4^2 + \\
& c_s^2\omega_4 + 2v^2\omega_4\omega_1 + 2\omega_2v^2\omega_1^2 - 4c_s^2u^2\omega_3^2\omega_4 + 8u^2v^2\omega_4^2\omega_1 + \omega_2^2\omega_1 - 4\omega_2^2u^2\omega_3v^2\omega_1 - 8c_s^2\omega_2\omega_3v^2\omega_4 + 3\omega_2\omega_3\omega_1 - \\
& 4u^2\omega_1 + 8\omega_2\omega_3v^2\omega_4 + 8\omega_2u^2v^2\omega_1 + 3c_s^2\omega_2\omega_3 - 3\omega_2u^2\omega_3 + 8\omega_2u^2\omega_3v^2\omega_4 - \omega_4\omega_1 - 4\omega_2v^2\omega_1 - u^2\omega_3\omega_4 - \\
& v^2\omega_4\omega_1^2 + \omega_2^2u^2\omega_3\omega_1 - 4c_s^2u^2\omega_4\omega_1^2 - 2\omega_2^2u^2\omega_1 - 4\omega_2^2\omega_3v^2 - 8u^2\omega_3v^2\omega_4\omega_1 - 4c_s^2\omega_3v^2\omega_4^2\omega_1 + 4\omega_3v^2\omega_4^2\omega_1 + \omega_4 + \\
& c_s^2\omega_4\omega_1^2 + 2u^2\omega_3\omega_1 - 9\omega_2v^2\omega_4 - 4u^2\omega_3v^2\omega_4^2 - c_s^2\omega_2\omega_4\omega_1^2 + 4c_s^2\omega_2u^2\omega_4\omega_1^2 + 16\omega_2u^2\omega_3v^2\omega_1 + 2\omega_1 + \omega_2\omega_3\omega_4,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_5],t-3\delta_t} = & 3 - 3\omega_2\omega_4\omega_1 + \omega_2^2\omega_3\omega_1 - 8\omega_2v^2\omega_4\omega_1 + 2\omega_3\omega_1 + 4\omega_2^2v^2\omega_1 + 4\omega_3v^2\omega_4^2 - \omega_2\omega_1^2 + 8\omega_2u^2\omega_3\omega_4\omega_1 + \\
& \omega_3\omega_4 + \omega_2\omega_3\omega_4\omega_1 + 4u^2\omega_3^2\omega_4 + \omega_1^2 - 8\omega_2u^2\omega_3\omega_1 + 4v^2\omega_4^2\omega_1 + \omega_2^2 - 4\omega_2 - 4v^2\omega_4^2 + 5\omega_2\omega_1 + \\
& 8\omega_2\omega_3v^2\omega_4\omega_1 + 4u^2\omega_4\omega_1^2 + 4\omega_2u^2\omega_1^2 - 4\omega_2^2v^2 - 4\omega_2^2\omega_3v^2\omega_1 - 4u^2\omega_3^2 - \omega_2^2\omega_3 + 2\omega_2\omega_4 + \omega_2\omega_4\omega_1^2 - \\
& 8u^2\omega_3\omega_4\omega_1 - \omega_3\omega_4\omega_1 + 3\omega_2\omega_3 - 2\omega_3 - 4\omega_2u^2\omega_3\omega_4 - \omega_4\omega_1^2 - \omega_2^2\omega_1 - 4u^2\omega_1^2 + 4\omega_2u^2\omega_3^2 - 3\omega_2\omega_3\omega_1 - \\
& 8\omega_2\omega_3v^2\omega_4 + 3\omega_4\omega_1 + 4\omega_2^2\omega_3v^2 - 4\omega_3v^2\omega_4^2\omega_1 - 2\omega_4 + 8u^2\omega_3\omega_1 + 8\omega_2v^2\omega_4 - 4\omega_2u^2\omega_4\omega_1^2 - 4\omega_1 - \omega_2\omega_3\omega_4,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_t,y}^{[\mu_1],t-3\delta_t} = & -2 + \frac{1}{2}\omega_2\omega_4\omega_1 - \frac{1}{2}\omega_2^2u^2\omega_3 - \frac{1}{2}\omega_3v^2\omega_4\omega_1 - 2\omega_2u^2\omega_3^2v^2\omega_4 + c_s^2\omega_3\omega_4\omega_1 + 8\omega_2u^2v^2\omega_4\omega_1 + 2u^2\omega_3v^2\omega_4^2\omega_1 + \\
& 5u\omega_3v^2\omega_4 - \frac{1}{2}c_s^2\omega_2\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_3^2v^2\omega_4 + 6\omega_2v^2\omega_4\omega_1 + 2\omega_2^2u^2\omega_3v^2 - c_s^2u\omega_4\omega_1^2 - 3\omega_2u^2\omega_1 - 5\omega_2\omega_3v^2 - \\
& \frac{1}{2}\omega_2^2\omega_3\omega_1 - u\omega_3\omega_4 - \omega_2^2v^2\omega_1 - u^2\omega_3 - \frac{5}{2}\omega_3v^2\omega_4^2 + \frac{1}{2}c_s^2\omega_3\omega_4^2 + 4\omega_2u^2v^2\omega_1^2 - u\omega_1 + \omega_2^2v^2\omega_4 - u\omega_3\omega_1 - \\
& \omega_2u\omega_3v^2\omega_4^2 - 2u^2v^2\omega_4\omega_1^2 - \frac{1}{2}\omega_2u^2\omega_3\omega_4\omega_1 - 3\omega_2u\omega_3 - c_s^2\omega_2\omega_3\omega_4\omega_1 + 3uv^2\omega_4^2\omega_1 + 4c_s^2\omega_2u^2\omega_3\omega_4\omega_1 + \\
& \frac{1}{2}c_s^2\omega_2^2\omega_3 - u^2\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4 - c_s^2\omega_2^2\omega_3\omega_4 - 4c_s^2\omega_2\omega_4 + 2u\omega_3v^2\omega_4^2\omega_1 - \frac{1}{2}\omega_2^2\omega_1 - 3v^2\omega_4 + c_s^2\omega_2\omega_4\omega_1^2 + \\
& \frac{3}{2}\omega_2u^2\omega_3\omega_1 - \frac{5}{2}v^2\omega_4^2\omega_1 - \omega_2^2 + c_s^2\omega_3 + \frac{3}{2}c_s^2\omega_2\omega_3\omega_1 + 3\omega_2 - \frac{1}{2}\omega_2u\omega_4\omega_1 - 6c_s^2\omega_2u\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_2^2\omega_4\omega_1 + \\
& 5v^2\omega_4^2 - c_s^2\omega_3\omega_1 - 2c_s^2\omega_2\omega_3\omega_4^2 - 2u^2\omega_3^2v^2\omega_4 - \frac{3}{2}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_3v^2\omega_4\omega_1 + 14\omega_2u\omega_3v^2\omega_4 + 2\omega_2^2u\omega_3v^2\omega_1 - \\
& 10\omega_2u\omega_3v^2 - 2c_s^2\omega_2^2\omega_3v^2 + c_s^2\omega_2\omega_4^2 - \frac{1}{2}\omega_2^2\omega_3v^2\omega_4 - 4c_s^2\omega_2\omega_3v^2\omega_4\omega_1 + 2\omega_2^2v^2 + 5c_s^2u\omega_4\omega_1 - \omega_2^2u\omega_3v^2\omega_4 - \\
& \frac{1}{2}c_s^2\omega_2\omega_4\omega_1 + 2c_s^2\omega_2^2\omega_3v^2\omega_1 + \frac{1}{2}\omega_2^2\omega_3 - 2\omega_2u\omega_3v^2\omega_1 - 3c_s^2\omega_3\omega_4 - \omega_2\omega_4 + \frac{5}{2}\omega_3v^2\omega_4 - 4c_s^2u^2\omega_3\omega_4\omega_1 - \\
& 3\omega_2u\omega_3v^2\omega_4\omega_1 + 4\omega_2u^2\omega_3^2v^2 + \frac{1}{2}c_s^2\omega_4\omega_1 - 5u\omega_3v^2\omega_4^2 + \frac{1}{2}u^2\omega_3\omega_4\omega_1 - 2\omega_2u^2v^2\omega_4\omega_1^2 + \frac{7}{2}c_s^2\omega_2\omega_3\omega_4 + \\
& \omega_2uv^2\omega_4^2\omega_1 + 2c_s^2u\omega_3\omega_4 - \frac{1}{2}\omega_2u^2\omega_3\omega_4 + 2c_s^2\omega_2\omega_4\omega_1 + \omega_2u^2\omega_4\omega_1 + 6\omega_2v^2 - c_s^2u\omega_4\omega_1 + \frac{1}{2}c_s^2\omega_3\omega_4 - \\
& \frac{1}{2}c_s^2\omega_2^2\omega_3\omega_1 + \frac{3}{2}\omega_2u\omega_3\omega_1 - \frac{3}{2}\omega_2\omega_3 - \frac{1}{2}\omega_2^2v^2\omega_4\omega_1 - \frac{3}{2}c_s^2\omega_4\omega_1 + \omega_3 - 5c_s^2u\omega_3\omega_4 - 2\omega_2u\omega_3^2v^2\omega_4 + \omega_2v^2\omega_4^2 -
\end{aligned}$$

$$\begin{aligned}
& \frac{1}{2}c_s^2\omega_2\omega_3^2\omega_4 - 10\omega_2uv^2\omega_4\omega_1 + 10\omega_2uv^2\omega_1 - 2c_s^2\omega_2u^2\omega_3^2\omega_4 - 2c_s^2\omega_3v^2\omega_4^2 - \frac{1}{2}\omega_3^2v^2\omega_4 + 3c_s^2\omega_4 + \frac{3}{2}v^2\omega_4\omega_1 + \\
& c_s^2\omega_2u\omega_4^2\omega_1 + \omega_2^2uv^2\omega_4\omega_1 + 2c_s^2u^2\omega_3^2\omega_4 + \omega_2u\omega_3\omega_4 - 4u^2v^2\omega_4^2\omega_1 + c_s^2\omega_2u\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_2\omega_3v^2\omega_4^2 + \frac{1}{2}\omega_2^2\omega_1 - \\
& \frac{1}{2}c_s^2\omega_2^2\omega_3\omega_4 + 6c_s^2\omega_2u\omega_3\omega_4 + 4\omega_2u\omega_3^2v^2 - \frac{1}{2}\omega_2u\omega_3\omega_4\omega_1 + uv^2\omega_4\omega_1^2 + 2\omega_2^2u^2\omega_3v^2\omega_1 + 4c_s^2\omega_2\omega_3v^2\omega_4 - \\
& 2\omega_2^2u\omega_3v^2 - c_s^2\omega_2u\omega_3\omega_4^2 + 2u^2\omega_1 + 7\omega_2\omega_3v^2\omega_4 - 4\omega_2^2u^2v^2\omega_1 + c_s^2\omega_2^2\omega_4 - 2u\omega_3^2v^2\omega_4 - 5uv^2\omega_4\omega_1 - \\
& \frac{3}{2}c_s^2\omega_2\omega_3 + \frac{3}{2}\omega_2u^2\omega_3 - 4\omega_2u^2\omega_3v^2\omega_4 + u\omega_3v^2\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_1 - 3\omega_2v^2\omega_1 + \frac{1}{2}u^2\omega_3\omega_4 + c_s^2\omega_2^2u\omega_4\omega_1 - c_s^2\omega_4^2 - \\
& \frac{1}{2}\omega_2^2u^2\omega_3\omega_1 + 2c_s^2u^2\omega_4\omega_1^2 + \omega_2^2u^2\omega_1 - \omega_2^2\omega_3v^2 + \frac{1}{2}u\omega_4\omega_1 + 4u^2\omega_3v^2\omega_4\omega_1 + 2c_s^2\omega_3v^2\omega_4^2\omega_1 + \omega_2^2u\omega_3 + \omega_4 - \\
& u^2\omega_3\omega_1 - 12\omega_2v^2\omega_4 + c_s^2u\omega_3\omega_4^2 - c_s^2u\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_2v^2\omega_4^2\omega_1 + 2u^2\omega_3v^2\omega_4^2 + u\omega_2v^2\omega_4\omega_1^2 - 2\omega_2u\omega_2^2\omega_1^2 + \\
& \frac{1}{2}u\omega_3\omega_4\omega_1 - 2c_s^2\omega_2u^2\omega_4\omega_1^2 - 8\omega_2u^2\omega_3v^2\omega_1 + \omega_2\omega_3^2v^2 + \frac{3}{2}\omega_2u\omega_1 + \omega_1 + \frac{1}{2}\omega_2\omega_3\omega_4 + \omega_2\omega_3v^2\omega_1 + 2u\omega_3,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l,y}^{[\mu_5],t-3\delta_t} = & 3 - \frac{5}{2}\omega_2\omega_4\omega_1 + \omega_4^2 + u\omega_4^2\omega_1 + \frac{1}{2}\omega_3\omega_1 + 6u\omega_3\omega_4 - \omega_2\omega_4^2 + \frac{1}{2}\omega_2\omega_3^2\omega_4 + 5u\omega_1 - u\omega_3\omega_1 - 4\omega_2u^2\omega_3\omega_4\omega_1 + \\
& \omega_2^2u\omega_3\omega_4 + 6\omega_2u\omega_3 + 3\omega_3\omega_4 + \frac{1}{2}\omega_2\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_4^2\omega_1 - 2u^2\omega_3^2\omega_4 + \frac{1}{2}\omega_2^2\omega_3\omega_4 - \omega_2u\omega_4\omega_1^2 + \omega_2^2u\omega_1 + \\
& 4\omega_2u^2\omega_3\omega_1 + \omega_2^2 - 4\omega_2 + 7\omega_2u\omega_4\omega_1 - \omega_1^2 + 2\omega_2\omega_1 + 2\omega_2u\omega_3^2\omega_4 - 2\omega_2u\omega_3^2 - \frac{1}{2}\omega_3\omega_4^2 - 2u^2\omega_4\omega_1^2 - 2\omega_2u^2\omega_1^2 + \\
& 2u^2\omega_3^2 - u\omega_3\omega_4^2 - \frac{1}{2}\omega_2^2\omega_3 + 5\omega_2\omega_4 + 4u^2\omega_3\omega_4\omega_1 + \omega_2u\omega_1^2 - \frac{1}{2}\omega_3\omega_4\omega_1 - \omega_2^2\omega_4 + \frac{1}{2}\omega_2\omega_3\omega_4^2 + \omega_2u\omega_3\omega_1 + \\
& 3\omega_2\omega_3 + 2u\omega_3^2 + u\omega_4\omega_1^2 - \frac{5}{2}\omega_3 + 2\omega_2u^2\omega_3^2\omega_4 - \omega_2u\omega_4\omega_1^2 - 7\omega_2u\omega_3\omega_4 - \frac{1}{2}\omega_2^2\omega_1 + 2u^2\omega_1^2 - 2\omega_2u^2\omega_3^2 - \\
& \omega_2u\omega_3\omega_4\omega_1 + \omega_2u\omega_3\omega_4^2 - \frac{1}{2}\omega_2\omega_3\omega_1 - \frac{1}{2}\omega_3^2\omega_4 + \frac{1}{2}\omega_2^2\omega_4\omega_1 - \omega_2^2u\omega_4\omega_1 + 2\omega_4\omega_1 - 6u\omega_4\omega_1 + \frac{1}{2}\omega_3^2 - \omega_2^2u\omega_3 + \\
& \frac{1}{2}\omega_2\omega_4^2\omega_1 - 4\omega_4 - 4u^2\omega_3\omega_1 + u\omega_3\omega_4\omega_1 + 2\omega_2u^2\omega_4\omega_1^2 - 6\omega_2u\omega_1 - \frac{3}{2}\omega_1 - \frac{7}{2}\omega_2\omega_3\omega_4 - 5u\omega_3 - 2u\omega_3^2\omega_4 - \frac{1}{2}\omega_2\omega_3^2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y+\delta_l}^{[\mu_5],t-3\delta_t} = & -1 - 3\omega_3v^2\omega_4\omega_1 + 3c_s^2\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_2v^2\omega_4\omega_1 + c_s^2v\omega_4^2\omega_1 - \omega_3\omega_1 - 5\omega_2\omega_3v^2 + v^3\omega_4^2 + \omega_2^2v^2\omega_1 - \\
& 3\omega_2\omega_3v\omega_1 - \frac{1}{2}\omega_3v^2\omega_4^2 + \frac{1}{2}c_s^2\omega_3\omega_4^2 - c_s^2\omega_2\omega_3v\omega_4 - \frac{1}{2}c_s^2\omega_2\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4 - c_s^2\omega_3v\omega_4^2\omega_1 - \frac{1}{2}c_s^2\omega_2\omega_4 + \\
& \frac{5}{2}\omega_2v\omega_1 - \omega_2\omega_3^2v^2\omega_1 + 2\omega_2^2\omega_3v^3\omega_1 - 2v^2\omega_4 - \frac{1}{2}\omega_2v\omega_1^2 - \frac{1}{2}v^2\omega_4^2\omega_1 - 2\omega_2^2v^3\omega_1 - \omega_3v^3\omega_4^2 + \frac{1}{2}\omega_2 + 2\omega_2^2v^3 + \\
& \frac{1}{2}v^2\omega_4^2 + \omega_3v^3\omega_4^2\omega_1 - \frac{1}{2}\omega_2\omega_1 - \frac{1}{2}\omega_2\omega_3v^2\omega_4\omega_1 + \frac{5}{2}\omega_2\omega_3v - \omega_2^2v^2 - \omega_2^2\omega_3v^2\omega_1 - v\omega_4\omega_1 - \frac{5}{2}c_s^2\omega_3\omega_4 + \\
& \frac{5}{2}\omega_3v^2\omega_4 + \frac{1}{2}\omega_2\omega_3v\omega_1^2 + \frac{1}{2}\omega_3v^2\omega_4\omega_1^2 + \frac{1}{2}c_s^2\omega_2^2\omega_4\omega_1 - \frac{1}{2}c_s^2\omega_3\omega_4\omega_1^2 + c_s^2\omega_3v\omega_4^2 + \frac{1}{2}c_s^2\omega_2\omega_3\omega_4 + \\
& \frac{1}{2}c_s^2\omega_2\omega_4\omega_1 + 4\omega_2v^2 - \frac{1}{2}\omega_2\omega_3^2v + \frac{1}{2}\omega_3\omega_4\omega_1 - \omega_3v\omega_4 - \omega_2\omega_3v^2\omega_1^2 + \frac{1}{2}c_s^2\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_2\omega_3 + c_s^2\omega_2v\omega_4 + \\
& c_s^2\omega_2\omega_3v\omega_4\omega_1 - \frac{5}{2}c_s^2\omega_4\omega_1 + \omega_3 + \frac{1}{2}\omega_3v^2\omega_4\omega_1 + 3\omega_2\omega_3v^3\omega_4 - \frac{1}{2}\omega_3^2v^2\omega_4 + 2c_s^2\omega_4 + \frac{5}{2}v^2\omega_4\omega_1 + \omega_2v^2\omega_1^2 - \\
& 3\omega_2v^3\omega_4 + 3\omega_2v^3\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_3\omega_1 - c_s^2\omega_2v\omega_4\omega_1 + \frac{1}{2}\omega_2v\omega_3v^2\omega_4 - \frac{1}{2}c_s^2\omega_3\omega_4\omega_1 + \omega_3v\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_3^2v\omega_1 - \\
& \frac{1}{2}\omega_4\omega_1 - 5\omega_2v^2\omega_1 - \frac{1}{2}c_s^2\omega_4^2 - \frac{1}{2}v^2\omega_4\omega_1^2 + v\omega_4 + \omega_2^2\omega_3v^2 - \frac{1}{2}c_s^2\omega_3\omega_4\omega_1^2 + \frac{1}{2}\omega_3v^2\omega_4^2\omega_1 - 3\omega_2\omega_3v^3\omega_4\omega_1 + \\
& \frac{1}{2}\omega_4 + \frac{1}{2}c_s^2\omega_4\omega_1^2 - c_s^2v\omega_4^2 - \frac{1}{2}\omega_2v^2\omega_4 - 2\omega_2^2\omega_3v^3 - v^3\omega_4^2\omega_1 + \omega_2\omega_3^2v^2 - 2\omega_2v + \omega_1 + 6\omega_2\omega_3v^2\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y+\delta_l}^{[\mu_5],t-3\delta_t} = & 3 - \frac{1}{2}\omega_2\omega_4\omega_1 + \frac{1}{2}\omega_4^2 + 4\omega_2v^2\omega_4\omega_1 - \omega_2v\omega_4 + 5\omega_3\omega_1 - \omega_2^2v - 2\omega_2^2v^2\omega_1 - v\omega_4\omega_1^2 + 7\omega_2\omega_3v\omega_1 - \\
& 2\omega_3v^2\omega_4^2 - \frac{1}{2}\omega_2\omega_1^2 + \omega_2\omega_3v\omega_4 + \frac{1}{2}\omega_2\omega_3^2\omega_1 + 2\omega_3v\omega_4^2\omega_1 + 3\omega_3\omega_4 + \frac{1}{2}\omega_2\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_4^2\omega_1 - 6\omega_2v\omega_1 + \omega_1^2 + \\
& \omega_2v\omega_1^2 - 2v^2\omega_4^2\omega_1 - \omega_3^2v\omega_4 - \frac{3}{2}\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_1 + 2v^2\omega_4^2 + 2\omega_2\omega_1 - 4\omega_2\omega_3v^2\omega_4\omega_1 + \omega_3v\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4^2 - \\
& 6\omega_2\omega_3v + \frac{1}{2}\omega_3\omega_4^2\omega_1 + 2\omega_2^2v^2 + 2\omega_2^2\omega_3v^2\omega_1 - \omega_3\omega_1^2 + 6v\omega_4\omega_1 + \frac{1}{2}\omega_2\omega_4 - \omega_2\omega_3v\omega_1^2 - \omega_2^2\omega_3v\omega_1 + \omega_2\omega_3^2v - \\
& \frac{7}{2}\omega_3\omega_4\omega_1 + 6\omega_3v\omega_4 + 2\omega_2\omega_3 - 2v\omega_4^2\omega_1 - 4\omega_3 - \omega_2\omega_3v\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_1^2 + 2v\omega_4^2 + \omega_2^2\omega_3v + \frac{1}{2}\omega_2\omega_3\omega_1^2 + \\
& \omega_3v\omega_4\omega_1^2 + \omega_2v\omega_4\omega_1 - \frac{5}{2}\omega_2\omega_3\omega_1 + 4\omega_2\omega_3v^2\omega_4 - \frac{1}{2}\omega_3^2\omega_4 - 7\omega_3v\omega_4\omega_1 - \omega_2\omega_3^2v\omega_1 + 3\omega_4\omega_1 - 5v\omega_4 - 2\omega_2^2\omega_3v^2 + \\
& \omega_3^2 + 2\omega_3v^2\omega_4^2\omega_1 - \frac{5}{2}\omega_4 - 4\omega_2v^2\omega_4 + \frac{1}{2}\omega_3\omega_4\omega_1^2 - \omega_3^2\omega_1 + 5\omega_2v - 4\omega_1 - \frac{1}{2}\omega_2\omega_3\omega_4 - 2\omega_3v\omega_4^2 - \frac{1}{2}\omega_2\omega_3^2 + \omega_2^2\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_5],t-4\delta_t} = & 2 - \omega_2\omega_4\omega_1 + 6\omega_3v^2\omega_4\omega_1 - 6c_s^2\omega_3\omega_4\omega_1 + \omega_2^2\omega_3\omega_1 + c_s^2\omega_2\omega_3\omega_4^2 + \omega_2\omega_3^2v^2\omega_4 - 14\omega_2v^2\omega_4\omega_1 + \\
& 2\omega_3\omega_1 + 10\omega_2\omega_3v^2 + 2\omega_2^2v^2\omega_1 + 5\omega_3v^2\omega_4^2 - c_s^2\omega_3\omega_4^2 - \omega_2\omega_3v^2\omega_4\omega_1^2 - \omega_2^2v^2\omega_4 + 7c_s^2\omega_2\omega_3\omega_4\omega_1 + \omega_3\omega_4 + \\
& 5c_s^2\omega_2\omega_4 + \omega_2\omega_3\omega_4\omega_1 + 2\omega_2\omega_3^2v^2\omega_1 + 4v^2\omega_4 + 5v^2\omega_4^2\omega_1 + \omega_2^2 - 3\omega_2 + c_s^2\omega_2^2\omega_4\omega_1 - 5v^2\omega_4^2 + 3\omega_2\omega_1 + \\
& 15\omega_2\omega_3v^2\omega_4\omega_1 - c_s^2\omega_2\omega_3\omega_4\omega_1^2 - c_s^2\omega_2\omega_4^2 + \omega_2^2\omega_3v^2\omega_4 - \omega_2^2\omega_3v^2\omega_4\omega_1 - 2\omega_2^2v^2 - 2\omega_2^2\omega_3v^2\omega_1 + c_s^2\omega_2\omega_4^2\omega_1 - \\
& \omega_2^2\omega_3 + 5c_s^2\omega_3\omega_4 + \omega_2\omega_4 - 5\omega_3v^2\omega_4 - \omega_3v^2\omega_4\omega_1^2 - c_s^2\omega_2^2\omega_4\omega_1 + c_s^2\omega_3\omega_4\omega_1^2 - 6c_s^2\omega_2\omega_3\omega_4 + \omega_2v^2\omega_4\omega_1^2 - \\
& 6c_s^2\omega_2\omega_4\omega_1 - 8\omega_2v^2 - \omega_3\omega_4\omega_1 + 2\omega_2\omega_3v^2\omega_1^2 - c_s^2\omega_3\omega_4 + 3\omega_2\omega_3 + \omega_2^2v^2\omega_4\omega_1 + 5c_s^2\omega_4\omega_1 - 2\omega_3 - \\
& \omega_2v^2\omega_4^2 - \omega_3^2v^2\omega_4\omega_1 + c_s^2\omega_2\omega_3\omega_4 + \omega_2^2v^2\omega_4 - 4c_s^2\omega_4 - 5v^2\omega_4\omega_1 - 2\omega_2v^2\omega_1^2 - c_s^2\omega_2\omega_3\omega_4\omega_1 + \omega_2\omega_3v^2\omega_4^2 - \\
& \omega_2^2\omega_1 - \omega_2\omega_3v^2\omega_4\omega_1 + c_s^2\omega_2\omega_3\omega_4 - 3\omega_2\omega_3\omega_1 - 14\omega_2\omega_3v^2\omega_4 + c_s^2\omega_3\omega_4\omega_1 - c_s^2\omega_2\omega_4 - \omega_2\omega_3v^2\omega_4\omega_1 - \\
& c_s^2\omega_2\omega_3\omega_4\omega_1^2 + \omega_4\omega_1 + 10\omega_2v^2\omega_1 + c_s^2\omega_4^2 + v^2\omega_4\omega_1^2 + 2\omega_2^2\omega_3v^2 + c_s^2\omega_3\omega_4\omega_1^2 - 5\omega_3v^2\omega_4\omega_1 - c_s^2\omega_2\omega_3\omega_4\omega_1 - \\
& \omega_4 - c_s^2\omega_4\omega_1^2 + 13\omega_2v^2\omega_4 + \omega_2v^2\omega_4\omega_1 + c_s^2\omega_2\omega_4\omega_1^2 - 2\omega_2\omega_3v^2 - 2\omega_1 - \omega_2\omega_3\omega_4 - 12\omega_2\omega_3v^2\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_5],t-4\delta_t} = & -4 + 7\omega_2\omega_4\omega_1 - \omega_4^2 - \omega_2^2\omega_3\omega_1 - 6\omega_3\omega_1 + \omega_2\omega_4^2 - \omega_2\omega_3^2\omega_4 + \omega_2\omega_1^2 - \omega_2\omega_3^2\omega_1 - 6\omega_3\omega_4 - 8\omega_2\omega_3\omega_4\omega_1 + \omega_4^2\omega_1 - \\
& \omega_2^2\omega_3\omega_4 - \omega_1^2 - \omega_2^2 + 5\omega_2 - \omega_3^2\omega_4\omega_1 - 6\omega_2\omega_1 + \omega_2\omega_3\omega_4\omega_1^2 + \omega_3\omega_4^2 - \omega_3\omega_4^2\omega_1 + \omega_3\omega_1^2 + \omega_2^2\omega_3 - 6\omega_2\omega_4 - \omega_2\omega_4\omega_1^2 + \\
& 7\omega_3\omega_4\omega_1 + \omega_2^2\omega_4 - \omega_2\omega_3\omega_4^2 - 6\omega_2\omega_3 + 5\omega_3 + \omega_4\omega_1^2 + \omega_2^2\omega_1 + \omega_2^2\omega_3\omega_4\omega_1 - \omega_2\omega_3\omega_1^2 + 7\omega_2\omega_3\omega_1 + \omega_2\omega_3\omega_4\omega_1^2 +
\end{aligned}$$

$$\omega_3^2 w_4 - \omega_2^2 \omega_4 w_1 - 6\omega_4 w_1 - \omega_3^2 + \omega_2 \omega_3^2 w_4 w_1 - \omega_2 \omega_4^2 w_1 + 5w_4 - \omega_3 \omega_4 w_1^2 + \omega_3^2 w_1 + 5w_1 + 7\omega_2 \omega_3 w_4 + \omega_2 \omega_3^2,$$

## 8 CLBM 2: relaxation of $k_{00}$ , $k_{10}$ , $k_{01}$ , $k_{20} + k_{02}$ , $k_{20} - k_{02}$

## 8.1 Definitions

Matrix  $\mathbf{A} = \mathbf{K}^{-1}\mathbf{S}\mathbf{K}$ :

$$\begin{aligned}\mathbf{A}_{5,4} &= -\frac{1}{2}v\omega_0 + \frac{1}{2}\omega_3u + \frac{1}{4}\omega_3 + \frac{1}{4}\omega_3u^2 - v^2\omega_2 + \frac{1}{2}v\omega_2 - \frac{1}{2}\omega_4u + \frac{1}{4}\omega_3v^2 - \frac{1}{4}\omega_4 + \frac{1}{4}v^2\omega_4 - \frac{1}{4}\omega_4u^2 + \frac{1}{2}v^2\omega_0, \\ \mathbf{A}_{5,5} &= \frac{1}{2}v\omega_4 - \frac{1}{2}v\omega_0 + \frac{1}{4}\omega_3 + \frac{1}{4}\omega_3u^2 - v^2\omega_2 + \frac{1}{2}\omega_2 - \frac{1}{2}v\omega_2 + \frac{1}{4}\omega_3v^2 + \frac{1}{2}\omega_3v + \frac{1}{4}\omega_4 + \frac{1}{4}v^2\omega_4 - \frac{1}{4}\omega_4u^2 + \frac{1}{2}v^2\omega_0.\end{aligned}$$

where

$$\mathbf{S} = \text{diag}(\omega_0, \omega_1, \omega_2, \omega_3, \omega_4)$$

and

$$\mathbf{K} = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 \\ -u & 1-u & -u & -u-1 & -u \\ -v & -v & 1-v & -v & -v-1 \\ v^2+u^2 & v^2+u^2-2u+1 & v^2-2v+u^2+1 & v^2+u^2+2u+1 & v^2+2v+u^2+1 \\ u^2-v^2 & -v^2+u^2-2u+1 & -v^2+2v+u^2-1 & -v^2+u^2+2u+1 & -v^2-2v+u^2-1 \end{pmatrix}$$

Matrix  $\mathbf{B}$ :

$$\begin{aligned}\mathbf{B}_{1,1} &= 0, \\ \mathbf{B}_{1,2} &= -1 - 2\omega_3u + \omega_3 + 2u\omega_1, \\ \mathbf{B}_{1,3} &= -1 + \omega_3 + 2v\omega_2 - 2\omega_3v, \\ \mathbf{B}_{1,4} &= -1 + 2\omega_3u + \omega_3 - 2u\omega_1, \\ \mathbf{B}_{1,5} &= -1 + \omega_3 - 2v\omega_2 + 2\omega_3v, \\ \mathbf{B}_{2,1} &= -1 - \frac{1}{2}\omega_3u + \frac{1}{4}\omega_3 + u\omega_1 - \frac{1}{2}\omega_4u + \frac{1}{4}\omega_4 + \frac{1}{2}\omega_1, \\ \mathbf{B}_{2,2} &= 0, \\ \mathbf{B}_{2,3} &= -1 - \frac{1}{2}v\omega_4 - \frac{1}{2}\omega_3u + u\omega_1 - \frac{1}{2}\omega_4u + \frac{1}{2}\omega_3v + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1, \\ \mathbf{B}_{2,4} &= -1 - \omega_3u + 2u\omega_1 - \omega_4u + \omega_1, \\ \mathbf{B}_{2,5} &= -1 + \frac{1}{2}v\omega_4 - \frac{1}{2}\omega_3u + u\omega_1 - \frac{1}{2}\omega_4u - \frac{1}{2}\omega_3v + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1, \\ \mathbf{B}_{3,1} &= -1 - \frac{1}{2}v\omega_4 + \frac{1}{4}\omega_3 + \frac{1}{2}\omega_2 + v\omega_2 - \frac{1}{2}\omega_3v + \frac{1}{4}\omega_4, \\ \mathbf{B}_{3,2} &= -1 - \frac{1}{2}v\omega_4 + \frac{1}{2}\omega_3u + \frac{1}{2}\omega_2 + v\omega_2 - \frac{1}{2}\omega_4u - \frac{1}{2}\omega_3v + \frac{1}{2}\omega_4, \\ \mathbf{B}_{3,3} &= 0, \\ \mathbf{B}_{3,4} &= -1 - \frac{1}{2}v\omega_4 - \frac{1}{2}\omega_3u + \frac{1}{2}\omega_2 + v\omega_2 + \frac{1}{2}\omega_4u - \frac{1}{2}\omega_3v + \frac{1}{2}\omega_4, \\ \mathbf{B}_{3,5} &= -1 - v\omega_4 + \omega_2 + 2v\omega_2 - \omega_3v, \\ \mathbf{B}_{4,1} &= -1 + \frac{1}{2}\omega_3u + \frac{1}{4}\omega_3 - u\omega_1 + \frac{1}{2}\omega_4u + \frac{1}{4}\omega_4 + \frac{1}{2}\omega_1, \\ \mathbf{B}_{4,2} &= -1 + \omega_3u - 2u\omega_1 + \omega_4u + \omega_1, \\ \mathbf{B}_{4,3} &= -1 - \frac{1}{2}v\omega_4 + \frac{1}{2}\omega_3u - u\omega_1 + \frac{1}{2}\omega_4u + \frac{1}{2}\omega_3v + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1, \\ \mathbf{B}_{4,4} &= 0, \\ \mathbf{B}_{4,5} &= -1 + \frac{1}{2}v\omega_4 + \frac{1}{2}\omega_3u - u\omega_1 + \frac{1}{2}\omega_4u - \frac{1}{2}\omega_3v + \frac{1}{2}\omega_4 + \frac{1}{2}\omega_1, \\ \mathbf{B}_{5,1} &= -1 + \frac{1}{2}v\omega_4 + \frac{1}{4}\omega_3 + \frac{1}{2}\omega_2 - v\omega_2 + \frac{1}{2}\omega_3v + \frac{1}{4}\omega_4, \\ \mathbf{B}_{5,2} &= -1 + \frac{1}{2}v\omega_4 + \frac{1}{2}\omega_3u + \frac{1}{2}\omega_2 - v\omega_2 - \frac{1}{2}\omega_4u + \frac{1}{2}\omega_3v + \frac{1}{2}\omega_4, \\ \mathbf{B}_{5,3} &= -1 + v\omega_4 + \omega_2 - 2v\omega_2 + \omega_3v,\end{aligned}$$

$$\begin{aligned}\mathbf{B}_{5,4} &= -1 + \frac{1}{2}v\omega_4 - \frac{1}{2}\omega_3u + \frac{1}{2}\omega_2 - v\omega_2 + \frac{1}{2}\omega_4u + \frac{1}{2}\omega_3v + \frac{1}{2}\omega_4, \\ \mathbf{B}_{5,5} &= 0.\end{aligned}$$

## 8.2 EFDE for $\mu_1$

$$\mu_{1,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l, y+j\delta_l}^{[\mu_1], t-\ell\delta_t} \mu_{x+i\delta_l, y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\begin{aligned}\alpha_{x,y-\delta_l}^{[\mu_1],t} &= 1 + \frac{1}{2}v\omega_4 - \frac{1}{4}\omega_3 + v^2\omega_2 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_4 - \frac{1}{4}\omega_3u^2 + \frac{1}{2}v\omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}v\omega_2 + \frac{1}{4}\omega_4u^2 - \frac{1}{4}v^2\omega_4. \\ \alpha_{x-\delta_l,y}^{[\mu_1],t} &= 1 + \omega_1u^2 - \frac{1}{4}\omega_3 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_1u - \frac{1}{4}\omega_3u^2 + \frac{1}{2}\omega_4u - \frac{1}{4}\omega_4u^2 + \frac{1}{4}v^2\omega_4 + \frac{1}{2}\omega_3u. \\ \alpha_{x,y}^{[\mu_1],t} &= 1 - 2\omega_1u^2 - 2v^2\omega_2 - 2\omega_3c_s^2 + v^2\omega_3 + \omega_3u^2. \\ \alpha_{x+\delta_l,y}^{[\mu_1],t} &= 1 + \omega_1u^2 - \frac{1}{4}\omega_3 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1u - \frac{1}{4}\omega_3u^2 - \frac{1}{2}\omega_4u - \frac{1}{4}\omega_4u^2 + \frac{1}{4}v^2\omega_4 - \frac{1}{2}\omega_3u. \\ \alpha_{x,y+\delta_l}^{[\mu_1],t} &= 1 - \frac{1}{2}v\omega_4 - \frac{1}{4}\omega_3 + v^2\omega_2 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_4 - \frac{1}{4}\omega_3u^2 - \frac{1}{2}v\omega_3 - \frac{1}{2}\omega_2 + \frac{1}{2}v\omega_2 + \frac{1}{4}\omega_4u^2 - \frac{1}{4}v^2\omega_4. \\ \alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 - \frac{1}{4}\omega_4\omega_1u^3 + \frac{1}{4}\omega_3c_s^2\omega_2 + \frac{1}{2}\omega_3c_s^2\omega_1u - \frac{1}{2}v\omega_4 - \omega_1u^2 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{2}\omega_3 - \frac{1}{4}v\omega_3\omega_2 - \frac{1}{4}v^2\omega_3\omega_4 + \frac{1}{2}\omega_3\omega_4u + \frac{1}{4}v\omega_3\omega_1u - v^2\omega_2 + \frac{3}{8}\omega_4\omega_1u^2 - \frac{1}{4}v^3\omega_4\omega_2 - \frac{1}{4}\omega_3\omega_4 - \omega_3c_s^2 + \frac{1}{4}\omega_4u\omega_2 - \frac{1}{4}v^2\omega_4\omega_1u - \frac{1}{8}v\omega_3\omega_4c_s^2 - \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{4}v\omega_4u^2\omega_2 + \frac{1}{2}\omega_3\omega_2 - \frac{1}{8}\omega_3u^2\omega_2 - \frac{1}{2}\omega_3\omega_4u\omega_2 - \frac{1}{8}\omega_3\omega_1 + \frac{1}{2}v^2\omega_1\omega_2 + \frac{1}{4}v\omega_3u\omega_2 + \frac{1}{2}\omega_1u^2\omega_2 - \frac{1}{2}\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_4u^2 + \frac{1}{4}v^3\omega_3\omega_2 + \frac{1}{2}v^2\omega_3\omega_4u + \frac{1}{2}\omega_1u - \frac{1}{8}v^2\omega_3\omega_1 + \frac{1}{2}\omega_3u^2 + \frac{1}{4}\omega_3\omega_1u^3 + \frac{1}{2}v\omega_3\omega_4u^2 + \frac{3}{8}v^2\omega_4\omega_2 - \frac{1}{4}v\omega_1\omega_2 + \frac{1}{8}\omega_3\omega_1u^2 + v\omega_1u^2\omega_2 + \frac{1}{4}\omega_3u\omega_2 + \frac{1}{4}\omega_3c_s^2\omega_1 - \frac{1}{8}v\omega_3 - \frac{1}{8}\omega_4\omega_2 + \frac{1}{4}v\omega_4\omega_1u - \frac{1}{4}\omega_1u\omega_2 + \frac{1}{4}v\omega_3\omega_1 - \frac{1}{4}v\omega_3u^2\omega_2 + \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4u - \frac{1}{4}v^2\omega_3\omega_1u + \frac{1}{2}v\omega_2 - \frac{1}{2}v^2\omega_3\omega_4u\omega_2 - \frac{1}{8}\omega_4u^2\omega_2 + \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{1}{2}v\omega_3\omega_4 - \frac{1}{4}\omega_3\omega_1u - \frac{1}{2}\omega_3\omega_4c_s^2u + \frac{1}{4}v\omega_4u\omega_2 + \frac{1}{8}v^2\omega_3\omega_2 + v^2\omega_1u\omega_2 - \frac{1}{2}v\omega_4\omega_1u^2 - v\omega_3\omega_4u - \frac{1}{8}\omega_3\omega_2 + \frac{1}{4}v\omega_4\omega_1 + \frac{1}{2}v\omega_3c_s^2\omega_2 - \frac{1}{2}\omega_3u, \\ \alpha_{x,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 - \frac{1}{2}v\omega_4 - \frac{1}{4}\omega_3 + v^2\omega_2 + \frac{1}{2}\omega_3c_s^2 + v^2\omega_3 - \frac{1}{2}\omega_4\omega_1u^2 + \frac{1}{2}v^3\omega_4\omega_2 + \frac{3}{2}\omega_3c_s^2 + v\omega_3\omega_4c_s^2 + \frac{1}{2}v\omega_4u^2\omega_2 - \frac{3}{4}v^2\omega_3 + \frac{1}{2}\omega_3u^2\omega_2 - \omega_1u^2\omega_2 + v\omega_3\omega_1u^2 + \frac{1}{4}\omega_4 + \frac{1}{2}\omega_3\omega_4u^2 - \frac{1}{2}v^3\omega_3\omega_2 - \frac{3}{4}\omega_3u^2 - v\omega_3\omega_4u^2 - \frac{1}{2}v^2\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_1u^2 - 2v\omega_1u^2\omega_2 - \frac{1}{2}v\omega_3 + \frac{1}{2}v\omega_3u^2\omega_2 + \frac{1}{2}\omega_2 + \frac{1}{2}v\omega_2 - \frac{1}{4}\omega_4u^2 - \frac{1}{2}\omega_3\omega_4c_s^2 + v\omega_4\omega_1u^2 + \frac{1}{4}v^2\omega_4\omega_4 - v\omega_3c_s^2\omega_2, \\ \alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{4}\omega_4\omega_1u^3 + \frac{1}{4}\omega_3c_s^2\omega_2 - \frac{1}{2}\omega_3c_s^2\omega_1u - \frac{1}{2}v\omega_4 - \omega_1u^2 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{2}\omega_3 - \frac{1}{4}v\omega_3\omega_2 - \frac{1}{4}v^2\omega_3\omega_4 - \frac{1}{2}\omega_3\omega_4u - \frac{1}{4}v\omega_3\omega_1u - v^2\omega_2 + \frac{3}{8}\omega_4\omega_1u^2 - \frac{1}{4}v^3\omega_4\omega_2 - \frac{1}{4}\omega_3\omega_4 - \omega_3c_s^2 - \frac{1}{4}\omega_4u\omega_2 + \frac{1}{4}v^2\omega_4\omega_1u - \frac{1}{8}v\omega_3\omega_4c_s^2 - \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{4}v\omega_4u^2\omega_2 + \frac{1}{2}\omega_3\omega_2 - \frac{1}{8}\omega_3u^2\omega_2 + \frac{1}{2}\omega_3\omega_4u\omega_2 - \frac{1}{8}\omega_3\omega_1 + \frac{1}{2}v^2\omega_1\omega_2 + \frac{1}{4}v\omega_3u\omega_2 + \frac{1}{2}\omega_1u^2\omega_2 - \frac{1}{2}\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_4u^2 + \frac{1}{4}v^3\omega_3\omega_2 - \frac{1}{2}v^2\omega_3\omega_4u - \frac{1}{2}\omega_1u - \frac{1}{8}v^2\omega_3\omega_1 + \frac{1}{2}\omega_3u^2 + \frac{1}{4}\omega_3\omega_1u^3 + \frac{1}{2}v\omega_3\omega_4u^2 + \frac{3}{8}v^2\omega_4\omega_2 - \frac{1}{4}v\omega_1\omega_2 + \frac{1}{8}\omega_3\omega_1u^2 + v\omega_1u^2\omega_2 - \frac{1}{4}\omega_3u\omega_2 + \frac{1}{4}\omega_3c_s^2\omega_1 - \frac{1}{8}v\omega_3 - \frac{1}{8}\omega_4\omega_2 - \frac{1}{4}v\omega_4\omega_1u + \frac{1}{4}\omega_1u\omega_2 + \frac{1}{4}v\omega_3\omega_1 - \frac{1}{4}v\omega_3u^2\omega_2 + \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4u + \frac{1}{4}v^2\omega_3\omega_1u + \frac{1}{2}v\omega_2 + \frac{1}{2}v^2\omega_3\omega_4u\omega_2 - \frac{1}{8}\omega_4u^2\omega_2 + \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{1}{2}v\omega_3\omega_4 - \frac{1}{4}\omega_3\omega_1u + \frac{1}{2}\omega_3\omega_4c_s^2u - \frac{1}{4}v\omega_4u\omega_2 + \frac{1}{8}v^2\omega_3\omega_2 - v^2\omega_1u\omega_2 - \frac{1}{2}v\omega_4\omega_1u^2 + v\omega_3\omega_4u - \frac{1}{8}\omega_3\omega_2 + \frac{1}{4}v\omega_4\omega_1 + \frac{1}{2}v\omega_3c_s^2\omega_2 + \frac{1}{2}\omega_3u, \\ \alpha_{x-\delta_l,y}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{2}\omega_4\omega_1u^3 - \omega_3c_s^2\omega_1u + \omega_1u^2 + \frac{1}{4}\omega_3 + \frac{1}{2}v^2\omega_3\omega_4 + 2v^2\omega_2 - \frac{1}{2}\omega_4\omega_1u^2 + \frac{3}{2}\omega_3c_s^2 + \frac{1}{2}v^2\omega_4\omega_1u - \frac{3}{4}v^2\omega_3 + v^2\omega_4u\omega_2 - v^2\omega_1\omega_2 + \frac{1}{4}\omega_4 + \frac{1}{2}\omega_1 - v^2\omega_3\omega_4u + \frac{1}{2}\omega_1u + \frac{1}{2}v^2\omega_3\omega_1 - \frac{3}{4}\omega_3u^2 - \frac{1}{2}\omega_3\omega_1u^3 - \frac{1}{2}v^2\omega_4\omega_2 - \omega_3c_s^2\omega_1 - \frac{1}{2}\omega_4u + \frac{1}{2}v^2\omega_3\omega_1u + \frac{1}{4}\omega_4u^2 + v^2\omega_3u\omega_2 - \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_3\omega_1u + \omega_3\omega_4c_s^2u - \frac{1}{2}v^2\omega_3\omega_2 - 2v^2\omega_1u\omega_2 - \frac{1}{4}v^2\omega_4 - \frac{1}{2}\omega_3u,\end{aligned}$$



$$\begin{aligned} \alpha_{x+\delta_1,y-\delta_1}^{[\mu_1,t-2\delta_t]} = & 1 - \frac{1}{2}vw_4w_1uw_2 + \frac{1}{4}w_4w_1u^3 + \frac{3}{4}w_3c_s^2w_2 - \frac{1}{2}w_3c_s^2w_1u + \frac{1}{2}vw_4 - w_1u^2 + \frac{1}{8}w_4w_1 - \frac{1}{2}w_3 - \frac{1}{4}w_4w_1u^2w_2 - \\ & \frac{1}{2}vw_3w_1uw_2 - \frac{1}{4}w_3w_4w_1u - \frac{1}{2}vw_3w_2 - \frac{1}{2}w_3c_s^2w_1w_2 - \frac{1}{4}v^2w_3w_4 + \frac{1}{2}w_3w_4u + \frac{1}{4}v^2w_3w_1uw_2 + \frac{1}{4}vw_3w_1u - \\ & \frac{1}{4}v^2w_4w_1w_2 - v^2w_2 + \frac{5}{8}w_4w_1u^2 - \frac{1}{4}v^3w_4w_2 + \frac{1}{4}w_3w_4 - w_3c_s^2 + \frac{1}{4}w_4uw_2 + \frac{1}{4}v^2w_4w_1uw_2 + \frac{1}{4}v^2w_4w_1u + \frac{1}{4}vw_3w_1w_2 - \\ & \frac{1}{2}vw_3w_4c_s^2 + \frac{1}{8}v^2w_4w_1 - \frac{1}{4}vw_4u^2w_2 + \frac{1}{2}v^2w_3 - \frac{3}{8}w_3u^2w_2 + \frac{1}{2}v^2w_4uw_2 + \frac{1}{4}w_3w_1u^3w_2 + \frac{1}{4}v^3w_4w_1w_2 + \frac{1}{8}w_3w_1 + \\ & \frac{1}{2}w_3c_s^2w_1uw_2 + \frac{1}{2}v^2w_1w_2 + \frac{1}{4}vw_3uw_2 - \frac{1}{4}w_4w_1u^3w_2 + \frac{1}{2}w_1u^2w_2 - \frac{1}{2}vw_3w_1u^2 - \frac{1}{2}w_4 - \frac{1}{4}v^2w_3w_4w_2 - \frac{1}{4}w_3w_4w_1u^2 - \\ & \frac{1}{4}w_3w_4c_s^2w_1 + \frac{1}{4}w_1w_2 - \frac{1}{2}w_1 - \frac{1}{4}w_3w_4u^2 + \frac{1}{4}v^3w_3w_2 - \frac{1}{2}v^2w_3w_4u + \frac{1}{2}w_1u - \frac{3}{8}v^2w_3w_1 + \frac{1}{2}vw_3w_4c_s^2w_1 + \\ & \frac{1}{2}vw_3w_4uw_2 + \frac{1}{2}vw_3w_4w_1u^2 + \frac{1}{2}w_3u^2 - \frac{1}{4}w_3w_1u^3 + \frac{1}{2}vw_3w_4u^2 + \frac{5}{8}v^2w_4w_2 + \frac{1}{4}vw_1w_2 + \frac{3}{8}w_3w_1u^2 + vw_1u^2w_2 + \\ & \frac{1}{2}w_3uw_2 + \frac{3}{4}w_3c_s^2w_1 + \frac{1}{2}vw_3 + \frac{1}{8}w_4w_2 + \frac{1}{4}vw_4w_1u - \frac{1}{4}w_1uw_2 - \frac{1}{4}vw_3w_1 - \frac{1}{4}vw_3u^2w_2 - \frac{1}{2}v^2w_3w_4uw_2 - \frac{1}{2}w_2 - \frac{1}{2}w_4u + \\ & \frac{1}{4}v^2w_3w_1u - \frac{1}{4}v^3w_3w_1w_2 - \frac{1}{2}vw_2 - \frac{1}{4}w_3w_4c_s^2w_2 + \frac{1}{2}v^2w_3uw_2 + \frac{1}{8}w_4u^2w_2 + \frac{1}{2}w_3w_4c_s^2 - \frac{1}{2}vw_3w_4 + \frac{1}{4}w_3w_1u + \\ & \frac{1}{2}w_3w_4c_s^2w_1 + \frac{1}{4}vw_4uw_2 + \frac{3}{8}v^2w_3w_2 - v^2w_1uw_2 - \frac{1}{2}vw_4w_1u^2 - \frac{1}{4}vw_4w_1u^2w_2 - vw_3w_4u + \frac{1}{8}w_3w_2 - \frac{1}{4}vw_4w_1 + \\ & \frac{1}{2}vw_3c_s^2w_2 - \frac{1}{2}w_3w_4c_s^2uw_2 - \frac{1}{4}vw_3w_1u^2w_2 + \frac{1}{4}vw_3w_4w_2 - \frac{1}{2}vw_3c_s^2w_1w_2 - \frac{1}{4}w_3w_1uw_2 + \frac{1}{2}vw_3w_4w_1u - \frac{1}{2}w_3u, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_1,y}^{[\mu_1,t-2\delta_t]} = & 1 + \frac{1}{2}\omega_4\omega_1u^3 - \frac{3}{2}\omega_3c_s^2\omega_2 - \omega_3c_s^2\omega_1u + \omega_1u^2 + \frac{1}{4}\omega_4\omega_1 - \frac{3}{4}\omega_3 + \frac{3}{4}\omega_4\omega_1u^2\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_2 + \\ & \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 + \frac{1}{2}v^2\omega_3\omega_4 - \omega_3\omega_4u + \frac{1}{2}v^2\omega_3\omega_1u\omega_2 + \frac{1}{4}v^2\omega_4\omega_1\omega_2 + 2v^2\omega_2 - \frac{3}{4}\omega_4\omega_1u^2 + \\ & \frac{1}{2}\omega_3\omega_4 + \frac{3}{2}\omega_3c_s^2 - \frac{1}{2}\omega_4u\omega_2 + \frac{1}{2}v^2\omega_4\omega_1u\omega_2 + \frac{1}{2}v^2\omega_4\omega_1u + \frac{1}{4}v^2\omega_4\omega_1 - \frac{3}{4}v^2\omega_3 + \frac{3}{4}\omega_3u^2\omega_2 + v^2\omega_4u\omega_2 + \\ & \frac{1}{2}\omega_3\omega_1u^3\omega_2 - \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1 + \omega_3c_s^2\omega_1u\omega_2 - v^2\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_1u^3\omega_2 - \omega_1u^2\omega_2 - \frac{3}{4}\omega_4 + \frac{1}{2}v^2\omega_3\omega_4\omega_2 + \\ & \omega_3\omega_4u\omega_2 + \frac{1}{2}\omega_1\omega_2 - \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3\omega_4u^2 - v^2\omega_3\omega_4u - \frac{1}{2}\omega_1u + \frac{1}{4}v^2\omega_3\omega_1 - \frac{1}{2}\omega_3\omega_4u^2\omega_2 - \frac{3}{4}\omega_3u^2 - \frac{1}{2}\omega_3\omega_1u^3 - \\ & \frac{5}{4}v^2\omega_4\omega_2 - \frac{1}{4}\omega_3\omega_1u^2 - \frac{1}{2}\omega_3u\omega_2 - \frac{1}{2}\omega_3c_s^2\omega_1 + \frac{3}{4}\omega_4\omega_2 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 + \frac{1}{2}\omega_1u\omega_2 - v^2\omega_3\omega_4u\omega_2 - \omega_2 + \frac{1}{2}\omega_4u + \\ & \frac{1}{2}v^2\omega_3\omega_1u - \frac{1}{4}\omega_3\omega_1\omega_2 + \omega_3\omega_4c_s^2\omega_2 + \frac{1}{4}\omega_4u^2 + v^2\omega_3u\omega_2 - \frac{1}{4}\omega_4u^2\omega_2 - \omega_3\omega_4c_s^2 + \frac{1}{2}\omega_3\omega_1u + \omega_3\omega_4c_s^2u - \\ & \frac{3}{4}v^2\omega_3\omega_2 - 2v^2\omega_1u\omega_2 - \frac{1}{4}v^2\omega_4 + \frac{3}{4}\omega_3\omega_2 - \omega_3\omega_4c_s^2\omega_2 - \frac{1}{2}\omega_3\omega_1u\omega_2 + \frac{1}{2}\omega_3u, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_1], t-2\delta_t} = & 2 + w_3 c_s^2 \omega_2 - 2 \omega_1 u^2 + \frac{1}{2} \omega_4 \omega_1 - \omega_3 - w_4 \omega_1 u^2 \omega_2 - \omega_3 \omega_1 u^2 \omega_2 - v^2 \omega_3 \omega_4 - v^2 \omega_4 \omega_1 \omega_2 - 2v^2 \omega_2 + \\ & \frac{3}{2} \omega_4 \omega_1 u^2 - 2 \omega_3 c_s^2 - \frac{1}{2} v^2 \omega_4 \omega_1 + v^2 \omega_3 - \frac{1}{2} \omega_3 u^2 \omega_2 + \frac{1}{2} \omega_3 \omega_1 + 2v^2 \omega_1 \omega_2 + 2 \omega_1 u^2 \omega_2 - \omega_4 - \omega_3 \omega_4 c_s^2 \omega_1 - \omega_1 - \\ & \omega_3 \omega_4 u^2 - \frac{1}{2} v^2 \omega_3 \omega_1 + \omega_3 \omega_4 u^2 \omega_2 + \omega_3 u^2 + \frac{3}{2} v^2 \omega_4 \omega_2 + \frac{1}{2} \omega_3 \omega_1 u^2 + \omega_3 c_s^2 \omega_1 + \frac{1}{2} \omega_4 \omega_2 - v^2 \omega_3 \omega_1 \omega_2 - \omega_2 + \\ & v^2 \omega_3 \omega_4 \omega_1 - \omega_3 \omega_4 c_s^2 \omega_2 - \frac{1}{2} \omega_4 u^2 \omega_2 + 2 \omega_3 \omega_4 c_s^2 + \frac{1}{2} v^2 \omega_3 \omega_2 + \frac{1}{2} \omega_3 \omega_2, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta t, y}^{[\mu_1], t-2\delta t} = & 1 - \frac{1}{2}\omega_4\omega_1 u^3 - \frac{3}{2}\omega_3 c_s^2 \omega_2 + \omega_3 c_s^2 \omega_1 u + \omega_1 u^2 + \frac{1}{4}\omega_4 \omega_1 - \frac{3}{4}\omega_3 + \frac{3}{4}\omega_4 \omega_1 u^2 \omega_2 - \frac{1}{2}\omega_3 \omega_4 \omega_2 + \\ & \frac{1}{2}\omega_3 c_s^2 \omega_1 \omega_2 + \frac{1}{4}\omega_3 \omega_1 u^2 \omega_2 + \frac{1}{2}v^2 \omega_3 \omega_4 + \omega_3 \omega_4 u - \frac{1}{2}v^2 \omega_3 \omega_1 \omega_2 + \frac{1}{4}v^2 \omega_4 \omega_1 \omega_2 + 2v^2 \omega_2 - \frac{3}{4}\omega_4 \omega_1 u^2 + \\ & \frac{1}{2}\omega_3 \omega_4 + \frac{3}{2}\omega_3 c_s^2 + \frac{1}{2}\omega_4 u \omega_2 - \frac{1}{2}v^2 \omega_4 \omega_1 \omega_2 - \frac{1}{2}v^2 \omega_4 \omega_1 u + \frac{1}{4}v^2 \omega_4 \omega_1 - \frac{3}{4}v^2 \omega_3 + \frac{3}{4}\omega_3 u^2 \omega_2 - v^2 \omega_4 u \omega_2 - \\ & \frac{1}{2}\omega_3 \omega_1 u^3 \omega_2 - \frac{1}{4}\omega_4 \omega_1 \omega_2 + \frac{1}{4}\omega_3 \omega_1 - \omega_3 c_s^2 \omega_1 \omega_2 - v^2 \omega_1 \omega_2 + \frac{1}{2}\omega_4 \omega_1 u^3 \omega_2 - \omega_1 u^2 \omega_2 - \frac{3}{4}\omega_4 + \frac{1}{2}v^2 \omega_3 \omega_4 \omega_2 - \\ & \omega_3 \omega_4 u \omega_2 + \frac{1}{2}\omega_1 \omega_2 - \frac{1}{2}\omega_1 + \frac{1}{2}\omega_3 \omega_4 u^2 + v^2 \omega_3 \omega_4 u + \frac{1}{2}\omega_1 u + \frac{1}{4}v^2 \omega_3 \omega_1 - \frac{1}{2}\omega_3 \omega_4 u^2 \omega_2 - \frac{3}{4}\omega_3 u^2 + \frac{1}{2}\omega_3 \omega_1 u^3 - \\ & \frac{5}{4}v^2 \omega_4 \omega_2 - \frac{1}{4}\omega_3 \omega_1 u^2 + \frac{1}{2}\omega_3 u \omega_2 - \frac{1}{2}\omega_3 c_s^2 \omega_1 + \frac{3}{4}\omega_4 \omega_2 + \frac{1}{4}v^2 \omega_3 \omega_1 \omega_2 - \frac{1}{2}\omega_1 u \omega_2 + v^2 \omega_3 \omega_4 u \omega_2 - \omega_2 - \frac{1}{2}\omega_4 u - \\ & \frac{1}{2}v^2 \omega_3 \omega_1 u - \frac{1}{4}\omega_3 \omega_1 \omega_2 + \omega_3 \omega_4 c_s^2 \omega_2 + \frac{1}{4}\omega_4 u^2 - v^2 \omega_3 u \omega_2 - \frac{1}{4}\omega_4 u^2 \omega_2 - \omega_3 \omega_4 c_s^2 - \frac{1}{2}\omega_3 \omega_1 u - \omega_3 \omega_4 c_s^2 u - \\ & \frac{3}{4}v^2 \omega_3 \omega_2 + 2v^2 \omega_1 u \omega_2 - \frac{1}{4}v^2 \omega_4 + \frac{3}{4}\omega_3 \omega_2 + \omega_3 \omega_4 c_s^2 u \omega_2 + \frac{1}{2}\omega_3 \omega_1 u \omega_2 - \frac{1}{2}\omega_3 u, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_1 y+\delta_2}^{[\mu_1], t-2\delta_t} = & 1 - \frac{1}{2}vw_4w_1uw_2 - \frac{1}{4}\omega_4w_1u^3 + \frac{3}{4}\omega_3c_s^2w_2 + \frac{1}{2}\omega_3c_s^2w_1u - \frac{1}{2}vw_4 - \omega_1u^2 + \frac{1}{8}\omega_4w_1 - \frac{1}{2}\omega_3 - \frac{1}{4}\omega_4w_1u^2w_2 - \\ & \frac{1}{2}vw_3w_1uw_2 + \frac{1}{4}\omega_3w_4w_1u + \frac{1}{4}vw_3w_2 - \frac{1}{2}\omega_3c_s^2w_1w_2 - \frac{1}{4}v^2w_3\omega_4 - \frac{1}{2}\omega_3w_4u - \frac{1}{4}v^2w_3\omega_1uw_2 + \frac{1}{4}vw_3w_1u - \\ & \frac{1}{4}v^2w_4w_1w_2 - v^2w_2 + \frac{5}{8}\omega_4w_1u^2 + \frac{1}{4}v^3w_4w_2 + \frac{1}{4}\omega_3w_4 - \omega_3c_s^2 - \frac{1}{4}\omega_4uw_2 - \frac{1}{4}v^2w_4w_1uw_2 - \frac{1}{4}v^2w_4w_1u - \frac{1}{4}vw_3w_1w_2 + \\ & \frac{1}{2}vw_3w_4c_s^2 + \frac{1}{8}v^2w_4w_1 + \frac{1}{4}vw_4u^2w_2 + \frac{1}{2}v^2w_3 - \frac{3}{8}\omega_3u^2w_2 - \frac{1}{2}v^2w_4uw_2 - \frac{1}{4}\omega_3w_1u^3w_2 - \frac{1}{4}v^3w_4w_1w_2 + \frac{1}{8}vw_3w_1 - \\ & \frac{1}{2}\omega_3c_s^2w_1uw_2 + \frac{1}{2}v^2w_1w_2 + \frac{1}{4}vw_3uw_2 + \frac{1}{4}\omega_4w_1u^3w_2 + \frac{1}{2}\omega_1u^2w_2 + \frac{1}{2}vw_3w_1u^2 - \frac{1}{2}\omega_4 - \frac{1}{4}v^2w_3w_4w_2 - \frac{1}{4}\omega_3w_4w_1u^2 - \\ & \frac{1}{4}\omega_3w_4c_s^2w_1 + \frac{1}{4}\omega_1w_2 - \frac{1}{2}\omega_1 - \frac{1}{4}\omega_3w_4u^2 - \frac{1}{4}v^3w_3w_2 + \frac{1}{2}v^2w_3w_4u - \frac{1}{2}\omega_1u - \frac{3}{8}v^2w_3w_1 - \frac{1}{2}vw_3w_4c_s^2w_1 + \\ & \frac{1}{2}vw_3w_4uw_2 - \frac{1}{2}vw_3w_4w_1u^2 + \frac{1}{2}\omega_3u^2 + \frac{1}{4}\omega_3w_1u^3 - \frac{1}{2}vw_3w_4u^2 + \frac{5}{8}v^2w_4w_2 - \frac{1}{4}vw_1w_2 + \frac{3}{8}\omega_3w_1u^2 - vw_1u^2w_2 - \\ & \frac{1}{4}\omega_3uw_2 + \frac{3}{8}\omega_3c_s^2w_1 - \frac{1}{2}vw_3 + \frac{1}{8}\omega_4w_2 + \frac{1}{4}vw_4w_1u + \frac{1}{4}\omega_1uw_2 + \frac{1}{4}vw_3w_1 + \frac{1}{4}vw_3u^2w_2 + \frac{1}{2}v^2w_3w_4uw_2 - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4u - \\ & \frac{1}{4}v^2w_3w_1u + \frac{1}{4}v^3w_3w_1w_2 + \frac{1}{2}vw_2 - \frac{1}{4}\omega_3w_4c_s^2w_2 - \frac{1}{2}v^2w_3uw_2 + \frac{1}{8}\omega_4u^2w_2 + \frac{1}{2}\omega_3w_4c_s^2 + \frac{1}{2}vw_3w_4 - \frac{1}{4}\omega_3w_1u - \\ & \frac{1}{2}\omega_3w_4c_s^2w_4 + \frac{1}{4}vw_4uw_2 + \frac{3}{8}v^2w_3w_2 + v^2w_1uw_2 + \frac{1}{2}vw_4w_1u^2 + \frac{1}{4}vw_4w_1u^2w_2 - vw_3w_4u + \frac{1}{8}\omega_3w_2 + \frac{1}{4}vw_4w_1 - \\ & \frac{1}{2}vw_3c_s^2w_2 + \frac{1}{2}\omega_3w_4c_s^2uw_2 + \frac{1}{4}vw_3w_1u^2w_2 - \frac{1}{4}vw_3w_4w_2 + \frac{1}{2}vw_3c_s^2w_1w_2 + \frac{1}{4}\omega_3w_1uw_2 + \frac{1}{2}vw_3w_4w_1u + \frac{1}{2}\omega_3u, \end{aligned}$$

$$\alpha_{x,y+\delta_1}^{[\mu_1],t-2\delta_t} = 1 - \frac{1}{2}\omega_3 c_s^2 \omega_2 - \frac{1}{2}v\omega_4 + 2\omega_1 u^2 + \frac{3}{4}\omega_4 \omega_1 - \frac{3}{4}\omega_3 + \frac{1}{4}\omega_4 \omega_1 u^2 \omega_2 - \frac{1}{2}v\omega_3 \omega_2 + \frac{1}{2}\omega_3 c_s^2 \omega_1 \omega_2 + \frac{1}{4}\omega_3 \omega_1 u^2 \omega_2 + \frac{1}{2}v^2 \omega_3 \omega_4 + \frac{3}{4}v^2 \omega_4 \omega_1 \omega_2 + v^2 \omega_2 - \frac{5}{4}\omega_4 \omega_1 u^2 - \frac{1}{2}v^3 \omega_4 \omega_2 + \frac{1}{2}\omega_3 \omega_4 + \frac{3}{2}\omega_3 c_s^2 + \frac{1}{2}v\omega_3 \omega_1 \omega_2 - v\omega_3 \omega_4 c_s^2 - \frac{1}{4}v^2 \omega_4 \omega_1 - \frac{1}{2}v\omega_4 u^2 \omega_2 - \frac{3}{4}v^2 \omega_3 + \frac{1}{4}\omega_3 u^2 \omega_2 + \frac{1}{2}v^3 \omega_4 \omega_1 \omega_2 - \frac{1}{4}\omega_4 \omega_1 \omega_2 + \frac{3}{4}\omega_3 \omega_1 - v^2 \omega_1 \omega_2 -$$



$$v\omega_3\omega_4 - \frac{3}{4}v^2\omega_3\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1\omega_2 - \frac{1}{4}v^2\omega_4 - \frac{1}{2}v\omega_3\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_2 - \frac{1}{2}v\omega_4\omega_1 + \frac{1}{2}v\omega_3\omega_4\omega_2,$$

$$\alpha_{x,y}^{[\mu_1],t-4\delta_t} = 1 + \omega_3\omega_4\omega_1\omega_2 + \omega_4\omega_1 - \omega_3 - \omega_3\omega_4\omega_2 + \omega_3\omega_4 - \omega_4\omega_1\omega_2 + \omega_3\omega_1 - \omega_4 + \omega_1\omega_2 - \omega_1 + \omega_4\omega_2 - \omega_3\omega_4\omega_1 - \omega_2 - \omega_3\omega_1\omega_2 + \omega_3\omega_2,$$

### 8.3 EFDE for $\mu_2$

$$\mu_{2,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_2],t-\ell\delta_t} \mu_{2,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\begin{aligned} \alpha_{x-\delta_l,y}^{[\mu_1],t} &= 1 + \omega_1 u^2 - \frac{1}{4}\omega_3 + \frac{1}{2}\omega_3 c_s^2 - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_1 - \frac{1}{2}\omega_1 u - \frac{1}{4}\omega_3 u^2 + \frac{1}{2}\omega_4 u - \frac{1}{4}v^2\omega_4 + \frac{1}{2}\omega_3 u. \\ \alpha_{x+\delta_l,y}^{[\mu_1],t} &= -1 - \omega_1 u^2 + \frac{1}{4}\omega_3 - \frac{1}{2}\omega_3 c_s^2 + \frac{1}{4}v^2\omega_3 + \frac{1}{4}\omega_4 + \frac{1}{2}\omega_1 - \frac{1}{2}\omega_1 u + \frac{1}{4}\omega_3 u^2 + \frac{1}{2}\omega_4 u + \frac{1}{4}v^2\omega_4 - \frac{1}{4}\omega_3 u. \\ \alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 - \frac{1}{8}\omega_4 u^3 + \frac{1}{4}\omega_4\omega_1 u^3 + \frac{1}{2}\omega_3 c_s^2 \omega_1 u - v\omega_4 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{4}\omega_3 - \frac{1}{4}v\omega_3\omega_2 + \frac{1}{8}\omega_2 u - \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_4 u + \frac{1}{2}v\omega_3\omega_1 u - v^2\omega_2 + \frac{1}{8}\omega_4\omega_1 u^2 - \frac{1}{2}v^3\omega_4\omega_2 - \frac{1}{8}\omega_3\omega_4 + \frac{1}{8}\omega_4^2 u^2 + \frac{1}{8}v^2\omega_3^2 u - \frac{1}{2}\omega_3 c_s^2 + \frac{1}{4}\omega_4 u\omega_2 + \frac{1}{4}v\omega_3^2 c_s^2 + \frac{1}{4}v^2\omega_3^2 - \frac{1}{4}v^2\omega_4\omega_1 u - \frac{1}{4}v\omega_3\omega_4 c_s^2 - \frac{1}{8}v^2\omega_4\omega_1 + \frac{1}{4}v^2\omega_3 - \frac{1}{2}v^2\omega_4 u\omega_2 - \frac{1}{2}v\omega_1 u\omega_2 + \frac{1}{8}\omega_3^2 u^3 - \frac{1}{8}\omega_3\omega_1 + \frac{1}{2}v^2\omega_1\omega_2 + \frac{1}{4}v\omega_3 u\omega_2 + \frac{3}{4}\omega_4 - \frac{1}{4}\omega_4\omega_1 u + \frac{1}{8}\omega_4^2 u - \frac{1}{4}\omega_1\omega_2 - \frac{1}{8}v^3\omega_3^2 + \frac{1}{8}v^2\omega_4^2 u + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_3\omega_4 u^2 + \frac{1}{2}v^3\omega_3\omega_2 + \frac{1}{4}v^2\omega_3\omega_4 u + \frac{1}{2}v\omega_3\omega_1 u^3 - \frac{1}{8}\omega_3\omega_1 + \frac{1}{2}v\omega_3\omega_1 u - \frac{1}{8}\omega_3\omega_1 u^2 + \frac{1}{8}\omega_3\omega_4 u^2 + \frac{1}{4}v\omega_3\omega_4 u^2 + \frac{3}{4}v^2\omega_4\omega_2 - \frac{1}{4}v\omega_1\omega_2 - \frac{1}{8}\omega_3\omega_1 u^2 + \frac{1}{4}\omega_3 u\omega_2 + \frac{1}{4}\omega_3 c_s^2 \omega_1 - \frac{1}{4}\omega_4 u^2 - \frac{1}{2}v^2\omega_3\omega_3 - \frac{1}{8}\omega_3\omega_1 - \frac{1}{8}\omega_4^2 u^2 - \frac{1}{8}\omega_3^2 u^2 + \frac{1}{4}v\omega_3\omega_4 u^2 - \frac{1}{4}v\omega_3\omega_1 u - \frac{1}{8}\omega_3^2 - \frac{1}{8}v\omega_4^2 u^2 - \frac{1}{4}\omega_3\omega_4 c_s^2 u - \frac{1}{4}\omega_3^2 c_s^2 u + \frac{1}{4}v\omega_4 u\omega_2 - \frac{1}{4}v^2\omega_3\omega_2 + v^2\omega_1 u\omega_2 - \frac{1}{4}v\omega_3^2 u + \frac{1}{4}v^2\omega_4 u - \frac{1}{2}v\omega_3\omega_4 u + \frac{1}{4}v\omega_4\omega_1 - \frac{1}{2}\omega_3 u, \\ \alpha_{x-\delta_l,y-\delta_l}^{[\mu_2],t-\delta_t} &= 1 + v\omega_4 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}v\omega_3\omega_2 - \frac{1}{2}v\omega_3\omega_1 u - \frac{1}{2}\omega_4\omega_1 u^2 + \frac{1}{4}\omega_4^2 u^2 - \frac{1}{4}\omega_4 u\omega_2 - \frac{1}{4}v^2\omega_3^2 + v\omega_1 u\omega_2 + \frac{1}{4}v\omega_4\omega_2 - \frac{1}{2}v\omega_3 u\omega_2 - \omega_4 + \frac{1}{4}\omega_4\omega_1 u - \frac{1}{2}\omega_4^2 u + \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_3^2 u^2 - \frac{1}{2}\omega_1 - \omega_1 u - \frac{1}{2}v\omega_4^2 + \frac{1}{4}\omega_4^2 + \frac{1}{4}v^2\omega_4^2 - \frac{1}{2}v^2\omega_4\omega_2 + \frac{1}{2}v\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1 u^2 - \frac{1}{4}\omega_3\omega_2 + \frac{1}{2}v\omega_4^2 u + \frac{1}{4}\omega_4\omega_2 - \frac{1}{2}v\omega_4\omega_1 u + \frac{1}{2}\omega_1 u\omega_2 - \frac{1}{4}v\omega_3\omega_1 - \frac{1}{2}\omega_2 + \omega_4 u - v\omega_2 + \frac{1}{4}\omega_3\omega_1 u - \frac{1}{2}v\omega_4 u\omega_2 + \frac{1}{2}v^2\omega_3\omega_2 + \frac{1}{2}v\omega_3^2 u - \frac{1}{4}v\omega_4\omega_1, \\ \alpha_{x,y-\delta_l}^{[\mu_2],t-\delta_t} &= 1 + \frac{1}{2}v\omega_4 - \frac{5}{4}\omega_3 + \frac{1}{2}v\omega_3\omega_2 + v^2\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_4 + v^2\omega_3^2 + \frac{1}{2}v\omega_4\omega_2 + 2v^2\omega_2^2 - \frac{1}{4}\omega_4 - v^2\omega_4\omega_2 + \frac{5}{2}v\omega_3 + v\omega_2^2 - \frac{1}{2}\omega_2 - 3v\omega_2 - v\omega_3\omega_4 - v\omega_3^2 - 3v^2\omega_3\omega_2 + \frac{1}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_2, \\ \alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= 1 - \frac{1}{8}\omega_4 u^3 + \frac{1}{4}\omega_4\omega_1 u^3 + \frac{1}{2}\omega_3 c_s^2 \omega_1 u + v\omega_4 + \frac{1}{8}\omega_4\omega_1 - \frac{1}{4}\omega_3 + \frac{1}{4}v\omega_3\omega_2 + \frac{1}{8}\omega_3^2 u + \frac{1}{8}v^2\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_4 u + \frac{1}{2}v\omega_3\omega_1 u + v^2\omega_2 - \frac{1}{8}\omega_4\omega_1 u^2 + \frac{1}{2}v^3\omega_4\omega_2 + \frac{1}{8}\omega_3\omega_4 - \frac{1}{8}\omega_4^2 u^2 + \frac{1}{8}v^2\omega_3^2 u + \frac{1}{2}\omega_3 c_s^2 + \frac{1}{4}\omega_4 u\omega_2 - \frac{1}{4}v\omega_3^2 c_s^2 - \frac{1}{4}v^2\omega_3^2 - \frac{1}{4}v^2\omega_4\omega_1 u + \frac{1}{4}v\omega_3\omega_4 c_s^2 + \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_3\omega_3 - \frac{1}{2}v^2\omega_4 u\omega_2 - \frac{1}{2}v\omega_1 u\omega_2 + \frac{1}{8}\omega_3^2 u^3 + \frac{1}{8}\omega_3\omega_1 - \frac{1}{2}v^2\omega_1\omega_2 + \frac{1}{4}v\omega_3 u\omega_2 - \frac{3}{4}\omega_4 - \frac{1}{4}\omega_4\omega_1 u + \frac{1}{8}\omega_4^2 u + \frac{1}{4}\omega_1\omega_2 + \frac{1}{8}v^3\omega_3^2 + \frac{1}{8}v^2\omega_4^2 u - \frac{1}{2}\omega_1 + \frac{1}{8}\omega_3\omega_4 u^2 - \frac{1}{2}v^3\omega_3\omega_2 + \frac{1}{4}v^2\omega_3\omega_4 u + \frac{1}{2}v\omega_3\omega_1 u^3 - \frac{1}{8}\omega_3\omega_1 + \frac{1}{2}v\omega_3\omega_1 u - \frac{1}{8}\omega_3\omega_1 u^2 + \frac{1}{8}\omega_3\omega_4 u^2 - \frac{3}{4}v^2\omega_4\omega_2 - \frac{1}{4}v\omega_3\omega_4 u^2 - \frac{3}{4}v^2\omega_4\omega_2 + \frac{1}{4}v\omega_1\omega_2 + \frac{1}{8}\omega_3\omega_1 u^2 + \frac{1}{4}\omega_3 u\omega_2 - \frac{1}{4}\omega_3 c_s^2 \omega_1 - \frac{1}{4}\omega_4 u^2 + \frac{1}{4}v\omega_4 u + \frac{1}{2}v\omega_1\omega_2 - \frac{1}{4}\omega_3 c_s^2 \omega_1 - \frac{1}{4}\omega_4 u^2 + \frac{1}{4}v\omega_4 u + \frac{1}{2}v\omega_4\omega_1 u - \frac{1}{2}\omega_1 u\omega_2 - \frac{1}{4}v\omega_3\omega_1 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4 u - \frac{1}{4}v^2\omega_3\omega_3 - \frac{1}{4}\omega_3\omega_2 + \frac{1}{2}v\omega_4\omega_2 - \frac{1}{2}v\omega_2 - \frac{1}{2}\omega_4 u^2 - \frac{1}{2}v^2\omega_3\omega_2 - \frac{1}{8}\omega_3^2 u^2 - \frac{1}{4}\omega_3\omega_4 c_s^2 - \frac{1}{4}\omega_3^2 c_s^2 u + \frac{1}{4}v\omega_4 u\omega_2 + \frac{1}{4}v^2\omega_3\omega_2 + v^2\omega_1 u\omega_2 - \frac{1}{4}v\omega_3^2 u - \frac{1}{4}v^2\omega_4 u - \frac{1}{2}v\omega_3\omega_4 u - \frac{1}{4}v\omega_4\omega_1 - \frac{1}{2}\omega_3 u, \\ \alpha_{x+\delta_l,y-\delta_l}^{[\mu_2],t-\delta_t} &= 1 + v\omega_4 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}v\omega_3\omega_2 + \frac{1}{2}v\omega_3\omega_1 u - \frac{1}{2}\omega_4\omega_1 u^2 + \frac{1}{4}\omega_4^2 u^2 + \frac{1}{4}\omega_4 u\omega_2 - \frac{1}{4}v^2\omega_3^2 - v\omega_1 u\omega_2 + \frac{1}{4}v\omega_4\omega_2 + \frac{1}{2}v\omega_3 u\omega_2 - \omega_4 - \frac{1}{4}\omega_4\omega_1 u + \frac{1}{2}\omega_4^2 u + \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_3^2 u^2 - \frac{1}{2}\omega_1 + \omega_1 u - \frac{1}{2}v\omega_4^2 + \frac{1}{4}\omega_4^2 + \frac{1}{4}v^2\omega_4^2 - \frac{1}{2}v^2\omega_4\omega_2 + \frac{1}{2}v\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1 u^2 - \frac{1}{4}\omega_3\omega_2 + \frac{1}{2}v\omega_4^2 u + \frac{1}{4}\omega_4\omega_2 - \frac{1}{2}v\omega_4\omega_1 u + \frac{1}{2}\omega_1 u\omega_2 - \frac{1}{4}v\omega_3\omega_1 - \frac{1}{2}\omega_2 + \omega_4 u - v\omega_2 - \frac{1}{4}\omega_3\omega_1 u + \frac{1}{2}v\omega_4 u\omega_2 + \frac{1}{2}v^2\omega_3\omega_2 - \frac{1}{2}v\omega_3^2 u - \frac{1}{4}v\omega_4\omega_1 - \frac{1}{2}\omega_3 u, \end{aligned}$$



$$w_4 u + v w_2 - \frac{1}{4} \omega_3 \omega_1 u - \frac{1}{2} v w_4 u \omega_2 + \frac{1}{2} v^2 \omega_3 \omega_2 + \frac{1}{2} v \omega_3^2 u + \frac{1}{4} v w_4 \omega_1,$$

$$\begin{aligned} \alpha_{x-\delta_l, y-\delta_l}^{[\mu_1], t-2\delta_t} = & 1 - \frac{1}{2} v^2 \omega_3^2 \omega_1 u^2 - \frac{1}{4} v w_4 \omega_1 u \omega_2 - \frac{1}{4} \omega_3^2 \omega_4 c_s^2 + \frac{1}{8} \omega_4^2 u^3 - \frac{5}{4} \omega_4 \omega_1 u^3 + \frac{5}{4} \omega_3 c_s^2 \omega_2 + \frac{3}{2} \omega_3 c_s^2 \omega_1 u + v w_4 - \\ & 3 \omega_1 u^2 + \frac{1}{2} v w_3^2 c_s^2 u \omega_2 + \frac{1}{8} \omega_4 \omega_1 - \frac{1}{4} \omega_3 - \frac{1}{2} \omega_4 \omega_1 u^2 \omega_2 + \frac{1}{4} v w_3 \omega_1 u \omega_2 - \frac{1}{8} \omega_3 \omega_4 \omega_1 u + \frac{3}{4} v \omega_4^2 \omega_1 u^2 - \frac{3}{8} v \omega_3 \omega_2 - \\ & \frac{1}{2} \omega_3 c_s^2 \omega_1 \omega_2 + v w_4 \omega_1^2 u^3 - \frac{1}{4} \omega_3 \omega_1 u^2 \omega_2 - v^2 \omega_3 c_s^2 \omega_2^2 - \frac{1}{8} \omega_3^2 u + \frac{1}{4} \omega_3 \omega_4^2 c_s^2 u + \frac{3}{2} v^2 \omega_3 \omega_4 c_s^2 \omega_2 - \frac{1}{8} v^2 \omega_3 \omega_4 + \\ & \frac{1}{4} v^3 \omega_3 \omega_2^2 - \frac{1}{4} \omega_3 \omega_4 u - \frac{1}{8} \omega_3^2 \omega_1 u - \frac{1}{2} v w_3^2 u^3 \omega_2 + \frac{3}{2} v^2 \omega_3 \omega_1 u \omega_2 - \frac{7}{4} v w_3 \omega_1 u - \frac{1}{4} v^2 \omega_4 \omega_1 \omega_2 - v^2 \omega_2 + \\ & \frac{1}{2} v w_3 \omega_4 c_s^2 u \omega_2 - \frac{1}{2} v w_3 \omega_4 c_s^2 \omega_2 + \frac{13}{8} \omega_4 \omega_1 u^2 - \frac{1}{4} \omega_3 \omega_4^2 c_s^2 - \frac{3}{4} v^3 \omega_4 \omega_2 + \frac{1}{8} \omega_3 \omega_4 - \frac{1}{8} \omega_4^2 u^2 + \frac{3}{8} v^2 \omega_3^2 u - 2 \omega_3 c_s^2 - \\ & \frac{1}{4} \omega_4 u \omega_2 - \frac{1}{2} v w_1 u \omega_2 - \frac{1}{4} v \omega_3^2 c_s^2 - \frac{1}{2} v^2 \omega_3^2 - 2 v w_1^2 u^3 \omega_2 + \frac{1}{4} v^2 \omega_4 \omega_1 u + \frac{1}{4} v w_3 \omega_1 \omega_2 - \frac{1}{2} v w_3 \omega_4 u^3 \omega_2 - \frac{9}{4} v w_3 \omega_4 c_s^2 + \\ & \frac{1}{4} v w_4 \omega_1^2 u^2 + \frac{1}{8} v^2 \omega_4 \omega_1 + \frac{1}{8} v^2 \omega_3^2 \omega_2 - \frac{5}{4} v w_4 u^2 \omega_2 - \frac{1}{2} v w_4^2 \omega_1 u^3 - \frac{1}{4} v^4 \omega_4^2 \omega_2 - \frac{1}{2} v \omega_3^2 c_s^2 \omega_2 + \frac{1}{2} \omega_3 \omega_4 u^3 + v^2 \omega_3 - \\ & \frac{8}{8} \omega_3 u^2 \omega_2 + \frac{1}{4} \omega_3^2 \omega_1 u^3 - \frac{1}{2} v^2 \omega_4 u \omega_2 + 2 v w_1 u \omega_2 + w_3 \omega_1 u^3 \omega_2 - \frac{1}{4} \omega_3 \omega_1 u^2 - \frac{3}{8} \omega_3^2 u^3 - \frac{1}{2} v^2 \omega_3 \omega_4 c_s^2 + \frac{1}{4} v^3 \omega_4 \omega_1 \omega_2 + \\ & \frac{1}{8} \omega_3 \omega_1 + \frac{1}{4} v w_4 u^2 \omega_2 - 2 v^2 \omega_1 u^2 \omega_2 + w_3 \omega_4 \omega_1 u^3 + \frac{1}{4} \omega_3^2 \omega_4 c_s^2 u + \frac{1}{8} v w_4 \omega_2 - w_3 c_s^2 \omega_1 u \omega_2 + \frac{1}{2} v^2 \omega_1 \omega_2 + \frac{1}{2} v w_3 \omega_4^2 u^3 - \\ & \frac{1}{4} v w_3 u \omega_2 + \frac{1}{2} \omega_4 \omega_1 u^3 \omega_2 + \frac{3}{2} \omega_1 u^2 \omega_2 - \frac{3}{4} v w_3^2 \omega_4 u^2 - \frac{5}{2} v w_3 \omega_1 u^2 - \frac{3}{4} \omega_4 - \frac{1}{4} v^3 \omega_4 \omega_2 + \frac{3}{8} \omega_4 \omega_1 u + v w_3 \omega_4 c_s^2 \omega_1 u - \\ & \frac{1}{4} \omega_4^2 u + \frac{1}{2} v^2 \omega_3 u^2 \omega_2^2 - \frac{3}{4} v^2 \omega_3 \omega_4 u^2 \omega_2 - \frac{1}{8} v^2 \omega_3 \omega_4 \omega_2 - \frac{1}{4} \omega_3 \omega_4 \omega_1 u^2 - \frac{1}{4} \omega_3 \omega_4 c_s^2 \omega_1 + \frac{1}{4} \omega_1 \omega_2 - v w_1^2 u^2 \omega_2 + \\ & \frac{8}{8} v^3 \omega_3^2 + \frac{1}{4} v^3 \omega_3^2 u \omega_2 - \frac{1}{8} v^2 \omega_4^2 u - \frac{1}{4} \omega_3^2 u^2 - \frac{1}{4} v^2 \omega_4^2 u^2 \omega_2 - \frac{1}{2} v \omega_3 \omega_1 u^3 - \frac{1}{2} \omega_1 + \frac{1}{2} v w_3 \omega_4 u^2 \omega_2 - \frac{1}{4} \omega_3^2 \omega_1 u^2 - \\ & \frac{1}{2} v^2 \omega_3^2 \omega_4 c_s^2 - \frac{11}{8} \omega_3 \omega_4 u^2 + \frac{3}{4} v^3 \omega_3 \omega_2 + \frac{1}{4} v^2 \omega_3 \omega_4 u - \frac{1}{2} v^2 \omega_3^2 \omega_1 u - \frac{3}{8} v \omega_4^2 - \frac{1}{4} v^2 \omega_4^2 \omega_2 - \frac{3}{8} v \omega_3 \omega_1 + \\ & \frac{1}{4} v^4 \omega_3^2 \omega_2 + \frac{1}{4} v w_3^2 u^2 \omega_2 + \frac{1}{2} v w_3^2 \omega_4 u^3 - \frac{3}{4} v w_3 \omega_4^2 u^2 + \frac{1}{8} \omega_4^2 - \frac{1}{2} v w_3 c_s^2 \omega_2^2 - \frac{1}{2} \omega_3 \omega_4 c_s^2 \omega_1 u + \frac{3}{8} \omega_3 \omega_4 u^2 \omega_2 - \\ & \frac{1}{2} v^3 \omega_3^2 \omega_2 + \frac{1}{2} v w_3 \omega_4 c_s^2 \omega_1 - \frac{1}{4} v w_3 \omega_4 u \omega_2 - \frac{1}{2} v^2 \omega_2 \omega_4 \omega_2 - \frac{1}{4} \omega_3 \omega_4 \omega_1 u^2 + \frac{1}{4} v \omega_3 \omega_4 c_s^2 \omega_1 + \frac{1}{8} \omega_3^2 u^2 \omega_2 + \\ & w_3 u^2 - \frac{1}{4} \omega_3^2 \omega_4 u^3 - \frac{7}{4} \omega_3 \omega_1 u^3 + \frac{1}{4} v^2 \omega_4^2 u \omega_2 + \frac{1}{8} v w_3^2 u^2 + \frac{3}{8} v^2 \omega_4^2 + \frac{9}{4} v w_3 \omega_4 u^2 + \frac{3}{4} v w_3^2 \omega_1 u^2 + v w_3 \omega_1^2 u^3 + \\ & \frac{7}{8} v^2 \omega_4 \omega_2 - \frac{1}{4} v w_3^2 u \omega_2 + \frac{1}{4} v w_1 \omega_2 - \frac{1}{2} \omega_1 u^2 \omega_2 + \frac{11}{8} \omega_3 \omega_1 u^2 + \frac{1}{4} \omega_3^2 \omega_4 u^2 - \frac{1}{2} v w_3^2 \omega_4 c_s^2 \omega_2 - 2 v w_3 \omega_4 \omega_1 u^3 + \\ & 5 v w_1 u^2 \omega_2 - \frac{1}{4} \omega_3 \omega_4^2 u^3 + \frac{1}{2} v^2 \omega_3^2 c_s^2 \omega_2 - \frac{1}{4} \omega_3 \omega_4 u \omega_2 + \frac{3}{4} \omega_3 c_s^2 \omega_1 + \frac{1}{4} v \omega_4^2 u - v^2 \omega_1 \omega_2 - \frac{1}{4} v w_4^2 u^3 \omega_2 + \frac{1}{2} v^4 \omega_4 \omega_2 + \\ & \frac{1}{4} \omega_4 \omega_2 + \frac{1}{4} v^2 \omega_3 \omega_2^2 + \frac{3}{2} v w_3 \omega_1 u^3 \omega_2 - \frac{3}{4} v w_4 \omega_1 u + \frac{1}{2} v w_3 \omega_1^2 u^2 - \frac{3}{4} \omega_1 u \omega_2 - \frac{1}{2} v w_3 \omega_1 u^3 - \frac{5}{4} v w_3 u^2 \omega_2 + \\ & \frac{1}{4} v^2 \omega_3 \omega_4 u \omega_2 - \frac{1}{2} \omega_2 + \frac{1}{2} \omega_4 u - \frac{3}{4} v^2 \omega_3 \omega_1 u - v^2 \omega_3 \omega_4 \omega_1 u^2 + \frac{3}{2} v w_4 \omega_1 u^3 \omega_2 - \frac{1}{4} v^3 \omega_3 \omega_1 \omega_2 - \frac{1}{2} v w_2 + 2 v w_3 \omega_1 u^2 \omega_2 - \\ & \omega_1^2 u^3 \omega_2 + \frac{1}{4} v w_3 u^2 \omega_2^2 - \frac{1}{2} \omega_3 \omega_4 c_s^2 \omega_2 + \frac{1}{2} \omega_4 u^2 + \frac{1}{2} \omega_3^2 c_s^2 + \frac{1}{4} \omega_2^2 \omega_1 u^3 - \frac{1}{4} \omega_3^2 c_s^2 \omega_2 - \frac{1}{2} v^2 \omega_3 \omega_4 u \omega_2 - \frac{1}{8} \omega_4 u^2 \omega_2 - \\ & \frac{1}{8} v^3 \omega_4^2 + \frac{1}{2} v^3 \omega_4^2 \omega_2 - \frac{1}{2} v^2 \omega_3 \omega_4 \omega_1 u + 2 \omega_1^2 u^3 + \frac{1}{2} v^2 \omega_3^2 \omega_4 u^2 + \frac{3}{2} v w_3 \omega_4 c_s^2 \omega_2 - \frac{1}{4} \omega_4 \omega_1^2 u^2 - \frac{1}{4} v w_3 \omega_4 + \frac{8}{8} \omega_3 \omega_1 u + \\ & \frac{1}{2} v^2 \omega_4 u^2 \omega_2^2 + \frac{1}{8} v w_3^2 + \frac{1}{8} v w_4^2 u^2 + 2 v^2 \omega_4 \omega_1 u^2 \omega_2 - \frac{3}{4} v w_3 \omega_4 c_s^2 \omega_2 - v w_1 u^2 \omega_2^2 - \frac{1}{4} \omega_3^2 u^3 \omega_2 - \frac{3}{4} \omega_3^2 c_s^2 \omega_2 - \frac{1}{4} v w_4 u \omega_2 + \\ & \frac{1}{8} v^2 \omega_3 \omega_2 - \frac{1}{4} \omega_3 \omega_4 u^3 \omega_2 + v^2 \omega_1 \omega_2 - \frac{5}{2} v w_4 \omega_1 u^2 + \frac{3}{4} v w_3 \omega_4^2 c_s^2 \omega_2 - \frac{1}{4} v^3 \omega_4 \omega_2 u \omega_2 - \frac{1}{4} v^2 \omega_3^2 u^2 \omega_2 - \frac{1}{2} \omega_4 \omega_1 u^3 + \frac{1}{4} v w_3^2 u - \\ & \frac{1}{2} v^2 \omega_4 + \omega_1^2 u^2 - \frac{3}{4} v w_4 \omega_1 u^2 \omega_2 - \frac{1}{4} \omega_2^2 \omega_1 u^2 + \frac{1}{2} v^2 \omega_3 \omega_4^2 u^2 + \frac{1}{2} v w_3^2 \omega_1 u + \frac{1}{2} \omega_3^2 c_s^2 \omega_2 u \omega_2 + \frac{1}{2} v w_3 \omega_4 u + \frac{1}{2} v^3 \omega_4 \omega_1 \omega_2 - \\ & \frac{1}{4} v^4 \omega_3 \omega_2^2 - \frac{1}{4} v^2 \omega_4 \omega_2^2 + \frac{1}{8} v w_3^2 \omega_2 - \frac{1}{4} v w_4 \omega_1 + \frac{1}{4} v w_4^2 u^2 \omega_2 + \frac{5}{2} v w_3 \omega_4 c_s^2 \omega_2 - \frac{1}{2} v w_3 \omega_4^2 c_s^2 \omega_2 + \\ & \frac{1}{2} \omega_3 \omega_4 c_s^2 \omega_2 u \omega_2 - \frac{3}{4} v w_3 \omega_1 u^2 \omega_2 + \frac{1}{8} v w_3 \omega_4 \omega_2 - \frac{1}{2} v w_3 c_s^2 \omega_1 \omega_2 - \frac{1}{4} \omega_3 \omega_1 u \omega_2 + \frac{1}{2} v w_3 \omega_4 \omega_1 u + \frac{1}{2} \omega_3 u, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_l, y-\delta_l}^{[\mu_2], t-2\delta_t} = & -2 + v w_4 \omega_1 u \omega_2 + \frac{1}{2} v^2 \omega_3^2 u \omega_2 - \frac{3}{2} v w_4 + \frac{1}{8} \omega_3^2 \omega_2 - \frac{3}{8} \omega_4 \omega_1 + \frac{5}{2} \omega_3 - \frac{1}{2} \omega_4 \omega_1 u^2 \omega_2 + \frac{3}{8} \omega_3 \omega_4 \omega_2 + 2 v w_3 \omega_4^2 u + v w_3 \omega_1 u \omega_2 + \\ & \frac{1}{2} \omega_3 \omega_4 \omega_1 u + \frac{1}{2} v w_4^2 \omega_1 u^2 - \frac{3}{4} v w_4^2 u \omega_2 - 2 v w_3 \omega_2 - \frac{3}{2} \omega_3 \omega_1 u^2 \omega_2 + \omega_3^2 u - v^2 \omega_3 \omega_4 + \frac{7}{2} \omega_3 \omega_4 u + \frac{1}{4} \omega_3^2 \omega_1 u + v^2 \omega_1 \omega_2^2 - \\ & 2 v^2 \omega_3 \omega_1 u \omega_2 - \frac{1}{2} v w_3 \omega_2 + \frac{1}{4} v w_4 \omega_2^2 + 3 v w_3 \omega_1 u - \frac{1}{2} v^2 \omega_4 \omega_1 \omega_2 + 2 v w_3^2 \omega_4 u + \frac{3}{2} \omega_4 \omega_1 u^2 - \frac{7}{4} \omega_3 \omega_4 - \frac{1}{4} \omega_4^2 u^2 + \frac{1}{2} \omega_4 u \omega_2 - \\ & 2 v^2 \omega_4 \omega_1 u \omega_2 + v w_1 \omega_2^2 - v^2 \omega_4 \omega_2^2 - \frac{3}{4} v^2 \omega_3^2 + \frac{1}{2} v w_3 \omega_1 \omega_2 + \frac{1}{4} \omega_3 \omega_1 u^2 - \frac{3}{2} v w_3^2 \omega_4 - v w_4 \omega_1^2 u^2 - \frac{1}{4} v^2 \omega_3^2 \omega_2 - 6 v w_1 \omega_2 + \\ & \frac{1}{2} \omega_3 \omega_1^2 u^2 - \frac{1}{2} v w_4 \omega_1^2 u - \frac{9}{8} \omega_3 \omega_1 - \frac{1}{2} v w_3^2 \omega_1 - 2 v w_4 \omega_2 + 3 v w_3 \omega_2 - 2 v^2 \omega_2^2 - v w_3^2 \omega_4 u^2 + \frac{1}{4} \omega_3 \omega_4^2 + \frac{3}{2} \omega_4 - 2 \omega_4 \omega_1 u - \\ & v w_3 \omega_1 \omega_1 + \frac{1}{2} \omega_2^2 u - \frac{3}{2} v^2 \omega_3 \omega_4 \omega_2 - \frac{3}{4} v w_2^2 \omega_1 u - \frac{3}{2} \omega_3 \omega_4 \omega_1 u^2 - \omega_3 \omega_4 \omega_2 - \frac{1}{2} \omega_1 \omega_2 + \frac{1}{4} v w_3 \omega_2^2 + 2 v w_2^2 \omega_2 - \frac{1}{2} \omega_3^2 \omega_2 - \\ & \frac{3}{2} \omega_3^2 u^2 + \omega_1 + v w_3 \omega_4 u^2 \omega_2 - \frac{1}{2} \omega_2^2 \omega_1 u^2 - \omega_3 \omega_4 u^2 + \frac{1}{2} v^2 \omega_3 \omega_4 u^2 + \frac{1}{2} v^2 \omega_3^2 \omega_1 u + 4 \omega_1 u + \frac{1}{2} v w_2^2 + \frac{1}{2} \omega_1^2 \omega_2 - \frac{1}{2} v^2 \omega_2^2 \omega_2 + \\ & \frac{1}{2} v w_3^2 \omega_2^2 - v w_3 \omega_2^2 - \frac{1}{4} \omega_4^2 + \frac{1}{2} \omega_3 \omega_4 u^2 \omega_2 - \frac{3}{2} v w_3 \omega_4 u^2 \omega_2 + \frac{1}{2} v w_3^2 \omega_4 u^2 + \frac{1}{2} \omega_3 \omega_4^2 \omega_2 - \frac{1}{2} v w_3 \omega_4 u^2 \omega_2 + \\ & v w_1^2 \omega_2 - \frac{1}{2} \omega_1 u - \frac{1}{4} v^2 \omega_4^2 + \frac{1}{4} \omega_4^2 \omega_1 u - v^2 \omega_3 \omega_4^2 u + \frac{1}{2} v w_3^2 \omega_1 u^2 + \frac{3}{2} v^2 \omega_4 \omega_2 + \frac{1}{2} v^2 \omega_3^2 \omega_1 - \frac{3}{4} v w_3^2 \omega_2 - 2 v w_1 \omega_2 + \omega_2^2 + \frac{1}{2} v^2 \omega_3^2 \omega_2 + \\ & \frac{5}{2} \omega_3 \omega_1 u^2 + \frac{1}{2} \omega_3^2 \omega_4 u^2 - \frac{3}{4} v w_3 \omega_4^2 + \frac{3}{2} \omega_3 \omega_2 \omega_2 - \frac{1}{2} v w_2^2 - \frac{5}{2} v w_3 + 2 v^2 \omega_1 \omega_2^2 + \frac{1}{8} \omega_3^2 \omega_1 - \frac{3}{8} \omega_4 \omega_2 - \frac{1}{2} v w_4 \omega_2^2 + \frac{1}{2} v^2 \omega_3 \omega_2^2 + \\ & \frac{3}{8} \omega_3 \omega_4 \omega_1 - \frac{3}{2} v^2 \omega_3 \omega_1 \omega_2 + 3 v w_4 \omega_1 u - v w_3 \omega_1^2 u^2 - v w_2^2 - 2 \omega_1 \omega_2 + \frac{3}{2} v w_3 \omega_1 + \frac{1}{4} v w_4^2 \omega_2 + 3 v^2 \omega_3 \omega_4 \omega_2 + \omega_2 - \frac{3}{2} \omega_4 u - \\ & v^2 \omega_3 \omega_2^2 - v^2 \omega_3^2 \omega_4 u + \frac{1}{4} \omega_4 \omega_1 u^2 + \frac{1}{2} v w_4 \omega_1 \omega_2 + 4 v w_2 + \frac{1}{2} v^2 \omega_3 \omega_4 \omega_1 - \frac{1}{2} v w_3 \omega_1^2 u + \frac{1}{2} \omega_3 \omega_1 \omega_2 + v^2 \omega_3 \omega_4 \omega_1 + \frac{1}{4} \omega_3^2 \omega_4 + \\ & \frac{1}{2} \omega_4 \omega_1^2 u^2 + \frac{7}{2} v w_3 \omega_4 - \frac{3}{4} \omega_3^2 \omega_4 u - 2 \omega_3 \omega_1 u + v w_2^2 + \frac{5}{2} v^2 \omega_3 \omega_2 - \frac{1}{2} \omega_3^2 - \frac{1}{2} v w_3^2 \omega_2 - 2 \omega_1^2 u^2 - 2 v w_4 \omega_1 \omega_2^2 - \\ & \frac{1}{4} \omega_4^2 \omega_1 u^2 - \frac{3}{4} v w_3 \omega_1 u - 5 v w_3 \omega_4 u + \frac{1}{2} \omega_4 \omega_1 \omega_2 + \frac{1}{2} v w_1 \omega_2^2 + \frac{1}{2} v^2 \omega_4 \omega_2^2 - \frac{9}{8} \omega_3 \omega_2 + \frac{1}{4} v w_3^2 \omega_2 + \frac{1}{2} v w_4 \omega_1 + \\ & \frac{1}{2} v w_4^2 \omega_2^2 - 2 v w_3 \omega_1 \omega_2^2 + \frac{1}{2} v^2 \omega_4^2 \omega_1 u - \frac{3}{4} \omega_3 \omega_4 u^2 + \frac{1}{2} v w_3 \omega_4 \omega_2 + \frac{1}{2} v^2 \omega_3^2 \omega_4 + \frac{1}{2} \omega_3 \omega_1 \omega_2 \omega_2 - \frac{3}{2} v w_3 \omega_4 \omega_1 u + \frac{1}{2} \omega_3 u, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_l, y-\delta_l}^{[\mu_1], t-2\delta_t} = & -\frac{1}{2} v w_4 \omega_1 u \omega_2 - \frac{1}{4} \omega_4^2 u^3 + \frac{5}{2} \omega_4 \omega_1 u^3 - \frac{1}{4} v^2 \omega_3^2 u \omega_2 - 3 \omega_3 c_s^2 \omega_1 u - v w_3^2 c_s^2 \omega_2 - v w_3 \omega_4^2 u \omega_2 - \frac{3}{2} v w_3 \omega_1 u \omega_2 - \\ & 2 v w_4 \omega_1^2 u^3 - \frac{3}{4} \omega_3^2 u - \omega_3 \omega_4^2 c_s^2 u - \frac{3}{2} v w_3 \omega_4 u + \frac{1}{2} v w_3^2 \omega_3^2 u - \frac{1}{2} v^2 \omega_3 \omega_1 u \omega_2 - v w_3 \omega_4 u - v w_3 \omega_4 c_s^2 \omega_2 - \end{aligned}$$

$$\begin{aligned}
& \frac{3}{4}v^2w_5^2u - \frac{1}{2}w_4uw_2 + \frac{5}{2}v^2w_4w_1uw_2 + 4vw_1^2u^3w_2 - \frac{1}{2}v^2w_4w_1u + vw_3w_4u^3w_2 + vw_4^2w_1u^3 - w_3w_4u^3 + v^2w_4uw_2 + \\
& 3vw_1uw_2 - \frac{3}{2}w_3w_1u^3w_2 - \frac{3}{4}w_3^2u^3 + \frac{1}{2}vw_4w_1^2u - 2w_3w_4w_1u^3 - w_3^2w_4c_s^2u + w_3c_s^2w_1uw_2 - vw_3w_4^2u^3 - \frac{1}{2}vw_3uw_2 - \\
& \frac{3}{2}w_4w_1u^3w_2 + \frac{7}{2}w_4w_1u - 2vw_3w_4c_s^2w_1u - \frac{3}{4}w_4^2u + \frac{1}{4}w_4^2u^3w_2 + vw_2^2w_1u + \frac{1}{2}w_3w_4uw_2 - \frac{1}{2}v^3w_3^2uw_2 + \frac{1}{4}w_3^2uw_2 + \\
& \frac{1}{4}v^2w_4^2u - \frac{1}{2}v^2w_3w_4u + \frac{1}{2}v^2w_3^2w_1u - 4w_1u - \frac{1}{2}w_1^2uw_2 - vw_3^2w_4u^3 + 2w_3w_4c_s^2w_1u + \frac{1}{2}vw_3w_4uw_2 + 2vw_3c_s^2w_1uw_2 + \\
& \frac{1}{2}w_3^2w_4u^3 + \frac{7}{2}w_3w_1u^3 - \frac{3}{4}v^2w_4^2uw_2 - vw_1^2uw_2 + w_1^2u - \frac{1}{2}w_4^2w_1u + \frac{1}{2}v^2w_3w_4^2u - 2vw_3w_2^2u^3 + \frac{1}{2}vw_3^2uw_2 + \\
& vw_3^2w_4c_s^2u + 4vw_3w_4w_1u^3 + \frac{1}{2}w_3w_4^2u^3 - \frac{1}{2}w_3uw_2 + \frac{1}{2}vw_4^2u + \frac{1}{2}vw_4^2u^3w_2 - 3vw_3w_1u^3w_2 - 3vw_4w_1u + 2w_1uw_2 + \\
& vw_3^2w_1u^3 - v^2w_3w_4uw_2 + w_4u + \frac{1}{2}v^2w_3^2w_4u - \frac{1}{2}w_4w_1^2u + \frac{3}{2}v^2w_3w_1u - 3vw_4w_1u^3w_2 + \frac{1}{2}vw_3w_2^2u + 2w_1^2u^3w_2 - \\
& w_4^2w_1u^3 + v^2w_3uw_2 - v^2w_3w_4w_1u - 4w_1^2u^3 + \frac{1}{2}w_3^2w_4u + \frac{3}{2}w_3w_1u + \frac{3}{2}w_3w_4c_s^2u + \frac{1}{4}w_3^2u^3w_2 + \frac{3}{2}w_3^2c_s^2u - \frac{1}{2}vw_4uw_2 + \\
& \frac{1}{2}w_3w_4u^3w_2 - 2v^2w_1uw_2 + \frac{1}{2}v^3w_4^2uw_2 + 2w_4w_1^2u^3 + \frac{1}{2}vw_3^2u + \frac{1}{4}w_4^2uw_2 - \frac{1}{2}w_3^2c_s^2uw_2 + vw_3w_4u - v^3w_4w_1uw_2 - \\
& w_4w_1uw_2 + vw_3w_4^2c_s^2u - \frac{1}{2}w_3w_4c_s^2uw_2 - \frac{1}{2}v^2w_4^2w_1u + \frac{1}{2}w_3w_4^2u + v^3w_3w_1uw_2 - \frac{1}{2}w_3w_1uw_2 + 2vw_3w_4w_1u + w_3u,
\end{aligned}$$

$$\begin{aligned} \alpha_{x,y-\delta_l}^{[\mu_2], t-2\delta_t} = & -2 - 2vw_4 - \frac{1}{2}\omega_4^2 u^2 \omega_2 - \frac{5}{2}\omega_4 \omega_1 + 2\omega_4 \omega_1 u^2 \omega_2 - vw_4^2 \omega_1 u^2 - \frac{1}{2}vw_3 \omega_2 - vw_4^2 \omega_1 + 2\omega_3 \omega_1 u^2 \omega_2 - \omega_1^2 - \\ & v^2 \omega_4 \omega_1 \omega_2 - 3\omega_4 \omega_1 u^2 + \frac{1}{2}\omega_4^2 u^2 + \frac{1}{2}v^2 \omega_3^2 + \frac{1}{2}vw_3 \omega_1 \omega_2 + 2vw_4 \omega_1^2 u^2 + \frac{1}{2}\omega_4 \omega_1 \omega_2 - \frac{1}{2}vw_4 \omega_2 + 2vw_3^2 \omega_4 u^2 + \\ & 2\omega_4 + 3\omega_3 \omega_4 \omega_1 u^2 - \frac{3}{2}\omega_1 \omega_2 - 4vw_1^2 u^2 \omega_2 + \frac{3}{2}\omega_3^2 u^2 + 3\omega_1 - 2vw_3 \omega_4 u^2 \omega_2 + 2\omega_3 \omega_4 u^2 + vw_4^2 + \frac{1}{2}\omega_4 \omega_1^2 - \\ & vw_3^2 u^2 \omega_2 + vw_1^2 \omega_2 + 2vw_3 \omega_4 u^2 - \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_1^2 \omega_2 - \frac{1}{2}vw_4 \omega_1^2 - \omega_3 \omega_4 u^2 \omega_2 - \omega_3 \omega_4^2 u^2 - 6vw_3 \omega_4 \omega_1 u^2 - \\ & \frac{1}{2}\omega_3^2 u^2 \omega_2 - \frac{1}{2}v^2 \omega_4^2 - vw_3^2 \omega_1 u^2 + v^2 \omega_4 \omega_2 - \frac{1}{2}v^2 \omega_3^2 \omega_1 - 3vw_1 \omega_2 - 2\omega_1^2 u^2 \omega_2 - 5\omega_3 \omega_1 u^2 - \omega_3^2 \omega_4 u^2 - \frac{1}{2}\omega_4 \omega_2 + \\ & v^2 \omega_3 \omega_1 \omega_2 + 2vw_3 \omega_1^2 u^2 + \frac{1}{2}vw_3 \omega_1 + \omega_2 + \frac{1}{2}vw_4 \omega_1 \omega_2 + 2vw_2 - \frac{1}{2}vw_3 \omega_1^2 - 2\omega_4 \omega_1^2 u^2 + \frac{1}{2}v^2 \omega_4^2 \omega_1 - v^2 \omega_3 \omega_2 + \\ & 4\omega_1^2 u^2 + 4vw_4 \omega_1 u^2 \omega_2 + \omega_4^2 \omega_1 u^2 + \frac{1}{2}\omega_4^2 \omega_1 + \frac{5}{2}vw_4 \omega_1 - vw_4^2 u^2 \omega_2 + 4vw_3 \omega_1 u^2 \omega_2, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_1,y-\delta_1}^{[\mu_1,t-2\delta_t]} = & -1 + \frac{1}{2}v^2\omega_3^2\omega_1u^2 - \frac{1}{4}vw_4\omega_1uw_2 + \frac{1}{4}\omega_3^2\omega_4c_s^2 + \frac{1}{8}\omega_4^2u^3 - \frac{5}{4}\omega_4\omega_1u^3 - \frac{5}{4}\omega_3c_s^2\omega_2 + \frac{3}{2}\omega_3c_s^2\omega_1u - vw_4 + \\ & 3\omega_1u^2 + \frac{1}{2}vw_3^2c_s^2uw_2 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{4}\omega_3 + \frac{1}{2}\omega_4\omega_1u^2\omega_2 + \frac{1}{4}vw_3\omega_1uw_2 - \frac{1}{8}\omega_3\omega_4\omega_1u - \frac{3}{4}vw_4^2\omega_1u^2 + \frac{3}{8}vw_3\omega_2 + \\ & \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + vw_4\omega_1^2u^3 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 + v^2\omega_3c_s^2\omega_2^2 - \frac{1}{8}\omega_3^2u + \frac{1}{4}\omega_3\omega_4^2c_s^2u - \frac{3}{2}v^2\omega_3\omega_4c_s^2\omega_2 + \frac{1}{8}v^2\omega_3\omega_4 - \\ & \frac{1}{4}v^3\omega_3\omega_2^2 - \frac{1}{4}\omega_3\omega_4u - \frac{1}{8}\omega_3^2\omega_1u - \frac{1}{4}vw_3^2u^3\omega_2 + \frac{3}{2}v^2\omega_3\omega_1uw_2 - \frac{7}{4}vw_3\omega_1u + \frac{1}{4}v^2\omega_4\omega_1\omega_2 + v^2\omega_2 + \\ & \frac{1}{2}vw_3\omega_4c_s^2uw_2 + \frac{1}{2}vw_3\omega_4c_s^2\omega_2 - \frac{13}{8}\omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_4^2c_s^2 + \frac{3}{4}v^3\omega_4\omega_2 - \frac{1}{8}\omega_3\omega_4 + \frac{1}{8}\omega_4^2u^2 + \frac{3}{8}v^2\omega_3^2u + 2w_3c_s^2 - \\ & \frac{1}{4}\omega_4\omega_2 - \frac{1}{2}vw_1\omega_2 + \frac{1}{4}vw_3^2c_s^2 + \frac{1}{2}v^2\omega_3^2 - 2vw_1^2u^3\omega_2 + \frac{1}{4}v^2\omega_4\omega_1u - \frac{1}{4}vw_3\omega_1\omega_2 - \frac{1}{2}vw_3\omega_4u\omega_3\omega_2 + \frac{9}{4}vw_3\omega_4c_s^2 - \\ & \frac{1}{2}vw_4\omega_1^2u^2 - \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{8}v^2\omega_3^2\omega_2 + \frac{5}{4}vw_4u^2\omega_2 - \frac{1}{2}vw_4^2\omega_1u^3 + \frac{1}{4}v^4\omega_4^2\omega_2 + \frac{1}{2}vw_3^2c_s^2\omega_2 + \frac{1}{2}\omega_3\omega_4u^3 - v^2\omega_3 + \\ & \frac{5}{8}\omega_3u^2\omega_2 + \frac{1}{4}\omega_3^2\omega_1u^3 - \frac{1}{2}v^2\omega_4\omega_2 + 2vw_1\omega_2 + \omega_3\omega_1u^3\omega_2 + \frac{1}{4}\omega_3\omega_1u^2 + \frac{3}{8}\omega_3^2u^3 + \frac{1}{2}v^2\omega_3\omega_4c_s^2 - \frac{1}{4}v^3\omega_4\omega_1\omega_2 - \\ & \frac{1}{8}\omega_3\omega_1 - \frac{1}{4}vw_4u^2\omega_2 + 2v^2\omega_1u^2\omega_2 + \omega_3\omega_4\omega_1u^3 + \frac{1}{4}\omega_3^2\omega_4c_s^2u - \frac{1}{8}vw_4\omega_2 - \omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}v^2\omega_1\omega_2 + \frac{1}{2}vw_3\omega_4^2u^3 - \\ & \frac{1}{4}vw_3\omega_2 + \frac{1}{2}\omega_4\omega_1u^3\omega_2 - \frac{3}{2}\omega_1u^2\omega_2 + \frac{3}{4}vw_3^2\omega_4u^2 + \frac{5}{2}vw_3\omega_1u^2 + \frac{3}{4}\omega_4 + \frac{1}{4}v^3\omega_4\omega_2^2 + \frac{3}{8}\omega_4\omega_1u + vw_3\omega_4c_s^2\omega_1u - \\ & \frac{1}{8}\omega_4^2u - \frac{1}{2}v^2\omega_3u^2\omega_2 + \frac{3}{2}v^2\omega_3\omega_4u^2\omega_2 + \frac{1}{8}v^2\omega_3\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_1\omega_2 + vw_1^2u^2\omega_2 - \\ & \frac{1}{8}v^3\omega_3^2 + \frac{1}{4}v^3\omega_3^2\omega_2 - \frac{8}{8}v^2\omega_4^2u + \frac{1}{4}\omega_3^2u^2 + \frac{1}{4}v^2\omega_4^2u^2\omega_2 - \frac{1}{2}\omega_3\omega_1u^3 + \frac{1}{2}\omega_1 - \frac{1}{2}vw_3\omega_4u^2\omega_2 + \frac{1}{4}\omega_3^2\omega_1u^2 + \\ & \frac{1}{2}v^2\omega_3^2\omega_4c_s^2 + \frac{11}{8}\omega_3\omega_4u^2 - \frac{3}{4}v^3\omega_3\omega_2 + \frac{1}{4}v^2\omega_3\omega_4u - \frac{1}{2}v^2\omega_3^2\omega_1u - \frac{3}{8}\omega_1u + \frac{3}{8}vw_4^2 + \frac{1}{4}v^2\omega_4^2\omega_2 + \frac{3}{8}v^2\omega_3\omega_1 - \\ & \frac{1}{4}v^4\omega_3^2\omega_2 - \frac{1}{4}vw_3^2u^2\omega_2 + \frac{1}{2}vw_3^2\omega_4u^3 + \frac{3}{4}vw_3\omega_4u^2 - \frac{1}{8}\omega_4^2 + \frac{1}{2}vw_3c_s^2\omega_2^2 - \frac{1}{8}\omega_3\omega_4c_s^2\omega_1u - \frac{3}{8}\omega_3\omega_4u^2\omega_2 + \\ & \frac{1}{4}v^3\omega_3^2\omega_2 - \frac{1}{2}vw_3\omega_4c_s^2\omega_1 - \frac{1}{8}vw_3\omega_4\omega_2 + \frac{1}{2}v^2\omega_2^2\omega_1u^2 - \frac{1}{4}\omega_3\omega_4^2u^2 - vw_3c_s^2\omega_1\omega_2 - vw_3\omega_4\omega_1u^2 - \frac{1}{8}\omega_3^2u^2\omega_2 - \\ & \omega_3u^2 - \frac{1}{4}\omega_3^2\omega_4u^3 - \frac{7}{8}\omega_3\omega_1u^3 + \frac{1}{4}v^2\omega_2^2\omega_2 - \frac{1}{8}vw_3^2u^2 - \frac{3}{8}v^2\omega_4^2 - \frac{9}{4}vw_3\omega_4u^2 - \frac{3}{4}vw_3^2\omega_1u^2 + vw_3\omega_1u^3 - \\ & \frac{7}{8}v^2\omega_4\omega_2 - \frac{1}{4}vw_3^2\omega_2 - \frac{1}{4}vw_1\omega_2 + \frac{1}{2}\omega_1^2u^2\omega_2 - \frac{11}{8}\omega_3\omega_1u^2 - \frac{1}{4}\omega_3^2\omega_4u^2 - \frac{1}{2}vw_3^2\omega_4c_s^2u - 2vw_3\omega_4\omega_1u^3 - \\ & 5vw_1u^2\omega_2 - \frac{1}{4}\omega_3\omega_4^2u^3 - \frac{1}{2}v^2\omega_2^2c_s^2\omega_2 - \frac{1}{4}\omega_3\omega_4c_s^2\omega_1 + \frac{1}{4}vw_4^2u - v^2\omega_1\omega_2^2 - \frac{1}{4}vw_4^2\omega^3\omega_2 - \frac{1}{4}v^4\omega_4\omega_2^2 - \\ & \frac{1}{4}\omega_4\omega_2 - \frac{1}{4}v^2\omega_3\omega_2^2 + \frac{3}{2}vw_3\omega_1u^3\omega_2 - \frac{3}{4}vw_4\omega_1u - \frac{1}{2}vw_3\omega_1u^2 + \frac{3}{4}\omega_1\omega_2 - \frac{1}{2}vw_3^2\omega_1u^3 + \frac{1}{4}vw_3\omega_1 + \frac{5}{4}vw_3u^2\omega_2 + \\ & \frac{1}{4}v^2\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4u - \frac{3}{4}v^2\omega_3\omega_1u + v^2\omega_3\omega_4\omega_1u^2 + \frac{3}{2}vw_4\omega_1u^3\omega_2 + \frac{1}{4}v^3\omega_3\omega_1\omega_2 + \frac{1}{2}vw_2 - 2v^2\omega_3\omega_1u^2\omega_2 - \\ & \omega_1u^3\omega_2 - \frac{1}{4}vw_3u^2\omega_2^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 - \frac{1}{2}\omega_4u^2 - \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{4}\omega_4^2\omega_1u^3 + \frac{1}{4}\omega_3^2c_s^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_1\omega_2 + \frac{1}{8}\omega_4u^2\omega_2 + \\ & \frac{1}{8}v^3\omega_4^2 - \frac{1}{2}v^3\omega_4^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1u + 2\omega_1^2u^3 - \frac{1}{2}v^2\omega_3^2\omega_4u^2 - \frac{3}{2}vw_3\omega_4c_s^2 + \frac{1}{4}\omega_4\omega_1u^2 + \frac{1}{4}vw_3\omega_4 + \frac{7}{8}\omega_3\omega_1u - \\ & \frac{1}{8}v^2\omega_4u^2\omega_2^2 - \frac{1}{8}vw_3^2 - \frac{1}{8}vw_4^2u^2 - 2v^2\omega_4\omega_1u^2\omega_2 - \frac{3}{4}vw_3\omega_4c_s^2u + vw_1u^2\omega_2^2 - \frac{1}{4}\omega_3^2u^3\omega_2 - \frac{3}{4}\omega_3^2c_s^2u^2 - \frac{1}{4}vw_4\omega_1\omega_2 - \\ & \frac{1}{8}v^2\omega_4\omega_2 - \frac{1}{4}vw_3\omega_4u^3\omega_2 + v^2\omega_1\omega_2 + \frac{5}{2}vw_4\omega_1u^2 - \frac{4}{3}vw_3\omega_4^2c_s^2 - \frac{1}{4}v^3\omega_4^2\omega_2\omega_2 - \frac{1}{2}vw_2^2\omega_1^3 + \frac{1}{4}vw_3^2u + \\ & \frac{1}{2}v^2\omega_4 - \omega_1^2u^2 + \frac{3}{4}vw_4\omega_1u^2\omega_2 + \frac{1}{4}\omega_4^2\omega_1u^2 - \frac{1}{2}v^2\omega_3\omega_4u^2 + \frac{1}{2}vw_3^2\omega_1u + \frac{1}{2}\omega_3^2c_s^2\omega_2 + \frac{1}{2}vw_3\omega_4u + \frac{1}{2}v^3\omega_4\omega_1\omega_2 + \\ & \frac{1}{4}v^4\omega_3\omega_2^2 + \frac{1}{4}v^2\omega_4\omega_2^2 - \frac{1}{8}vw_3^2\omega_2 + \frac{1}{4}vw_4\omega_1 - \frac{1}{4}vw_4^2u^2\omega_2 - \frac{5}{2}vw_3c_s^2\omega_2 - \frac{3}{4}vw_3^2\omega_4c_s^2 - \frac{1}{2}vw_3\omega_4^2c_s^2u + \\ & \frac{1}{2}vw_3\omega_4c_s^2\omega_2 + \frac{3}{4}vw_3\omega_1u^2\omega_2 - \frac{1}{8}vw_3\omega_4\omega_2 - \frac{1}{2}v^3\omega_3\omega_1\omega_2 + \frac{1}{2}vw_3c_s^2\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1\omega_2 + \frac{1}{2}vw_3\omega_4\omega_1u + \frac{1}{2}\omega_3u, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_i, y-\delta_l}^{[\mu_2], t-2\delta_t} = & -2 - v\omega_4\omega_1 u\omega_2 - \frac{1}{2}v^2\omega_3^2 u\omega_2 - \frac{3}{2}v\omega_4 + \frac{1}{8}\omega_3^2\omega_2 - \frac{3}{8}\omega_4\omega_1 + \frac{5}{2}\omega_3 - \frac{1}{2}\omega_4\omega_1 u^2\omega_2 + \frac{3}{8}\omega_3\omega_4\omega_2 - 2v\omega_3\omega_4^2 u - v\omega_3\omega_1 u\omega_2 - \\ & \frac{1}{2}\omega_3\omega_4\omega_1 u + \frac{1}{2}v\omega_4^2\omega_1 u^2 + \frac{3}{4}v\omega_4^2 u\omega_2 - 2v\omega_3\omega_2 - \frac{3}{2}\omega_3\omega_1 u^2\omega_2 - \omega_3^2 u - v^2\omega_3\omega_4 - \frac{7}{2}\omega_3\omega_4 u - \frac{1}{4}\omega_3^2\omega_1 u + v^2\omega_1\omega_2^2 + \end{aligned}$$

$$\begin{aligned}
& 2v^2\omega_3\omega_1u\omega_2 + \frac{1}{2}v\omega_3u\omega_2^2 + \frac{1}{4}v\omega_4\omega_2^2 - 3v\omega_3\omega_1u - \frac{1}{2}v^2\omega_4\omega_1\omega_2 - 2v\omega_3^2\omega_4u + \frac{3}{2}\omega_4\omega_1u^2 - \frac{7}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4^2u^2 - \frac{1}{2}\omega_4u\omega_2 + \\
& 2v^2\omega_4\omega_1u\omega_2 - v\omega_1u\omega_2^2 + v^2\omega_4u\omega_2^2 - \frac{3}{4}v^2\omega_3^2 + \frac{1}{2}v\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1^2u - \frac{3}{4}v\omega_3^2\omega_4 - v\omega_4\omega_1^2u^2 - \frac{1}{4}v^2\omega_3^2\omega_2 + 6v\omega_1u\omega_2 + \\
& \frac{1}{2}\omega_3\omega_1^2u^2 + \frac{1}{2}v\omega_4\omega_1^2u - \frac{9}{8}\omega_3\omega_1 - \frac{1}{2}v\omega_3^2\omega_1 - 2v\omega_4\omega_2 - 3v\omega_3u\omega_2 - 2v^2\omega_2^2 - v\omega_3^2\omega_4u^2 + \frac{1}{4}\omega_3\omega_4^2 + \frac{3}{2}\omega_4 + 2\omega_4\omega_1u - \\
& v\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_4^2u - \frac{3}{2}v^2\omega_3\omega_4\omega_2 + \frac{3}{4}v\omega_4^2\omega_1u - \frac{3}{2}\omega_3\omega_4\omega_1u^2 + \omega_3\omega_4u\omega_2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}v\omega_3\omega_2^2 + 2v\omega_2^2\omega_2 + \frac{1}{2}\omega_3^2u\omega_2 - \\
& \frac{3}{4}\omega_3^2u^2 + \omega_1 + v\omega_3\omega_4u^2\omega_2 - \frac{1}{4}\omega_3^2\omega_1u^2 - \omega_3\omega_4u^2 + \frac{1}{2}v^2\omega_3\omega_2^2 - \frac{1}{2}v^2\omega_3^2\omega_1u - 4\omega_1u + \frac{1}{2}v\omega_2^2 - \frac{1}{2}\omega_1^2u\omega_2 - \frac{1}{4}v^2\omega_4^2\omega_2 + \\
& \frac{1}{2}v\omega_3^2u^2\omega_2 - v\omega_3\omega_4^2u^2 - \frac{1}{4}\omega_4^2 + \frac{1}{2}\omega_3\omega_4u^2\omega_2 + \frac{3}{2}v\omega_3\omega_4u\omega_2 + \frac{1}{2}\omega_3\omega_4^2u^2 + 3v\omega_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_2^2 - \frac{1}{2}v^2\omega_4^2\omega_2 - \\
& v\omega_1^2u\omega_2 + \omega_1^2u - \frac{1}{4}v^2\omega_4^2 - \frac{1}{4}\omega_4^2\omega_1u + v^2\omega_3\omega_4^2u + \frac{1}{2}v\omega_3^2\omega_1u^2 + \frac{3}{2}v^2\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_1 + \frac{3}{4}v\omega_3^2u\omega_2 - 2v\omega_1u\omega_2 + \omega_1^2u^2\omega_2 + \\
& \frac{5}{8}\omega_3\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_4u^2 - \frac{3}{4}v\omega_3\omega_4^2 - \frac{3}{2}\omega_3u\omega_2 + \frac{1}{2}v\omega_4^2u - \frac{5}{8}\omega_3 - 2v^2\omega_1u\omega_2^2 + \frac{1}{8}\omega_3^2\omega_1 - \frac{3}{8}\omega_4\omega_2 + \frac{1}{2}v\omega_4u\omega_2^2 + \frac{1}{2}v^2\omega_3\omega_2^2 + \\
& \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{3}{2}v^2\omega_3\omega_1\omega_2 - 3v\omega_4\omega_1u - v\omega_3\omega_1^2u^2 - v\omega_2^2 + 2\omega_1u\omega_2 + \frac{3}{2}v\omega_3\omega_1 + \frac{1}{4}v\omega_4^2\omega_2 - 3v^2\omega_3\omega_4u\omega_2 + \omega_2 + \frac{3}{2}\omega_4u + \\
& v^2\omega_3u\omega_2^2 + v^2\omega_3^2\omega_4u - \frac{1}{4}\omega_4\omega_1^2u + \frac{1}{2}v\omega_4\omega_1\omega_2 + 4v\omega_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1 + \frac{1}{2}v\omega_3\omega_1^2u + \frac{1}{2}\omega_3\omega_1\omega_2 - v^2\omega_3\omega_4\omega_1u + \frac{1}{4}\omega_3^2\omega_4 + \\
& \frac{1}{2}\omega_4\omega_1^2u^2 + \frac{7}{2}v\omega_3\omega_4 + \frac{3}{4}\omega_3^2\omega_4u + 2\omega_3\omega_1u + v\omega_3^2 - 3v\omega_4u\omega_2 + \frac{5}{2}v^2\omega_3\omega_2 - \frac{1}{2}\omega_3^2 + \frac{1}{2}v\omega_3^2u - 2\omega_1^2u^2 - 2v\omega_4\omega_1u^2\omega_2 - \\
& \frac{1}{4}\omega_4^2\omega_1u^2 + \frac{3}{4}v\omega_3^2\omega_1u + 5v\omega_3\omega_4u - \frac{1}{2}\omega_4\omega_1u\omega_2 + \frac{1}{2}v\omega_1u^2 + \frac{1}{2}v^2\omega_4\omega_2^2 - \frac{9}{8}\omega_3\omega_2 + \frac{1}{4}v\omega_3^2\omega_2 + \frac{1}{2}v\omega_4\omega_1 + \\
& \frac{1}{2}v\omega_4^2u^2\omega_2 - 2v\omega_3\omega_1u^2\omega_2 - \frac{1}{2}v^2\omega_4^2\omega_1u + \frac{3}{4}\omega_3\omega_4^2u + \frac{1}{2}v\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_1u\omega_2 + \frac{3}{2}v\omega_3\omega_4\omega_1u + \frac{5}{2}\omega_3u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_t,y}^{[\mu_1],t-2\delta_t} = & 1 + v^2\omega_3^2\omega_1u^2 + \frac{1}{4}\omega_4^2u^3 - \frac{1}{2}\omega_4\omega_1u^3 - \frac{1}{4}v^2\omega_3^2u\omega_2 - \omega_3c_s^2\omega_1u - \omega_1u^2 + \frac{1}{4}\omega_4^2u^2\omega_2 + \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_3 + \\
& \frac{1}{4}\omega_4\omega_1u^2\omega_2 - \frac{1}{4}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u^2\omega_2 + 2v^2\omega_3c_s^2\omega_2^2 - \frac{1}{4}\omega_3^2u - 3v^2\omega_3\omega_4c_s^2\omega_2 + \frac{1}{4}v^2\omega_3\omega_4 - \\
& \frac{1}{2}\omega_3\omega_4u - \omega_1u^2\omega_2^2 - \frac{3}{2}v^2\omega_3\omega_1u\omega_2 + \frac{1}{4}v^2\omega_4\omega_1\omega_2 + 2v^2\omega_2 - \frac{1}{4}\omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4^2u^2 - \frac{1}{4}v^2\omega_3^2u + \frac{1}{2}\omega_3c_s^2 - \\
& \frac{1}{2}\omega_4u\omega_2 - \frac{3}{2}v^2\omega_4\omega_1u\omega_2 - \frac{1}{2}v^2\omega_3^2 + \frac{1}{4}\omega_3u^2\omega_2^2 + \frac{1}{2}v^2\omega_4\omega_1u + \frac{1}{4}v^2\omega_4\omega_1 + \frac{1}{2}v^2\omega_3^2\omega_2 + \frac{1}{2}v^4\omega_4^2\omega_2 - \frac{1}{4}v^2\omega_3 + \\
& v^2\omega_4u\omega_2 - \frac{1}{2}\omega_3\omega_1u^3\omega_2 - \frac{1}{4}\omega_3^2u^3 + v^2\omega_3\omega_4^2c_s^2 - \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1 - \frac{1}{4}\omega_4^2\omega_2 + 4v^2\omega_1u^2\omega_2^2 + \omega_3c_s^2\omega_1u\omega_2 - \\
& v^2\omega_1\omega_2 + \frac{1}{2}\omega_4\omega_1u^3\omega_2 + 2\omega_1u^2\omega_2 - \frac{5}{4}\omega_4 + \frac{1}{2}\omega_4\omega_1u - \frac{1}{4}\omega_4^2u - v^2\omega_3u^2\omega_2^2 - \frac{1}{4}\omega_4^2u^3\omega_2 + 3v^2\omega_3\omega_4u\omega_2 + \\
& \frac{1}{4}v^2\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_4u\omega_2 + \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}\omega_3^2u\omega_2 - \frac{1}{4}v^2\omega_4u^2\omega_2^2 - \frac{1}{2}v_1 + v^2\omega_3^2\omega_4c_s^2 + \frac{1}{4}\omega_3\omega_4u^2 - \\
& \frac{1}{2}v^2\omega_3\omega_4u + \frac{1}{2}v^2\omega_3^2\omega_1u - \frac{3}{2}\omega_1u - \frac{1}{2}\omega_3c_s^2\omega_2^2 - \frac{1}{4}v^2\omega_4^2\omega_2 + \frac{1}{4}v^2\omega_3^2\omega_2 + \frac{1}{4}\omega_4^2 - \frac{1}{4}\omega_3\omega_4u^2\omega_2 + \\
& v^2\omega_4^2\omega_1u^2 - \frac{1}{4}\omega_3u^2 + \frac{1}{2}\omega_3\omega_1u^3 - \frac{1}{4}v^2\omega_4^2u\omega_2 + \frac{4}{3}v^2\omega_4^2\omega_2 - \frac{5}{2}v^2\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_2^2 + \frac{1}{4}\omega_3\omega_1u^2 - v^2\omega_3^2c_s^2\omega_2 - \\
& \frac{1}{2}\omega_3u\omega_2 - \frac{1}{2}\omega_3c_s^2\omega_1 + 2v^2\omega_1u\omega_2^2 - v^4\omega_4\omega_2^2 + \frac{3}{2}\omega_4\omega_2 - \frac{5}{4}v^2\omega_3\omega_2^2 + \frac{1}{4}v^2\omega_3\omega_1u\omega_2 + 2\omega_1u\omega_2 - \frac{1}{2}v^2\omega_3\omega_4u\omega_2 - \\
& w_2 + \frac{1}{4}\omega_4u^2\omega_2^2 + \frac{1}{2}\omega_4u + \frac{1}{2}v^2\omega_3\omega_1u + 2v^2\omega_3\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_1\omega_2 - 4v^2\omega_3\omega_1u^2\omega_2 - \frac{1}{2}\omega_1u\omega_2^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \\
& \frac{3}{4}\omega_4u^2 + v^2\omega_3u\omega_2 - \omega_4u^2\omega_2 + v^2\omega_3\omega_4\omega_1u - v^2\omega_3^2\omega_4u^2 - \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_3\omega_1u - v^2\omega_4u^2\omega_2^2 - 4v^2\omega_4\omega_1u^2\omega_2 + \\
& \frac{1}{2}\omega_3\omega_4c_s^2u + \frac{1}{4}\omega_3^2u^3\omega_2 - \frac{1}{4}\omega_4\omega_2^2 + \frac{1}{2}\omega_3^2c_s^2u + \frac{1}{2}v^2\omega_3\omega_2 - 2v^2\omega_1u\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_2^2 - \frac{3}{4}v^2\omega_4 + \frac{1}{4}\omega_4u\omega_2 - \\
& v^2\omega_3\omega_4u^2 - \frac{1}{2}\omega_3^2c_s^2u\omega_2 - \frac{1}{2}\omega_4\omega_1u\omega_2 + v^4\omega_3\omega_2^2 + \frac{5}{4}v^2\omega_4\omega_2^2 - \frac{1}{2}\omega_3\omega_4c_s^2u\omega_2 + \frac{1}{2}v^2\omega_4^2\omega_1u - \frac{1}{2}\omega_3\omega_1u\omega_2 + \frac{1}{2}\omega_3u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_t,y}^{[\mu_2],t-2\delta_t} = & -2 - v^2\omega_3^2u\omega_2 + \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{1}{2}\omega_4\omega_1 - \omega_4\omega_1u^2\omega_2 + \frac{1}{2}\omega_1\omega_2^2 + \omega_3\omega_1u^2\omega_2 + 2v^2\omega_3\omega_4 - 2v^2\omega_1\omega_2^2 + \\
& 4v^2\omega_3\omega_1u\omega_2 + 2v^2\omega_4\omega_1\omega_2 + \omega_4\omega_1u^2 - \frac{1}{2}\omega_4^2u^2 + \frac{5}{4}\omega_4u\omega_2 + 4v^2\omega_4\omega_1\omega_2 + 2v^2\omega_4u\omega_2^2 + \frac{3}{2}v^2\omega_3^2 + \frac{1}{2}\omega_4\omega_1\omega_2 + \\
& \frac{1}{2}\omega_4^2\omega_2 + 4v^2\omega_2^2 + 2\omega_4 - \frac{1}{2}\omega_4\omega_1u - \frac{1}{2}\omega_4u\omega_2^2 + \omega_4^2u + 3v^2\omega_3\omega_4\omega_2 - \frac{3}{2}\omega_1\omega_2 + \frac{1}{2}\omega_3^2u^2 + \omega_1 - v^2\omega_3\omega_4^2 - \\
& v^2\omega_3^2\omega_1u + 2\omega_1u + v^2\omega_4^2\omega_2 - \frac{1}{2}\omega_4^2u^2 - \frac{1}{2}\omega_3^2u^2\omega_2 - v^2\omega_4^2u\omega_2 + \frac{1}{2}v^2\omega_4^2\omega_2 + 2v^2\omega_3\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1 - \\
& \omega_3\omega_1u^2 + \frac{1}{2}\omega_3u\omega_2 - 4v^2\omega_1u\omega_2^2 - \frac{5}{2}\omega_4\omega_2 + 2v^2\omega_3\omega_1\omega_2 - 3\omega_1u\omega_2 - 6v^2\omega_3\omega_4u\omega_2 - \omega_2^2 + 3\omega_2 - 2\omega_4u + \\
& 2v^2\omega_3u\omega_2^2 + 2v^2\omega_3^2\omega_4u - v^2\omega_3\omega_4\omega_1 + \omega_1u\omega_2^2 - 2v^2\omega_3\omega_4\omega_1u - \frac{1}{2}\omega_3\omega_1u - \frac{1}{2}\omega_3u\omega_2^2 + \frac{1}{2}\omega_4\omega_2^2 - \frac{1}{2}v^2\omega_4^2\omega_1 - \\
& 5v^2\omega_3\omega_2 - \omega_4^2u\omega_2 + \frac{1}{2}\omega_4\omega_1u\omega_2 - 2v^2\omega_4\omega_2^2 - v^2\omega_4^2\omega_1u - v^2\omega_3^2\omega_4 + \frac{1}{2}\omega_3\omega_1u\omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_1],t-2\delta_t} = & -\frac{1}{2}\omega_4^2u^3 + \omega_4\omega_1u^3 + v^2\omega_3^2\omega_1\omega_2 + 2\omega_3c_s^2\omega_1u - \frac{1}{2}\omega_3\omega_4\omega_1u - \frac{1}{2}\omega_3^2u + \omega_3\omega_4c_s^2u - \omega_3\omega_4u - \frac{1}{2}\omega_3^2\omega_1u - \\
& 2v^2\omega_3\omega_1u\omega_2 + \frac{1}{2}v^2\omega_3^2u - 2v^2\omega_4\omega_1u\omega_2 - v^2\omega_4\omega_1u - \omega_3\omega_1^2u - \omega_3^2\omega_1u^3 - 2v^2\omega_4u\omega_2 + \frac{1}{2}\omega_3^2u^3 + \omega_3\omega_4c_s^2u + \\
& \frac{3}{2}\omega_4\omega_1u - \frac{1}{2}\omega_4^2u + \frac{1}{2}v^2\omega_4^2\omega_2 + 2\omega_3\omega_1^2u^3 + v^2\omega_3\omega_4u - 4\omega_1u - 2\omega_3\omega_4c_s^2\omega_1u - \omega_3\omega_1u^3 + v^2\omega_4\omega_1u\omega_2 + \omega_1^2u - \\
& v^2\omega_3\omega_4u^2 + 2v^2\omega_3\omega_4\omega_2 + \omega_4u - v^2\omega_3^2\omega_4u - v^2\omega_3\omega_1u + \omega_4^2\omega_1u^3 - 2v^2\omega_3u\omega_2 + 2v^2\omega_3\omega_4\omega_1u + \frac{7}{2}\omega_3\omega_1u - \\
& \omega_3\omega_4c_s^2u - \omega_3^2c_s^2u + 4v^2\omega_1u\omega_2 - 2\omega_4\omega_1u\omega_2 - v^2\omega_4^2\omega_1u + \frac{1}{2}\omega_3\omega_1u\omega_2 + \omega_3u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_2],t-2\delta_t} = & -4 + \frac{1}{2}\omega_3^2\omega_2 - \frac{1}{2}\omega_4\omega_1 + 5\omega_3 + \frac{1}{2}\omega_3\omega_4\omega_2 - \omega_1^2 - 2\omega_4\omega_1u^2 - \omega_3\omega_4 + \omega_4^2u^2 - v^2\omega_3^2 + \omega_3\omega_2^2 + v^2\omega_3^2\omega_2 - \\
& 2\omega_3\omega_1^2u^2 - \frac{7}{2}\omega_3\omega_1 + \omega_4 - \omega_3^2u^2 + 3\omega_1 + \omega_3^2\omega_1u^2 - v^2\omega_4^2\omega_2 + v^2\omega_4^2 - 2v^2\omega_4\omega_2 + \omega_3\omega_2^2 + 2\omega_3\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_1 - \\
& \frac{1}{2}\omega_4\omega_2 - 2v^2\omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_1 - \omega_2^2 + 3\omega_2 + 2\omega_4\omega_1u^2 + 2v^2\omega_3\omega_2 - \omega_3^2 - \omega_4^2\omega_1u^2 + 2v^2\omega_4\omega_2^2 - \frac{7}{2}\omega_3\omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_t,y}^{[\mu_1],t-2\delta_t} = & -1 - v^2\omega_3^2\omega_1u^2 + \frac{1}{4}\omega_4^2u^3 - \frac{1}{2}\omega_4\omega_1u^3 - \frac{1}{4}v^2\omega_3^2u\omega_2 - \omega_3c_s^2\omega_1u + \omega_1u^2 - \frac{1}{4}\omega_4^2u^2\omega_2 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_3 - \\
& \frac{1}{4}\omega_4\omega_1u^2\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 - 2v^2\omega_3c_s^2\omega_2^2 - \frac{1}{4}\omega_3^2u + 3v^2\omega_3\omega_4c_s^2\omega_2 - \frac{1}{4}v^2\omega_3\omega_4 - \\
& \frac{1}{2}\omega_3\omega_4u + \omega_1u^2\omega_2^2 - \frac{3}{2}v^2\omega_3\omega_1u\omega_2 - \frac{1}{4}v^2\omega_4\omega_1\omega_2 - 2v^2\omega_2 + \frac{1}{4}\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_4 + \frac{1}{4}\omega_4^2u^2 - \frac{1}{4}v^2\omega_3^2u - \frac{1}{2}\omega_3c_s^2 -
\end{aligned}$$

$$\begin{aligned}
& \frac{1}{2}w_4uw_2 - \frac{3}{2}v^2w_4w_1uw_2 + \frac{1}{2}v^2w_3^2 - \frac{1}{4}w_3u^2w_2^2 + \frac{1}{2}v^2w_4w_1u - \frac{1}{4}v^2w_4w_1 - \frac{1}{2}v^2w_3^2w_2 - \frac{1}{2}v^4w_4^2w_2 + \frac{1}{4}v^2w_3w_1 \\
& + v^2w_4uw_2 - \frac{1}{2}w_3w_1u^3w_2 - \frac{1}{4}w_3^2u^3 - v^2w_3w_4^2c_s^2 + \frac{1}{4}w_4w_1w_2 - \frac{1}{4}w_3w_1 + \frac{1}{4}w_4^2w_2 - 4v^2w_1u^2w_2^2 + w_3c_s^2w_1uw_2 + \\
& v^2w_1w_2 + \frac{1}{2}w_4w_1u^3w_2 - 2w_1u^2w_2 + \frac{5}{4}w_4 + \frac{1}{2}w_4w_1u - \frac{1}{4}w_4^2u + v^2w_3u^2w_2^2 - \frac{1}{4}w_4^2u^3w_2 - 3v^2w_3w_4u^2w_2 - \\
& \frac{1}{4}v^2w_3w_4w_2 + \frac{1}{2}w_3w_4uw_2 - \frac{1}{2}w_1w_2 + \frac{1}{4}w_3^2uw_2 - \frac{1}{4}v^2w_4^2u - \frac{1}{2}v^2w_4^2u^2w_2 + \frac{1}{2}w_1 - v^2w_3^2w_4c_s^2 - \frac{1}{4}w_3w_4u^2 - \\
& \frac{1}{2}v^2w_3w_4u + \frac{1}{2}v^2w_3^2w_1u - \frac{3}{2}w_1u + \frac{1}{2}w_3c_s^2w_2^2 + \frac{1}{4}v^2w_4^2w_2 - \frac{1}{4}v^2w_3w_1 + \frac{1}{2}v^4w_3^2w_2 - \frac{1}{4}w_4^2 + \frac{1}{4}w_3w_4u^2w_2 - \\
& v^2w_4^2w_1u^2 + \frac{1}{4}w_3u^2 + \frac{1}{2}w_3w_1u^3 - \frac{1}{4}v^2w_4^2u w_2 - \frac{3}{4}v^2w_4^2 + \frac{5}{2}v^2w_4w_2 - \frac{1}{4}w_3w_2^2 - \frac{1}{4}w_3w_1u^2 + v^2w_3^2c_s^2w_2 - \\
& \frac{1}{2}w_3uw_2 + \frac{1}{2}w_3c_s^2w_1 + 2v^2w_1uw_2^2 + v^4w_4w_2^2 - \frac{3}{4}w_4w_2 + \frac{5}{4}v^2w_3w_2^2 - \frac{1}{4}v^2w_3w_1w_2 + 2w_1uw_2 - \frac{1}{2}v^2w_3w_4uw_2 + \\
& w_2 - \frac{1}{4}w_4u^2w_2^2 + \frac{1}{2}w_4u + \frac{1}{2}v^2w_3w_1u - 2v^2w_3w_4w_1u^2 + \frac{1}{4}w_3w_1w_2 + 4v^2w_3w_1u^2w_2 - \frac{1}{2}w_1uw_2^2 - \frac{1}{2}w_3w_4c_s^2w_2 - \\
& \frac{3}{4}w_4u^2 + v^2w_3uw_2 + w_4u^2w_2 + v^2w_3w_4w_1u + v^2w_3^2w_4u^2 + \frac{1}{2}w_3w_4c_s^2 + \frac{1}{2}w_3w_1u + v^2w_4u^2w_2^2 + 4v^2w_4w_1u^2w_2 + \\
& \frac{1}{2}w_3w_4c_s^2u + \frac{1}{4}w_3^2u^3w_2 + \frac{1}{4}w_4w_2^2 + \frac{1}{2}w_3^2c_s^2u - \frac{1}{2}v^2w_3w_2 - 2v^2w_1uw_2 - \frac{1}{2}v^2w_3^2u^2w_2 + \frac{3}{4}v^2w_4 + \frac{1}{4}w_4^2uw_2 + \\
& v^2w_3w_4^2u^2 - \frac{1}{2}w_3^2c_s^2uw_2 - \frac{1}{2}w_4w_1uw_2 - v^4w_3w_2^2 - \frac{5}{4}v^2w_4w_2^2 - \frac{1}{2}w_3w_4c_s^2uw_2 + \frac{1}{2}v^2w_4^2w_1u - \frac{1}{2}w_3w_1uw_2 + \frac{1}{2}w_3u,
\end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta t, y}^{[\mu_2], t-2\delta t} = & -2 + v^2 w_3^2 u w_2 + \frac{1}{2} w_4^2 u^2 w_2 - \frac{1}{2} w_4 w_1 - w_4 w_1 u^2 w_2 + \frac{1}{2} w_1 w_2^2 + w_3 w_1 u^2 w_2 + 2v^2 w_3 w_4 - 2v^2 w_1 w_2^2 - \\ & 4v^2 w_3 w_1 u w_2 + 2v^2 w_4 w_1 w_2 + w_4 w_1 u^2 - \frac{1}{2} w_4^2 u^2 - \frac{5}{2} w_4 u w_2 - 4v^2 w_4 w_1 u w_2 - 2v^2 w_4 u w_2^2 + \frac{3}{2} v^2 w_3^2 + \frac{1}{2} w_4 w_1 w_2 + \\ & \frac{1}{2} w_4^2 w_2 + 4v^2 w_2^2 + 2w_4 + \frac{1}{2} w_4 w_1 u + \frac{1}{2} w_4 u w_2^2 - w_4^2 u + 3v^2 w_3 w_4 w_2 - \frac{3}{2} w_1 w_2 + \frac{1}{2} w_3^2 u^2 + w_1 - v^2 w_3 w_4^2 + \\ & v^2 w_3^2 w_1 u - 2w_1 u + v^2 w_4^2 w_2 - \frac{1}{2} w_4^2 - \frac{1}{2} w_3^2 u^2 w_2 + v^2 w_4^2 u w_2 + \frac{1}{2} v^2 w_4^2 - 2v^2 w_3 w_4^2 u - 3v^2 w_4 w_2 - \frac{1}{2} v^2 w_3^2 w_1 - \\ & w_3 w_1 u^2 - \frac{1}{2} w_3 u w_2 + 4v^2 w_1 u w_2^2 - \frac{5}{2} w_4 w_2 + 2v^2 w_3 w_1 w_2 + 3w_1 u w_2 + 6v^2 w_3 w_4 u w_2 - w_2^2 + 3w_2 + 2w_4 u - \\ & 2v^2 w_3 u w_2^2 - 2v^2 w_3^2 w_4 u - v^2 w_3 w_4 w_1 - w_1 u w_2^2 + 2v^2 w_3 w_4 w_1 u + \frac{1}{2} w_3 w_1 u + \frac{1}{2} w_3 u w_2^2 + \frac{1}{2} w_4 w_2^2 - \frac{1}{2} v^2 w_4^2 w_1 - \\ & 5v^2 w_3 w_2 + w_4^2 u w_2 - \frac{1}{2} w_4 w_1 u w_2 - 2v^2 w_4 w_2^2 + v^2 w_4^2 u w_1 - v^2 w_3^2 w_4 - \frac{1}{2} w_3 w_1 u w_2, \end{aligned}$$

$$\begin{aligned} \alpha^{[\mu_1],t-\delta_t}_{x-\delta t,y+\delta t} = & 1 - \frac{1}{2}v^2\omega_3^2\omega_1u^2 + \frac{1}{4}vw_4\omega_1uw_2 - \frac{1}{4}\omega_3^2\omega_4c_s^2 + \frac{1}{8}\omega_4^2u^3 - \frac{5}{4}\omega_4\omega_1u^3 + \frac{5}{4}\omega_3c_s^2\omega_2 + \frac{3}{2}\omega_3c_s^2\omega_1u - vw_4 - \\ & 3\omega_1u^2 - \frac{1}{2}vw_3^2c_s^2uw_2 + \frac{1}{8}\omega_4\omega_1 - \frac{1}{4}\omega_3 - \frac{1}{2}\omega_4\omega_1u^2\omega_2 - \frac{1}{4}vw_3\omega_1uw_2 - \frac{1}{8}\omega_3\omega_4\omega_1u - \frac{3}{4}vw_4^2\omega_1u^2 + \frac{3}{8}vw_3\omega_2 - \\ & \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - vw_4\omega_1^2u^3 - \frac{1}{4}\omega_3\omega_1u^2\omega_2 - v^2\omega_3c_s^2\omega_2^2 - \frac{1}{8}\omega_3^2u + \frac{1}{4}\omega_3\omega_4^2c_s^2u + \frac{3}{2}v^2\omega_3\omega_4c_s^2\omega_2 - \frac{1}{8}v^2\omega_3\omega_4 - \\ & \frac{1}{4}v^3\omega_3\omega_2^2 - \frac{1}{4}\omega_3\omega_4u - \frac{1}{8}\omega_3^2\omega_1u + \frac{1}{4}vw_3^2u^3\omega_2 + \frac{3}{2}v^2\omega_3\omega_1uw_2 + \frac{1}{4}vw_3\omega_1u - \frac{1}{4}v^2\omega_4\omega_1\omega_2 - v^2\omega_2 - \\ & \frac{1}{2}vw_3\omega_4c_s^2\omega_2 + \frac{1}{2}vw_3\omega_4c_s^2\omega_2 + \frac{1}{13}\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_4^2c_s^2 + \frac{3}{4}v^3\omega_4\omega_2 + \frac{1}{8}\omega_3\omega_4 - \frac{1}{8}\omega_4^2u^2 + \frac{3}{2}v^2\omega_3^2u - 2\omega_3c_s^2 - \\ & \frac{1}{4}\omega_4\omega_2 + \frac{1}{2}vw_1\omega_2 + \frac{1}{4}vw_3^2c_s^2 - \frac{1}{2}v^2\omega_3^2 + 2vw_1^2u^3\omega_2 + \frac{1}{4}v^2\omega_4\omega_1u - \frac{1}{4}vw_3\omega_1\omega_2 + \frac{1}{2}vw_3\omega_4u\omega_3\omega_2 + \frac{9}{4}vw_3\omega_4c_s^2 - \\ & \frac{1}{4}vw_4\omega_1^2u^2 + \frac{1}{8}v^2\omega_4\omega_1 + \frac{1}{8}v^2\omega_3^2\omega_2 + \frac{5}{4}vw_4u^2\omega_2 + \frac{1}{2}vw_4^2\omega_1u^3 - \frac{1}{4}v^4\omega_4^2\omega_2 + \frac{1}{2}vw_3^2c_s^2\omega_2 + \frac{1}{2}\omega_3\omega_4u^3 + v^2\omega_3 - \\ & \frac{5}{8}\omega_3u^2\omega_2 + \frac{1}{4}\omega_3^2\omega_1u^3 - \frac{1}{2}v^2\omega_4\omega_1\omega_2 - 2vw_1\omega_2 + \omega_3\omega_1u^3\omega_2 - \frac{1}{4}\omega_3\omega_1u^2 + \frac{3}{8}\omega_3^2u^3 - \frac{1}{2}v^2\omega_3\omega_4c_s^2 - \frac{1}{4}v^3\omega_4\omega_1\omega_2 + \\ & \frac{1}{8}\omega_3\omega_1 - \frac{1}{4}vw_4u^2\omega_2 - 2v^2\omega_1u^2\omega_2 + \omega_3\omega_4\omega_1u^3 + \frac{1}{4}\omega_3^2\omega_4c_s^2u - \frac{1}{8}vw_4\omega_2 - \omega_3c_s^2\omega_1\omega_2 + \frac{1}{2}v^2\omega_1\omega_2 - \frac{1}{2}vw_3\omega_4^2u^3 + \\ & \frac{1}{4}vw_3\omega_2 + \frac{1}{2}\omega_4\omega_1u^3\omega_2 + \frac{3}{2}\omega_1u^2\omega_2 + \frac{3}{4}vw_3^2\omega_4u^2 + \frac{5}{2}vw_3\omega_1u^2 - \frac{3}{4}\omega_4 + \frac{1}{4}v^3\omega_4\omega_2^2 + \frac{3}{8}\omega_4\omega_1u - vw_3\omega_4c_s^2\omega_1u - \\ & \frac{1}{8}\omega_4^2u + \frac{1}{2}v^2\omega_3u^2\omega_2^2 - \frac{3}{2}v^2\omega_3\omega_4u^2\omega_2 - \frac{1}{8}v^2\omega_3\omega_4\omega_2 - \frac{1}{4}\omega_3\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_1\omega_2 + vw_1^2u^2\omega_2 - \\ & \frac{1}{8}v^3\omega_3^2 - \frac{1}{4}v^3\omega_3^2\omega_2 - \frac{1}{8}v^2\omega_4^2u - \frac{1}{4}\omega_3^2u^2 - \frac{1}{4}v^2\omega_4^2u^2\omega_2 - \frac{1}{2}\omega_3\omega_1u^3 - \frac{1}{2}\omega_1 - \frac{1}{2}vw_3\omega_4u^2\omega_2 - \frac{1}{4}\omega_3\omega_1u^2 - \\ & \frac{1}{2}v^2\omega_3^2\omega_4c_s^2 - \frac{11}{16}\omega_3\omega_4u^2 - \frac{3}{4}v^3\omega_3\omega_2 + \frac{1}{4}v^2\omega_3\omega_4u - \frac{1}{2}v^2\omega_3^2\omega_1u - \frac{3}{2}\omega_1u + \frac{3}{8}vw_4^2 - \frac{1}{4}v^2\omega_4^2\omega_2 - \frac{3}{8}v^2\omega_3\omega_1 + \\ & \frac{1}{4}v^4\omega_3^2\omega_2 - \frac{1}{4}vw_3^2u^2\omega_2 - \frac{1}{2}vw_3^2\omega_4u^3 + \frac{3}{4}vw_3\omega_4u^2 + \frac{1}{8}\omega_4^2 + \frac{1}{2}vw_3c_s^2\omega_2^2 - \frac{1}{8}\omega_3\omega_4c_s^2\omega_1u + \frac{3}{8}\omega_3\omega_4u^2\omega_2 + \\ & \frac{1}{2}v^3\omega_3^2\omega_2 - \frac{1}{2}vw_3\omega_4c_s^2\omega_1 + \frac{1}{2}vw_3\omega_4\omega_1\omega_2 - \frac{1}{2}v^2\omega_4^2\omega_1u^2 + \frac{1}{4}\omega_3\omega_4^2u^2 + vw_3c_s^2\omega_1\omega_2 - vw_3\omega_4\omega_1u^2 + \frac{1}{8}\omega_3^2u^2\omega_2 + \\ & \omega_3u^2 - \frac{1}{4}\omega_3^2\omega_4u^3 - \frac{7}{4}\omega_3\omega_1u^3 + \frac{1}{4}v^2\omega_4^2u\omega_2 - \frac{1}{8}vw_3^2u^2 + \frac{3}{8}v^2\omega_4^2 - \frac{9}{4}vw_3\omega_4u^2 - \frac{3}{4}vw_3^2\omega_1u^2 - vw_3\omega_1u^3 + \\ & \frac{7}{8}v^2\omega_4\omega_2 + \frac{1}{4}vw_3^2\omega_2 - \frac{1}{4}vw_1\omega_2 - \frac{1}{2}\omega_1^2u^2\omega_2 + \frac{11}{8}\omega_3\omega_1u^2 + \frac{1}{4}\omega_3^2\omega_4u^2 + \frac{1}{2}vw_3^2\omega_4c_s^2u + 2vw_3\omega_4\omega_1u^3 - \\ & 5vw_1u^2\omega_2 - \frac{1}{4}\omega_3\omega_4^2u^3 + \frac{1}{2}v^2\omega_3^2c_s^2\omega_2 - \frac{1}{4}\omega_3\omega_4\omega_1u^2 + \frac{3}{4}\omega_3c_s^2\omega_1 - \frac{1}{4}vw_4^2u - v^2\omega_1\omega_2\omega_2 + \frac{1}{4}vw_4^2\omega_3^2\omega_2 + \frac{1}{2}v^4\omega_4\omega_2^2 + \\ & \frac{1}{4}\omega_4\omega_2 + \frac{1}{4}v^2\omega_3\omega_2^2 - \frac{3}{2}vw_3\omega_1u^3\omega_2 + \frac{3}{4}vw_4\omega_1u - \frac{1}{2}vw_3\omega_1u^2 + \frac{1}{2}vw_3^2\omega_1u^3 + \frac{1}{4}vw_3\omega_1 + \frac{5}{4}vw_3u^2\omega_2 + \\ & \frac{1}{4}v^2\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4u - \frac{3}{4}v^2\omega_3\omega_1u - v^2\omega_3\omega_4\omega_1u^2 - \frac{3}{2}vw_4\omega_1u^3\omega_2 + \frac{1}{4}v^3\omega_3\omega_1\omega_2 + \frac{1}{2}vw_2 + 2v^2\omega_3\omega_1u^2\omega_2 - \\ & \omega_1^2u^3\omega_2 - \frac{1}{4}vw_3u^2\omega_2^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \frac{1}{2}\omega_4u^2 + \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{4}\omega_4^2\omega_1u^3 - \frac{1}{4}\omega_3^2c_s^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_1\omega_2 - \frac{1}{8}\omega_4u^2\omega_2 + \\ & \frac{1}{8}v^3\omega_4^2 - \frac{1}{2}v^3\omega_4^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1u + 2\omega_1^2u^3 + \frac{1}{2}v^2\omega_3^2\omega_4u^2 + \frac{3}{2}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_4\omega_1u^2 + \frac{1}{4}vw_3\omega_4 + \frac{1}{8}\omega_3\omega_1u + \\ & \frac{1}{2}v^2\omega_4u^2\omega_2^2 - \frac{1}{8}vw_3^2 - \frac{1}{8}vw_4^2u^2 + 2v^2\omega_4\omega_1u^2\omega_2 - \frac{3}{2}\omega_3\omega_4c_s^2u + vw_1u^2\omega_2^2 - \frac{1}{4}\omega_3^2u^3\omega_2 - \frac{3}{4}\omega_3^2c_s^2u + \frac{1}{4}vw_4\omega_1\omega_2 + \\ & \frac{1}{2}v^2\omega_3\omega_2 - \frac{1}{4}\omega_3\omega_4u^3\omega_2 + v^2\omega_1\omega_2 + \frac{5}{2}vw_4\omega_1u^2 - \frac{3}{4}vw_3\omega_4c_s^2 + \frac{1}{4}v^3\omega_4^2u\omega_2 - \frac{1}{2}v^2\omega_3^2u^2\omega_2 - \frac{1}{2}\omega_4\omega_1u^3 - \frac{1}{4}vw_3^2u - \\ & \frac{1}{2}v^2\omega_4 + \omega_1^2u^2 + \frac{3}{4}vw_4\omega_1u^2\omega_2 - \frac{1}{4}\omega_4\omega_1u^2 + \frac{1}{2}v^2\omega_3\omega_4u^2 - \frac{1}{2}vw_3^2\omega_1u + \frac{1}{2}\omega_3^2c_s^2\omega_2 - \frac{1}{2}vw_3\omega_4u - \frac{1}{2}v^3\omega_4\omega_1\omega_2 - \\ & \frac{1}{2}v^4\omega_3\omega_2^2 - \frac{1}{4}v^2\omega_4\omega_2^2 - \frac{1}{8}vw_3^2\omega_2 + \frac{1}{4}vw_4\omega_1 - \frac{1}{4}vw_4^2u^2\omega_2 - \frac{1}{2}vw_3\omega_4c_s^2\omega_2 - \frac{3}{4}vw_3^2\omega_4c_s^2 + \frac{1}{2}vw_3\omega_4^2c_s^2u + \\ & \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \frac{3}{4}vw_3\omega_1u^2\omega_2 - \frac{1}{8}vw_3\omega_4\omega_2 + \frac{1}{2}v^3\omega_3\omega_1\omega_2 + \frac{1}{2}vw_3c_s^2\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1\omega_2 - \frac{1}{2}vw_3\omega_4\omega_1u + \frac{1}{2}\omega_3u, \end{aligned}$$

$$\alpha_{x-\delta_t, y+\delta_t}^{[\mu_2], t-2\delta_t} = -2 - v \omega_4 \omega_1 u \omega_2 + \frac{1}{2} v^2 \omega_3^2 u \omega_2 + \frac{3}{2} v \omega_4 + \frac{1}{8} \omega_3^2 \omega_2 - \frac{3}{8} \omega_4 \omega_1 + \frac{5}{2} \omega_3 - \frac{1}{2} \omega_4 \omega_1 u^2 \omega_2 + \frac{3}{8} \omega_3 \omega_4 \omega_2 - 2v \omega_3 \omega_4^2 u - v \omega_3 \omega_1 u \omega_2 +$$

$$\begin{aligned}
& \frac{1}{2}\omega_3\omega_4\omega_1u - \frac{1}{2}v\omega_4^2\omega_1u^2 + \frac{3}{4}v\omega_4^2u\omega_2 + 2v\omega_3\omega_2 - \frac{3}{2}\omega_3\omega_1u^2\omega_2 + \omega_3^2u - v^2\omega_3\omega_4 + \frac{7}{4}\omega_3^2\omega_1u + v^2\omega_1\omega_2^2 - \\
& 2v^2\omega_3\omega_1u\omega_2 + \frac{1}{2}v\omega_3u\omega_2^2 - \frac{1}{4}v\omega_4\omega_2^2 - 3v\omega_3\omega_1u - \frac{1}{2}v^2\omega_4\omega_1\omega_2 - 2v\omega_3^2\omega_4u + \frac{3}{2}\omega_4\omega_1u^2 - \frac{7}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4^2u^2 + \frac{1}{2}\omega_4u\omega_2 - \\
& 2v^2\omega_4\omega_1u\omega_2 - v\omega_1u\omega_2^2 - v^2\omega_4u\omega_2^2 - \frac{3}{4}v^2\omega_3^2 - \frac{1}{2}v\omega_3\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1u + \frac{3}{4}v\omega_3^2\omega_4 + v\omega_4\omega_1u^2 - \frac{1}{4}v^2\omega_3^2\omega_2 + 6v\omega_1u\omega_2 + \\
& \frac{1}{2}\omega_3\omega_1^2u^2 + \frac{1}{2}v\omega_4\omega_1u - \frac{9}{8}\omega_3\omega_1 + \frac{1}{2}v\omega_3^2\omega_1 + 2v\omega_4\omega_2 - 3v\omega_3u\omega_2 - 2v^2\omega_2^2 + v\omega_3^2\omega_4u^2 + \frac{1}{4}\omega_3\omega_4^2 + \frac{3}{2}\omega_4 - 2\omega_4\omega_1u + \\
& v\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2u - \frac{3}{2}v^2\omega_3\omega_4\omega_2 + \frac{3}{4}v\omega_4^2\omega_1u - \frac{3}{2}\omega_3\omega_4\omega_1u^2 - \omega_3\omega_4u\omega_2 - \frac{1}{2}\omega_1\omega_2 - \frac{1}{4}v\omega_3\omega_2^2 - 2v\omega_1^2u^2\omega_2 - \frac{1}{2}\omega_3^2\omega_2 - \\
& \frac{3}{4}\omega_3^2u^2 + \omega_1 - v\omega_3\omega_4u^2\omega_2 - \frac{1}{4}\omega_3^2\omega_1u^2 - \omega_3\omega_4u^2 + \frac{1}{2}v^2\omega_3\omega_4 + \frac{1}{2}v^2\omega_3^2\omega_1u + 4\omega_1u - \frac{1}{2}v\omega_4^2 + \frac{1}{2}\omega_1^2u\omega_2 - \frac{1}{4}v^2\omega_4^2\omega_2 - \\
& \frac{1}{2}v\omega_3^2u^2\omega_2 + v\omega_3\omega_4^2u^2 - \frac{1}{4}\omega_4^2 + \frac{1}{2}\omega_3\omega_4u^2\omega_2 + \frac{3}{2}v\omega_3\omega_4u\omega_2 + \frac{1}{2}\omega_3\omega_4^2u^2 - 3v\omega_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3^2u^2\omega_2 + \frac{1}{2}v^2\omega_4^2\omega_2 - \\
& v\omega_1^2u\omega_2 - \omega_1^2u - \frac{1}{4}v^2\omega_4^2 + \frac{1}{4}\omega_4^2\omega_1u - v^2\omega_3\omega_4^2u - \frac{1}{2}v\omega_3^2\omega_1u^2 + \frac{3}{2}v^2\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_1 + \frac{3}{4}v\omega_3^2\omega_2 + 2v\omega_1\omega_2 + \omega_1^2u^2\omega_2 + \\
& \frac{5}{2}\omega_3\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_4u^2 + \frac{3}{4}v\omega_3\omega_4^2 + \frac{3}{2}\omega_3u\omega_2 + \frac{1}{2}v\omega_4^2u + \frac{5}{2}v\omega_3 + 2v^2\omega_1u\omega_2 + \frac{1}{8}\omega_3^2\omega_1 - \frac{3}{8}\omega_4\omega_2 + \frac{1}{2}v\omega_4u\omega_2^2 + \frac{1}{2}v^2\omega_3\omega_2^2 + \\
& \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{3}{2}v^2\omega_3\omega_1\omega_2 - 3v\omega_4\omega_1u + v\omega_3\omega_1u^2 + v\omega_2^2 - 2\omega_1u\omega_2 - \frac{3}{2}v\omega_3\omega_1 - \frac{1}{4}v\omega_4^2\omega_2 + 3v^2\omega_3\omega_4u\omega_2 + \omega_2 - \frac{3}{2}\omega_4u - \\
& v^2\omega_3u\omega_2^2 - v^2\omega_3^2\omega_4u + \frac{1}{4}\omega_4\omega_1^2u - \frac{1}{2}v\omega_4\omega_1\omega_2 - 4v\omega_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1 + \frac{1}{2}v\omega_3\omega_1u^2 + \frac{1}{2}\omega_3\omega_1\omega_2 + v^2\omega_3\omega_4\omega_1u + \frac{1}{4}\omega_3^2\omega_4 + \\
& \frac{1}{2}\omega_4\omega_1^2u^2 - \frac{7}{2}v\omega_3\omega_4 - \frac{3}{4}\omega_3^2\omega_4u - 2\omega_3\omega_1u - v\omega_3^2 - 3v\omega_4u\omega_2 + \frac{5}{2}v^2\omega_3\omega_2 - \frac{1}{2}\omega_3^2 + \frac{1}{2}v\omega_3^2u - 2\omega_1^2u^2 + 2v\omega_4\omega_1u^2\omega_2 - \\
& \frac{1}{2}\omega_4^2\omega_1u^2 + \frac{3}{4}v\omega_3^2\omega_1u + 5v\omega_3\omega_4u + \frac{1}{2}\omega_4\omega_1u\omega_2 - \frac{1}{2}v\omega_1\omega_2^2 + \frac{1}{2}v^2\omega_4\omega_2^2 - \frac{9}{8}\omega_3\omega_2 - \frac{1}{4}v\omega_3^2\omega_2 - \frac{1}{2}v\omega_4\omega_1 - \\
& \frac{1}{2}v\omega_4^2u^2\omega_2 + 2v\omega_3\omega_1u^2\omega_2 + \frac{1}{2}v^2\omega_4^2\omega_1u - \frac{3}{4}\omega_3\omega_4^2u - \frac{1}{2}v^2\omega_3^2\omega_4 + \frac{1}{2}\omega_3\omega_1u\omega_2 + \frac{3}{2}v\omega_3\omega_4\omega_1u - \frac{5}{2}\omega_3u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y+\delta_l}^{[\mu_1],t-2\delta_t} = & \\
& \frac{1}{2}v\omega_4\omega_1u\omega_2 - \frac{1}{4}\omega_4^2u^3 + \frac{5}{2}\omega_4\omega_1u^3 - \frac{1}{4}v^2\omega_3^2u\omega_2 - 3\omega_3c_s^2\omega_1u + v\omega_3^2c_s^2u\omega_2 + v\omega_3\omega_4^2u + \frac{3}{2}v\omega_3\omega_1u\omega_2 - \omega_3\omega_4\omega_1u + \\
& 2v\omega_4\omega_1^2u^3 - \frac{3}{4}\omega_3^2u - \omega_3\omega_4^2c_s^2u - \frac{3}{2}v\omega_3\omega_4u - \frac{1}{2}v\omega_3^2u^3\omega_2 - \frac{1}{2}v^2\omega_3\omega_1u\omega_2 + v\omega_3\omega_4c_s^2u\omega_2 + \\
& \frac{3}{4}v^2\omega_3^2u - \frac{1}{2}\omega_4u\omega_2 + \frac{5}{2}v^2\omega_4\omega_1u\omega_2 - 4v\omega_1^2u^3\omega_2 - \frac{1}{2}v^2\omega_4\omega_1u - v\omega_3\omega_4u^3\omega_2 - v\omega_4^2\omega_1u^3 - \omega_3\omega_4u^3 + v^2\omega_4u\omega_2 - \\
& 3v\omega_1u\omega_2 - \frac{3}{2}\omega_3\omega_1u^3\omega_2 - \frac{3}{4}\omega_3^2u^3 - \frac{1}{2}v\omega_4\omega_1^2u - 2\omega_3\omega_4\omega_1u^3 - \omega_3^2\omega_4c_s^2u + \omega_3c_s^2\omega_1u\omega_2 + v\omega_3\omega_4^2u^3 + \frac{1}{2}v\omega_3u\omega_2 - \\
& \frac{3}{2}\omega_4\omega_1u^3\omega_2 + \frac{7}{2}\omega_4\omega_1u + 2v\omega_3\omega_4c_s^2\omega_1u - \frac{3}{4}\omega_4^2u + \frac{1}{4}\omega_4^2u^3\omega_2 - v\omega_2^2\omega_1u + \frac{1}{2}v\omega_3\omega_4u\omega_2 + \frac{1}{2}\omega_3^2u\omega_2 + \\
& \frac{1}{4}v^2\omega_4^2u - \frac{1}{2}v^2\omega_3\omega_4u + \frac{1}{2}v^2\omega_3^2\omega_1u - 4\omega_1u - \frac{1}{2}\omega_1^2u\omega_2 + v\omega_3^2\omega_4u^3 + 2v\omega_3\omega_4c_s^2\omega_1u - \frac{1}{2}v\omega_3\omega_4u\omega_2 - 2v\omega_3c_s^2\omega_1u\omega_2 + \\
& \frac{1}{2}\omega_3^2\omega_4u^3 + \frac{7}{2}\omega_3\omega_1u^3 - \frac{3}{4}v^2\omega_4^2u\omega_2 + v\omega_1^2u\omega_2 + \omega_1^2u - \frac{1}{2}\omega_4\omega_1u + \frac{1}{2}v^2\omega_3\omega_4^2u + 2v\omega_3\omega_1u^3 - \frac{1}{2}v\omega_3^2u\omega_2 - \\
& v\omega_3\omega_4c_s^2u - 4v\omega_3\omega_4\omega_1u^3 + \frac{1}{2}\omega_3u\omega_2 - \frac{1}{2}v\omega_4^2u - \frac{1}{2}v\omega_4^2u^3\omega_2 + 3v\omega_3\omega_1u^3\omega_2 + 3v\omega_4\omega_1u + 2\omega_1u\omega_2 - \\
& v\omega_2^2\omega_1u^3 - v^2\omega_3\omega_4u\omega_2 + \omega_4u + \frac{1}{2}v^2\omega_3^2\omega_4u - \frac{1}{2}\omega_4\omega_1^2u + \frac{3}{2}v^2\omega_3\omega_1u + 3v\omega_4\omega_1u^3\omega_2 - \frac{1}{2}v\omega_3\omega_2^2u + 2\omega_1^2u^3\omega_2 - \\
& \omega_4\omega_1u^3 + v^2\omega_3\omega_4u\omega_2 - v^2\omega_3\omega_4\omega_1u - 4\omega_1^2u^3 + \frac{1}{2}\omega_3^2\omega_4u + \frac{3}{2}\omega_3\omega_1u + \frac{3}{2}v\omega_3\omega_4c_s^2u + \frac{1}{4}\omega_3^2\omega_3^2u + \frac{3}{2}\omega_3^2c_s^2u + \frac{1}{2}v\omega_4u\omega_2 + \\
& \frac{1}{2}\omega_3\omega_4u^3\omega_2 - 2v^2\omega_1u\omega_2 - \frac{1}{2}v^3\omega_4^2u\omega_2 + 2\omega_4\omega_1^2u^3 - \frac{1}{2}v\omega_3^2u + \frac{1}{4}\omega_4^2u\omega_2 - \frac{1}{2}\omega_3^2c_s^2u\omega_2 - v\omega_3\omega_4u + v^3\omega_4\omega_1u\omega_2 - \\
& \omega_4\omega_1u\omega_2 - v\omega_3\omega_4^2c_s^2u - \frac{1}{2}\omega_3\omega_4c_s^2u\omega_2 - \frac{1}{2}v^2\omega_4^2\omega_1u + \frac{1}{2}\omega_3\omega_2^2u - v^3\omega_3\omega_1u\omega_2 - \frac{1}{2}\omega_3\omega_1u\omega_2 - 2v\omega_3\omega_4\omega_1u + \omega_3u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y+\delta_l}^{[\mu_2],t-2\delta_t} = & -2 + 2v\omega_4 - \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{5}{2}\omega_4\omega_1 + 2\omega_4\omega_1u^2\omega_2 + v\omega_4^2\omega_1u^2 + \frac{1}{2}v\omega_3\omega_2 + v\omega_4^2\omega_1 + 2\omega_3\omega_1u^2\omega_2 - \omega_1^2 - \\
& v^2\omega_4\omega_1\omega_2 - 3\omega_4\omega_1u^2 + \frac{1}{2}\omega_4^2u^2 + \frac{1}{4}v^2\omega_3^2 - \frac{1}{2}v\omega_3\omega_1\omega_2 - 2v\omega_4\omega_1^2u^2 + \frac{1}{2}\omega_4\omega_1\omega_2 + \frac{1}{2}v\omega_4\omega_2 - 2v\omega_3^2\omega_4u^2 + \\
& 2\omega_4 + 3\omega_3\omega_4\omega_1u^2 - \frac{3}{2}\omega_1\omega_2 + 4v\omega_1^2u^2\omega_2 + \frac{3}{2}\omega_3^2u^2 + 3\omega_1 + 2v\omega_3\omega_4u^2\omega_2 + 2\omega_3\omega_4u^2 - v\omega_4^2 + \frac{1}{2}\omega_4\omega_1^2 + \\
& v\omega_3^2u^2\omega_2 - v\omega_1^2\omega_2 - 2v\omega_3\omega_4^2u^2 - \frac{3}{2}\omega_4^2 + \frac{1}{2}\omega_1^2\omega_2 + \frac{1}{2}v\omega_4\omega_1^2 - \omega_3\omega_4u^2\omega_2 - \omega_3\omega_4^2u^2 + 6v\omega_3\omega_4\omega_1u^2 - \\
& \frac{1}{2}\omega_3^2u^2\omega_2 - \frac{1}{2}v^2\omega_4^2 + v\omega_3^2\omega_1u^2 + v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1 + 3v\omega_1\omega_2 - 2\omega_1^2u^2\omega_2 - 5\omega_3\omega_1u^2 - \omega_3\omega_4u^2 - \frac{1}{2}\omega_4\omega_2 + \\
& v^2\omega_3\omega_1\omega_2 - 2v\omega_3\omega_1u^2 - \frac{1}{2}v\omega_3\omega_1 + \omega_2 - \frac{1}{2}v\omega_4\omega_1\omega_2 - 2v\omega_2 + \frac{1}{2}v\omega_3\omega_1^2 - 2\omega_4\omega_1^2u^2 + \frac{1}{2}v^2\omega_4^2\omega_1 - v^2\omega_3\omega_2 + \\
& 4\omega_1^2u^2 - 4v\omega_4\omega_1u^2\omega_2 + \omega_4^2\omega_1u^2 + \frac{1}{2}\omega_4^2\omega_1 + v\omega_4^2u^2\omega_2 - 4v\omega_3\omega_1u^2\omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l,y+\delta_l}^{[\mu_1],t-2\delta_t} = & -1 + \frac{1}{2}v^2\omega_3^2\omega_1u^2 + \frac{1}{4}v\omega_4\omega_1u\omega_2 + \frac{1}{4}\omega_3^2\omega_4c_s^2 + \frac{1}{8}\omega_4^2u^3 - \frac{5}{4}\omega_4\omega_1u^3 - \frac{5}{4}\omega_3c_s^2\omega_2 + \frac{3}{2}\omega_3\omega_4^2\omega_1u + v\omega_4 + \\
& 3\omega_1u^2 - \frac{1}{2}v\omega_3^2c_s^2u\omega_2 - \frac{1}{8}\omega_4\omega_1 + \frac{1}{4}\omega_3 + \frac{1}{2}\omega_4\omega_1u^2\omega_2 - \frac{1}{4}v\omega_3\omega_1u\omega_2 - \frac{1}{8}\omega_3\omega_4\omega_1u + \frac{3}{4}v\omega_4^2\omega_1u^2 - \frac{3}{8}v\omega_3\omega_2 + \\
& \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - v\omega_4\omega_1u^3 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 + v^2\omega_3c_s^2\omega_2 - \frac{1}{8}\omega_3^2u + \frac{1}{4}\omega_3\omega_4^2c_s^2u - \frac{3}{2}\omega_3\omega_4c_s^2\omega_2 + \frac{1}{8}v^2\omega_3\omega_4 + \\
& \frac{1}{4}v^3\omega_3\omega_2^2 - \frac{1}{4}\omega_3\omega_4u - \frac{1}{8}\omega_3^2\omega_1u + \frac{1}{4}v\omega_3^2u^3\omega_2 + \frac{3}{2}v\omega_3\omega_1u\omega_2 + \frac{1}{4}v^2\omega_4\omega_1\omega_2 + v^2\omega_2 - \\
& \frac{1}{2}v\omega_3\omega_4c_s^2u\omega_2 - \frac{1}{2}v\omega_3\omega_4c_s^2\omega_2 - \frac{1}{8}\omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_4c_s^2 - \frac{3}{4}v^3\omega_4\omega_2 - \frac{1}{8}\omega_3\omega_4 + \frac{1}{8}\omega_4^2u^2 + \frac{3}{8}v^2\omega_3^2u + 2\omega_3c_s^2 - \\
& \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{2}v\omega_1u\omega_2^2 - \frac{1}{4}v\omega_3^2c_s^2 + \frac{1}{2}v^2\omega_3^2 + 2v\omega_1^2u^3\omega_2 + \frac{1}{4}v^2\omega_4\omega_1u + \frac{1}{4}v\omega_3\omega_1\omega_2 + \frac{1}{2}v\omega_3\omega_4u^3\omega_2 - \frac{9}{4}v\omega_3\omega_4c_s^2 + \\
& \frac{1}{2}v\omega_4\omega_1^2u^2 - \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{8}v^2\omega_3^2\omega_2 - \frac{5}{4}v\omega_4u^2\omega_2 + \frac{1}{2}v\omega_4\omega_1u^3 + \frac{1}{4}v^4\omega_4^2\omega_2 - \frac{1}{2}v\omega_3^2c_s^2\omega_2 + \frac{1}{2}\omega_3\omega_4u^3 - v^2\omega_3 + \\
& \frac{5}{8}\omega_3u^2\omega_2 + \frac{1}{4}\omega_3^2\omega_1u^3 - \frac{1}{2}v^2\omega_4\omega_1u\omega_2 - 2v\omega_1u\omega_2 + \omega_3\omega_1u^3\omega_2 + \frac{1}{4}\omega_3\omega_1u^2 + \frac{3}{8}\omega_3^2u^3 + \frac{1}{2}v^2\omega_3\omega_4c_s^2 + \frac{1}{4}v^3\omega_4\omega_1\omega_2 - \\
& \frac{9}{8}\omega_3\omega_1 + \frac{1}{4}v\omega_4u^2\omega_2^2 + 2v^2\omega_1u^2\omega_2^2 + \omega_3\omega_4\omega_1u^3 + \frac{1}{4}\omega_3\omega_4c_s^2u + \frac{1}{8}v\omega_4\omega_2 - \omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}v^2\omega_1\omega_2 - \frac{1}{2}v\omega_3\omega_4^2u^3 + \\
& \frac{1}{4}v\omega_3\omega_1\omega_2 + \frac{1}{2}\omega_4\omega_1u^3\omega_2 - \frac{3}{4}\omega_1u^2\omega_2 - \frac{3}{4}v\omega_3^2\omega_4u^2 - \frac{5}{2}v\omega_3\omega_1u^2 + \frac{3}{4}\omega_4 - \frac{1}{4}v^3\omega_4\omega_2^2 + \frac{3}{8}\omega_4\omega_1u - v\omega_3\omega_4c_s^2\omega_1u - \\
& \frac{1}{8}\omega_4^2u - \frac{1}{2}v^2\omega_3\omega_1u^2 + \frac{3}{2}v^2\omega_3\omega_4u^2\omega_2 + \frac{1}{8}v^2\omega_3\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{4}\omega_1\omega_2 - v\omega_1^2u^2\omega_2 + \\
& \frac{5}{8}\omega_3^2\omega_3^2 - \frac{1}{4}\omega_3^2\omega_3u\omega_2 - \frac{1}{8}v^2\omega_4^2u + \frac{1}{4}\omega_3^2u^2 + \frac{1}{4}v^2\omega_4^2u^2\omega_2 - \frac{1}{2}\omega_3\omega_1u^3 + \frac{1}{2}\omega_1 + \frac{1}{2}v\omega_3\omega_4u^2\omega_2 + \frac{1}{4}\omega_3^2\omega_1u^2 + \\
& \frac{1}{2}v^2\omega_3\omega_4c_s^2 + \frac{11}{8}\omega_3\omega_4u^2 + \frac{3}{4}v^3\omega_3\omega_2 + \frac{1}{4}v^2\omega_3\omega_4u - \frac{1}{2}v^2\omega_3^2\omega_1u - \frac{3}{2}\omega_1u - \frac{3}{8}v\omega_4^2 + \frac{1}{4}v^2\omega_4^2\omega_2 + \frac{3}{8}v^2\omega_3\omega_1 -
\end{aligned}$$

$$\begin{aligned}
& \frac{1}{4}v^4\omega_3^2\omega_2 + \frac{1}{4}v\omega_3^2u^2\omega_2 - \frac{1}{2}v\omega_3^2\omega_4u^3 - \frac{3}{4}v\omega_3\omega_4^2u^2 - \frac{1}{8}\omega_4^2 - \frac{1}{2}v\omega_3c_s^2\omega_2^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1u - \frac{3}{8}\omega_3\omega_4u^2\omega_2 - \\
& \frac{1}{2}v^3\omega_3^2\omega_2 + \frac{1}{2}v\omega_3\omega_4c_s^2\omega_1 + \frac{1}{4}v\omega_3\omega_4u\omega_2 + \frac{1}{2}v^2\omega_4^2\omega_1u^2 - \frac{1}{4}\omega_3\omega_4^2u^2 + v\omega_3c_s^2\omega_1\omega_2 + v\omega_3\omega_4\omega_1u^2 - \frac{1}{8}\omega_3^2u^2 - \\
& \omega_3u^2 - \frac{1}{4}\omega_3^2\omega_4u^3 - \frac{7}{4}\omega_3\omega_1u^3 + \frac{1}{4}v^2\omega_4^2\omega_2 + \frac{1}{8}v\omega_3^2u^2 - \frac{3}{4}v^2\omega_4^2 + \frac{9}{4}v\omega_3\omega_4u^2 + \frac{3}{4}v\omega_3^2\omega_1u^2 - v\omega_3\omega_1u^3 - \\
& \frac{7}{8}v^2\omega_4\omega_2 + \frac{1}{4}v\omega_3^2\omega_2 + \frac{1}{4}v\omega_1\omega_2 + \frac{1}{2}\omega_1^2u^2\omega_2 - \frac{11}{8}\omega_3\omega_1u^2 - \frac{1}{4}\omega_3^2\omega_4u^2 + \frac{1}{2}v\omega_3^2\omega_4c_s^2u + 2v\omega_3\omega_4\omega_1u^3 + \\
& 5v\omega_1u^2\omega_2 - \frac{1}{4}\omega_3\omega_4^2u^3 - \frac{1}{2}v^2\omega_3^2c_s^2\omega_2 - \frac{1}{4}\omega_3\omega_4^2\omega_1u^2 - \frac{1}{4}v\omega_2^2u - v^2\omega_1\omega_2 + \frac{1}{4}v\omega_4^2u^3\omega_2 - \frac{1}{2}v^4\omega_4\omega_2^2 - \\
& \frac{1}{4}\omega_4\omega_2 - \frac{1}{4}v^2\omega_3\omega_2^2 - \frac{3}{2}v\omega_3\omega_1u^3\omega_2 + \frac{3}{4}v\omega_4\omega_1u + \frac{1}{2}v\omega_3\omega_1u^2 + \frac{3}{4}\omega_1\omega_2 + \frac{1}{2}v\omega_3\omega_1u^3 - \frac{1}{4}v\omega_3\omega_1 - \frac{5}{4}v\omega_3\omega_2^2 + \\
& \frac{1}{4}v^2\omega_3\omega_4u\omega_2 + \frac{1}{2}\omega_2 + \frac{1}{2}v\omega_4u - \frac{3}{4}v^2\omega_3\omega_1u + v^2\omega_3\omega_4\omega_1u^2 - \frac{3}{2}v\omega_4\omega_1u^3\omega_2 - \frac{1}{4}v^3\omega_3\omega_1\omega_2 - \frac{1}{2}v\omega_2 - 2v^2\omega_3\omega_1u^2\omega_2 - \\
& \omega_1^3\omega_2 + \frac{1}{4}v\omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 - \frac{1}{2}\omega_4u^2 - \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{4}\omega_4^2\omega_1u^3 + \frac{1}{4}\omega_3^2c_s^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_2 + \frac{1}{8}\omega_4u^2\omega_2 - \\
& \frac{1}{8}v^3\omega_4^2 + \frac{1}{2}v^3\omega_4^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1u + 2\omega_1^2u^3 - \frac{1}{2}v^2\omega_3^2\omega_4u^2 - \frac{3}{2}\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_4\omega_1^2u^2 - \frac{1}{4}v\omega_3\omega_4 + \frac{7}{8}\omega_3\omega_1u - \\
& \frac{1}{2}v^2\omega_4u^2\omega_2^2 + \frac{8}{8}v\omega_3^2 + \frac{8}{8}v\omega_4^2u^2 - 2v^2\omega_4\omega_1u^2\omega_2 - \frac{3}{2}\omega_3\omega_4c_s^2u - v\omega_1u^2\omega_2^2 - \frac{1}{4}\omega_3^2\omega_3^2u - \frac{3}{4}\omega_3^2c_s^2u + \frac{1}{4}v\omega_4\omega_2u - \\
& \frac{1}{5}v^2\omega_3\omega_2 - \frac{1}{4}\omega_3\omega_4u^3\omega_2 + v^2\omega_1\omega_2 - \frac{5}{2}v\omega_4\omega_1u^2 + \frac{3}{4}v\omega_3\omega_4^2c_s^2 + \frac{1}{4}v^3\omega_4^2\omega_2 + \frac{1}{2}v^2\omega_3^2u^2\omega_2 - \frac{1}{2}\omega_4\omega_1^2u^3 - \frac{1}{4}v\omega_3^2u + \\
& \frac{9}{2}v^2\omega_4 - \omega_1^2u^2 - \frac{3}{4}v\omega_4\omega_1u^2\omega_2 + \frac{1}{4}\omega_4^2\omega_1u^2 - \frac{1}{2}v^2\omega_3\omega_4u^2 - \frac{1}{2}v\omega_3^2\omega_1u + \frac{1}{2}\omega_3^2c_s^2\omega_2 - \frac{1}{2}v\omega_3\omega_4u - \frac{1}{2}v^3\omega_4\omega_1u\omega_2 + \\
& \frac{1}{2}v^4\omega_3\omega_2^2 + \frac{1}{4}v^2\omega_4\omega_2^2 + \frac{1}{8}v\omega_3^2\omega_2 - \frac{1}{4}v\omega_4\omega_1 + \frac{1}{4}v\omega_4^2u^2\omega_2 + \frac{5}{2}v\omega_3c_s^2\omega_2 + \frac{3}{4}v\omega_3^2\omega_4c_s^2 + \frac{1}{2}v\omega_3\omega_4c_s^2u + \\
& \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 - \frac{3}{4}v\omega_3\omega_1u^2\omega_2 + \frac{1}{2}v\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u\omega_2 - \frac{1}{2}v\omega_3\omega_4\omega_1u + \frac{1}{2}\omega_3u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_i, y+\delta_i}^{[\mu_2], t-2\delta_t} = & \\
& -2 + v\omega_4\omega_1\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_2 + \frac{3}{2}v\omega_4 + \frac{1}{8}\omega_3^2\omega_2 - \frac{3}{8}\omega_4\omega_1 + \frac{5}{2}\omega_3 - \frac{1}{2}\omega_4\omega_1u^2\omega_2 + \frac{3}{8}\omega_3\omega_4\omega_2 + 2v\omega_3\omega_4^2u + v\omega_3\omega_1\omega_2 - \\
& \frac{1}{2}\omega_3\omega_4\omega_1u - \frac{1}{2}v\omega_4^2\omega_1u^2 - \frac{3}{4}v\omega_4^2\omega_2 + 2v\omega_3\omega_2 - \frac{3}{2}\omega_3\omega_1u^2\omega_2 - \omega_3^2u - v^2\omega_3\omega_4 - \frac{7}{2}\omega_3\omega_4u - \frac{1}{4}\omega_3^2\omega_1u + v^2\omega_1\omega_2^2 + \\
& 2v^2\omega_3\omega_1\omega_2 - \frac{1}{2}v\omega_3\omega_2 - \frac{1}{4}v\omega_4\omega_2^2 + 3v\omega_3\omega_1u - \frac{1}{2}v^2\omega_4\omega_1\omega_2 + 2v\omega_3^2\omega_4u + \frac{3}{2}\omega_4\omega_1u^2 - \frac{7}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4^2u^2 - \frac{1}{2}\omega_4\omega_2u + \\
& 2v^2\omega_4\omega_1\omega_2 + v\omega_1\omega_2 + v^2\omega_4\omega_2 - \frac{3}{2}v^2\omega_3^2 - \frac{1}{2}v\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1^2u + \frac{3}{2}v\omega_3^2\omega_4 + v\omega_4\omega_1^2u^2 - \frac{1}{4}v^2\omega_3^2\omega_2 - 6v\omega_1\omega_2 + \\
& \frac{1}{2}\omega_3\omega_1^2u^2 - \frac{1}{2}v\omega_4\omega_1u - \frac{9}{8}\omega_3\omega_1 + \frac{1}{2}v\omega_3^2\omega_1 + 2v\omega_4\omega_2 + 3v\omega_3\omega_2 - 2v^2\omega_2^2 + v\omega_3^2\omega_4u^2 + \frac{1}{4}\omega_3\omega_4^2 + \frac{3}{2}\omega_4 + 2\omega_4\omega_1u + \\
& v\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_4^2u - \frac{3}{2}v^2\omega_3\omega_4\omega_2 - \frac{3}{4}v\omega_4^2\omega_1u - \frac{3}{2}\omega_3\omega_4\omega_1u^2 + \omega_3\omega_4\omega_2 - \frac{1}{2}\omega_1\omega_2 - \frac{1}{4}v\omega_3\omega_2^2 - 2v\omega_1^2\omega_2 + \frac{1}{2}\omega_3^2\omega_2 - \\
& \frac{3}{4}\omega_3^2\omega_2^2 + \omega_1 - v\omega_3\omega_4u^2\omega_2 - \frac{1}{4}\omega_3^2\omega_1u^2 - \omega_3\omega_4u^2 + \frac{1}{2}v^2\omega_3\omega_4^2 - \frac{1}{2}v^2\omega_3^2\omega_1u - 4\omega_1u - \frac{1}{2}v\omega_4^2 - \frac{1}{2}\omega_1^2\omega_2 - \frac{1}{4}v^2\omega_4\omega_2 - \\
& \frac{1}{2}v\omega_3^2\omega_2 + v\omega_3\omega_4^2\omega_2 - \frac{1}{4}\omega_4^2 + \frac{1}{2}\omega_3\omega_4\omega_2 - \frac{3}{2}v\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_4^2u^2 - 3v\omega_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_2^2 - \frac{1}{2}v^2\omega_4\omega_2u + \\
& v\omega_1^2\omega_2 + \omega_1^2u - \frac{1}{4}v^2\omega_4^2 - \frac{1}{4}\omega_4^2\omega_1u + v^2\omega_3\omega_4^2u - \frac{1}{2}v\omega_3^2\omega_1u^2 + \frac{3}{2}v^2\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_1 - \frac{3}{4}v\omega_3\omega_2 + \frac{1}{2}v\omega_4\omega_2^2 + \frac{1}{2}v^2\omega_3\omega_2^2 + \\
& \frac{5}{2}\omega_3\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_4u^2 + \frac{3}{4}v\omega_3\omega_4^2 - \frac{3}{2}\omega_3\omega_1\omega_2 - \frac{1}{2}v\omega_4^2u + \frac{5}{2}v\omega_3 - 2v^2\omega_1\omega_2 + \frac{1}{8}\omega_3^2\omega_1 - \frac{3}{8}\omega_4\omega_2 - \frac{1}{2}v\omega_4\omega_2^2 + \frac{1}{2}v^2\omega_3\omega_2^2 + \\
& \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{3}{2}v^2\omega_3\omega_1\omega_2 + 3v\omega_4\omega_1u + v\omega_3\omega_1^2u^2 + v\omega_2^2 + 2\omega_1\omega_2 - \frac{3}{2}v\omega_3\omega_1 - \frac{1}{4}v\omega_4^2\omega_2 - 3v^2\omega_3\omega_4\omega_2 + \omega_2 + \frac{3}{2}\omega_4u + \\
& v^2\omega_3\omega_2^2 + v^2\omega_3^2\omega_4u - \frac{1}{4}\omega_4\omega_2^2u - \frac{1}{2}v\omega_4\omega_1\omega_2 - 4v\omega_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1 - \frac{1}{2}v\omega_3\omega_2^2u + \frac{1}{2}\omega_3\omega_1\omega_2 - v^2\omega_3\omega_4\omega_1u + \frac{1}{4}\omega_3^2\omega_4 + \\
& \frac{1}{2}\omega_4\omega_1^2u^2 - \frac{7}{2}v\omega_3\omega_4 + \frac{3}{4}\omega_3^2\omega_4u + 2\omega_3\omega_1u - v\omega_3^2 + 3v\omega_4\omega_2 + \frac{5}{2}v\omega_3 - \frac{1}{2}v\omega_3^2u - 2\omega_1^2u^2 + 2v\omega_4\omega_1u^2\omega_2 - \\
& \frac{1}{4}\omega_4^2\omega_1u^2 - \frac{3}{4}v\omega_3^2\omega_1u - 5v\omega_3\omega_4u - \frac{1}{2}\omega_4\omega_1\omega_2 - \frac{1}{2}v\omega_1\omega_2^2 + \frac{1}{2}v^2\omega_4\omega_2^2 - \frac{9}{8}\omega_3\omega_2 - \frac{1}{4}v\omega_3^2\omega_2 - \frac{1}{2}v\omega_4\omega_1 - \\
& \frac{1}{2}v\omega_4^2\omega_2u + 2v\omega_3\omega_1u^2\omega_2 - \frac{1}{2}v^2\omega_4^2\omega_1u + \frac{3}{4}\omega_3\omega_4^2u - \frac{1}{2}v\omega_3\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_4 - \frac{1}{2}\omega_3\omega_1\omega_2 + \frac{5}{2}\omega_3u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_1], t-3\delta_t} = & -v^2\omega_3\omega_4^2\omega_1u + \frac{7}{2}v\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_4^2u^3 - \frac{1}{2}\omega_4\omega_1u^3 - \frac{3}{4}v^2\omega_3^2\omega_2 - \omega_3c_s^2\omega_1u + v\omega_3\omega_4^2u + \frac{7}{2}v\omega_3\omega_1\omega_2 + \\
& \frac{17}{4}\omega_3\omega_4\omega_1u - \frac{1}{2}v\omega_3^2\omega_4\omega_2 + v\omega_3\omega_4\omega_1^2u + \frac{3}{4}\omega_3^2u - \frac{1}{2}\omega_3\omega_4^2c_s^2u + \frac{3}{2}\omega_3\omega_4u + \frac{3}{4}\omega_3^2\omega_1u + \frac{1}{2}v^2\omega_3^2\omega_4\omega_2u - \\
& \frac{1}{2}v^2\omega_3\omega_1\omega_2 + \frac{7}{2}v\omega_3\omega_1u + v\omega_3\omega_4u - \frac{1}{4}v^2\omega_3^2u + \frac{1}{2}\omega_4\omega_1\omega_2 - \frac{1}{2}v^2\omega_4\omega_1\omega_2 + v\omega_1\omega_2^2 - \frac{1}{2}\omega_3\omega_1\omega_2 + \\
& \frac{3}{2}v\omega_3\omega_4\omega_1u + \frac{1}{2}v^2\omega_4\omega_1u + \omega_3\omega_1^2u + \frac{1}{2}\omega_3^2\omega_1u^3 + v^2\omega_4\omega_2 - 6v\omega_1\omega_2 - v^2\omega_4\omega_1\omega_2^2 - \frac{1}{2}\omega_3\omega_1\omega_2^3 - \\
& \frac{1}{2}v\omega_3\omega_4\omega_2u - \frac{1}{2}\omega_3^2\omega_1u^3 - \frac{1}{2}v\omega_4\omega_1\omega_2u - \frac{1}{2}\omega_3\omega_4\omega_2u - \frac{1}{2}\omega_3\omega_4^2u^2 + \frac{1}{2}v\omega_3\omega_2^2 - 3v\omega_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_2^2 - \\
& v\omega_1^2\omega_2 + \omega_1^2u - \frac{1}{4}v^2\omega_4^2 - \frac{1}{4}\omega_4^2\omega_1u + v^2\omega_3\omega_4^2u - \frac{1}{2}v\omega_3^2\omega_1u^2 + \frac{3}{2}v^2\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_1 - \frac{3}{4}v\omega_3\omega_2 + \frac{1}{2}v\omega_4\omega_2^2 + \frac{1}{2}v^2\omega_3\omega_2^2 + \\
& \frac{5}{2}\omega_3\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_4u^2 + \frac{3}{4}v\omega_3\omega_4^2 - \frac{3}{2}\omega_3\omega_1\omega_2 - \frac{1}{2}v\omega_4^2u + \frac{5}{2}v\omega_3 - 2v^2\omega_1\omega_2 + \frac{1}{8}\omega_3^2\omega_1 - \frac{3}{8}\omega_4\omega_2 - \frac{1}{2}v\omega_4\omega_2^2 + \frac{1}{2}v^2\omega_3\omega_2^2 + \\
& \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{3}{2}v^2\omega_3\omega_1\omega_2 + 3v\omega_4\omega_1u + v\omega_3\omega_1^2u^2 + v\omega_2^2 + 2\omega_1\omega_2 - \frac{3}{2}v\omega_3\omega_1 - \frac{1}{4}v\omega_4^2\omega_2 - 3v^2\omega_3\omega_4\omega_2 + \omega_2 + \frac{3}{2}\omega_4u + \\
& v^2\omega_3\omega_2^2 + v^2\omega_3^2\omega_4u - \frac{1}{4}\omega_4\omega_2^2u - \frac{1}{2}v\omega_4\omega_1\omega_2 - 4v\omega_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1 - \frac{1}{2}v\omega_3\omega_2^2u + \frac{1}{2}\omega_3\omega_1\omega_2 - v^2\omega_3\omega_4\omega_1u + \frac{1}{4}\omega_3^2\omega_4 + \\
& \frac{1}{2}\omega_4\omega_1^2u^2 - \frac{7}{2}v\omega_3\omega_4 + \frac{3}{4}\omega_3^2\omega_4u + 2\omega_3\omega_1u - v\omega_3^2 + 3v\omega_4\omega_2 + \frac{5}{2}v\omega_3 - \frac{1}{2}v\omega_3^2u - 2\omega_1^2u^2 + 2v\omega_4\omega_1u^2\omega_2 - \\
& \frac{1}{4}\omega_4^2\omega_1u^2 - \frac{3}{4}v\omega_3^2\omega_1u - 5v\omega_3\omega_4u - \frac{1}{2}\omega_4\omega_1\omega_2 - \frac{1}{2}v\omega_1\omega_2^2 + \frac{1}{2}v^2\omega_4\omega_2^2 - \frac{9}{8}\omega_3\omega_2 - \frac{1}{4}v\omega_3^2\omega_2 - \frac{1}{2}v\omega_4\omega_1 - \\
& \frac{1}{2}v\omega_4^2\omega_2u + 2v\omega_3\omega_1u^2\omega_2 - \frac{1}{2}v^2\omega_4^2\omega_1u + \frac{3}{4}\omega_3\omega_4^2u - \frac{1}{2}v\omega_3\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_4 - \frac{1}{2}\omega_3\omega_1\omega_2 + \frac{5}{2}\omega_3u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_2], t-3\delta_t} = & 3 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 + \frac{5}{2}v\omega_4 + \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{1}{4}\omega_3^2\omega_2 + \frac{13}{4}\omega_4\omega_1 - \frac{15}{4}\omega_3 - \omega_4\omega_1u^2\omega_2 + v^2\omega_3^2\omega_4\omega_1 - \frac{3}{4}\omega_3\omega_4\omega_2 + \\
& \frac{1}{4}\omega_3^2\omega_1\omega_2 + \frac{7}{2}v\omega_3\omega_2 + v\omega_4^2\omega_1 + \omega_3\omega_1u^2\omega_2 + \omega_1^2 + v^2\omega_3\omega_4 - 2v^2\omega_1\omega_2^2 - \frac{1}{2}v\omega_4\omega_2^2 + v^2\omega_3\omega_4^2\omega_1 + 2v^2\omega_4\omega_1\omega_2 + \\
& \frac{1}{2}\omega_3\omega_1^2\omega_2 - v\omega_3\omega_4\omega_1^2 + \omega_4\omega_1u^2 + \frac{13}{4}\omega_3\omega_4 - \frac{1}{2}\omega_4^2u^2 + \frac{1}{2}v^2\omega_3^2\omega_2 - 4v\omega_3\omega_1\omega_2 + \frac{3}{2}v\omega_3^2\omega_4 - \omega_3\omega_1^2 + \frac{1}{2}v^2\omega_3^2\omega_2 +
\end{aligned}$$

$$\begin{aligned}
& w_3 \omega_1^2 u^2 + \frac{1}{2} v w_3 \omega_1 \omega_2^2 + \frac{1}{2} \omega_3 \omega_4^2 \omega_1 - \frac{3}{4} \omega_4 \omega_1 \omega_2 + \frac{19}{4} \omega_3 \omega_1 + v \omega_3^2 \omega_1 + \frac{7}{2} v \omega_4 \omega_2 + 2 v^2 \omega_2^2 + v^2 \omega_4 \omega_1 \omega_2^2 - \frac{1}{2} \omega_3 \omega_4^2 - \\
& \frac{11}{4} \omega_4 + 7 v w_3 \omega_4 \omega_1 + \frac{1}{2} v w_4 \omega_1^2 \omega_2 + \frac{1}{2} \omega_3^2 \omega_4 \omega_1 + 3 v^2 \omega_3 \omega_4 \omega_2 - \frac{1}{2} v^2 \omega_3^2 \omega_1 \omega_2 + 2 \omega_1 \omega_2 - \frac{1}{2} v w_3 \omega_2^2 + \frac{1}{2} \omega_3^2 u^2 - 4 \omega_1 - \\
& \frac{1}{2} \omega_3^2 \omega_1 u^2 - v^2 \omega_3 \omega_4^2 + \frac{1}{2} v w_4^2 \omega_1 \omega_2 - v \omega_4^2 + \frac{1}{2} v^2 \omega_4^2 \omega_2 - \frac{1}{2} \omega_4 \omega_1^2 - v \omega_1^2 \omega_2 + \frac{1}{2} \omega_4^2 - \frac{1}{2} \omega_1 \omega_2 + \frac{1}{2} v w_4 \omega_1^2 + \frac{1}{2} \omega_3^2 \omega_1 u^2 \omega_2 - \\
& \frac{1}{2} \omega_3^2 \omega_2^2 \omega_2 + \frac{1}{2} v^2 \omega_4^2 - \frac{1}{2} \omega_4^2 \omega_1 u^2 \omega_2 - \frac{3}{2} v \omega_3^2 \omega_4 \omega_1 - 2 v^2 \omega_4 \omega_2 - \frac{1}{2} v^2 \omega_3^2 \omega_1 + 6 v w_1 \omega_2 - \omega_3 \omega_1 u^2 + \frac{3}{2} v \omega_3 \omega_4^2 + \frac{5}{2} v \omega_3 - \\
& \frac{3}{4} \omega_3^2 \omega_1 + \frac{3}{4} \omega_4 \omega_2 - v^2 \omega_3 \omega_2^2 - \frac{15}{4} \omega_3 \omega_4 \omega_1 + 2 v^2 \omega_3 \omega_1 \omega_2 + v \omega_2^2 - 3 v \omega_3 \omega_1 - \frac{1}{2} v \omega_2^2 \omega_2 - \frac{3}{2} \omega_2 - \frac{3}{2} v \omega_3 \omega_4^2 \omega_1 - 4 v \omega_4 \omega_1 \omega_2 - \\
& 5 v \omega_2 - v^2 \omega_3 \omega_4 \omega_1 - \frac{9}{4} \omega_3 \omega_1 \omega_2 + \frac{1}{2} v \omega_3 \omega_1^2 + \omega_4 \omega_1^2 u^2 \omega_2 - \frac{1}{2} \omega_3^2 \omega_4 + \frac{1}{2} v w_4 \omega_1 \omega_2^2 - \omega_4 \omega_1^2 u^2 - 6 v \omega_3 \omega_4 + \frac{1}{2} v \omega_3 \omega_1 \omega_2 - \\
& \omega_3 \omega_1^2 u^2 \omega_2 - v \omega_3^2 - \frac{1}{2} v^2 \omega_4^2 \omega_1 - 2 v^2 \omega_3 \omega_2 - 3 v^2 \omega_3 \omega_4 \omega_1 \omega_2 + v^2 \omega_3 \omega_1 \omega_2^2 + \frac{3}{4} \omega_3^2 + \frac{1}{2} \omega_3 \omega_4 \omega_1^2 + \frac{1}{2} \omega_4^2 \omega_1 u^2 - \frac{1}{2} v^2 \omega_4^2 \omega_1 \omega_2 - \\
& v \omega_1 \omega_2^2 + v \omega_3 \omega_4 \omega_1 \omega_2 - v^2 \omega_4 \omega_2^2 + \frac{7}{4} \omega_3 \omega_2 - \frac{1}{2} \omega_4^2 \omega_1 - \frac{1}{2} v \omega_2^2 \omega_2 - 3 v \omega_4 \omega_1 + \frac{1}{2} v \omega_3^2 \omega_1 \omega_2 - v \omega_3 \omega_4 \omega_2 - v^2 \omega_3^2 \omega_4,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_1,y}^{[\mu_1],t-3\delta_t} = & -1 + \frac{1}{2} \omega_3^2 \omega_4 c_s^2 - \frac{1}{4} \omega_4^2 u^3 + \frac{3}{2} \omega_4 \omega_1 u^3 + \frac{1}{4} v^2 \omega_3^2 u \omega_2 - \frac{5}{2} \omega_3 c_s^2 \omega_2 - \omega_3 c_s^2 \omega_1 u + 4 \omega_1 u^2 - \frac{1}{4} \omega_4^2 u^2 \omega_2 - \frac{1}{4} \omega_4 \omega_1 + \\
& \frac{1}{4} \omega_3 - \frac{1}{2} \omega_3 \omega_4^2 c_s^2 \omega_2 + \frac{13}{4} \omega_4 \omega_1 u^2 \omega_2 + \frac{1}{4} \omega_3 \omega_4 \omega_2 + \frac{1}{4} \omega_3 \omega_4 \omega_1 u + \frac{1}{2} \omega_3 c_s^2 \omega_1 \omega_2 - \frac{1}{2} \omega_3 \omega_4^2 u^3 \omega_2 + \frac{13}{4} \omega_3 \omega_1 u^2 \omega_2 + \\
& \frac{1}{4} \omega_3^2 u - \frac{1}{2} \omega_3 \omega_4^2 c_s^2 u + \frac{1}{2} \omega_3^2 \omega_4 u^2 \omega_2 + \frac{1}{2} \omega_3 \omega_4 u + \frac{1}{4} \omega_3^2 \omega_1 u + \omega_1 u^2 \omega_2^2 - \frac{3}{2} v^2 \omega_3 \omega_1 u \omega_2 + \frac{1}{4} v^2 \omega_4 \omega_1 \omega_2 - \frac{11}{4} \omega_4 \omega_1 u^2 + \\
& \frac{1}{5} \omega_3 \omega_4^2 c_s^2 - \frac{1}{4} \omega_3 \omega_4 + \frac{1}{4} \omega_3^2 u^2 - \frac{1}{4} v^2 \omega_3^2 u + 2 \omega_3 c_s^2 + \frac{1}{2} \omega_4 \omega_1 \omega_2 + \frac{3}{4} v^2 \omega_3^2 + \frac{1}{4} v^2 \omega_3^2 - \frac{1}{4} \omega_3 u^2 \omega_2^2 - \\
& \frac{1}{2} v^2 \omega_4 \omega_1 u - \frac{1}{4} v^2 \omega_4 \omega_1 - \frac{3}{4} v^2 \omega_3^2 \omega_2 - \frac{1}{2} \omega_3 \omega_4 u^3 - \frac{1}{2} \omega_3^2 \omega_4 u^3 \omega_2 - v^2 \omega_3 + \frac{5}{4} \omega_3 u^2 \omega_2 - \frac{1}{2} \omega_3^2 \omega_1 u^3 - v^2 \omega_4 \omega_1 u \omega_2^2 - \\
& \frac{3}{2} \omega_3 \omega_1 u^3 \omega_2 + \frac{1}{2} \omega_3 \omega_1^2 u^2 - \frac{1}{4} \omega_3^2 u^3 + \frac{1}{4} \omega_4 \omega_1 \omega_2 - \frac{1}{4} \omega_3 \omega_1 + \frac{1}{4} \omega_4^2 \omega_2 + \frac{1}{2} \omega_3 \omega_4 \omega_1 u^2 - 2 \omega_3 \omega_4 \omega_1 u^3 - \frac{1}{2} \omega_3^2 \omega_4 c_s^2 u + \\
& \omega_3 c_s^2 \omega_1 u \omega_2 + v^2 \omega_3 \omega_1 u \omega_2^2 - \frac{3}{4} \omega_4 \omega_1 u^3 \omega_2 - 5 \omega_1 \omega_2^2 + \frac{5}{4} \omega_4 - \frac{3}{4} \omega_4 \omega_1 u - \omega_3 \omega_4 c_s^2 \omega_1 u \omega_2 + \frac{1}{4} \omega_4^2 u + \frac{1}{4} \omega_4^2 u^3 \omega_2 - \\
& \frac{1}{2} \omega_3^2 \omega_4 c_s^2 \omega_2 + \frac{1}{2} \omega_3 \omega_4 \omega_1 u^2 - \frac{1}{2} \omega_3 \omega_4 u \omega_2 + \frac{1}{2} \omega_3 \omega_4 c_s^2 \omega_1 - \frac{1}{2} \omega_1 \omega_2 - \frac{1}{4} \omega_3^2 \omega_1 u \omega_2 - \frac{1}{4} \omega_3^2 \omega_1 u \omega_2 + \frac{1}{4} v^2 \omega_4^2 u + \frac{1}{4} \omega_3^2 u^2 + \\
& \omega_3 \omega_1^2 u^3 + \frac{1}{2} \omega_1 - \frac{1}{2} \omega_3 \omega_1 u \omega_2^2 + \frac{1}{2} \omega_3^2 \omega_1 u^2 + \frac{1}{2} \omega_3 \omega_4 c_s^2 u \omega_2 + \frac{5}{2} \omega_3 \omega_4 u^2 + \frac{1}{2} v^2 \omega_3^2 \omega_1 u + 2 \omega_1 u + \frac{1}{2} \omega_3 c_s^2 \omega_2^2 - \\
& \frac{1}{2} \omega_4 \omega_1 u^2 \omega_2^2 + \frac{3}{4} v^2 \omega_4^2 \omega_2 + \frac{1}{4} v^2 \omega_3 \omega_1 - \frac{1}{4} \omega_3 \omega_4 \omega_1 u \omega_2 - \frac{1}{4} \omega_4^2 + \omega_3 \omega_4 c_s^2 \omega_1 u - \frac{1}{2} \omega_3^2 \omega_1 u^2 \omega_2 - 3 \omega_3 \omega_4 u^2 \omega_2 - \\
& \frac{1}{5} \omega_3 \omega_4^2 u^2 - \frac{1}{4} \omega_3^2 u^2 \omega_2 - \omega_3 u^2 + \frac{1}{2} \omega_3^2 \omega_4 u^3 + \frac{3}{2} \omega_3 \omega_1 u^3 - \frac{1}{4} v^2 \omega_4^2 u \omega_2 - \frac{1}{2} \omega_3 \omega_1 u \omega_2^2 - \omega_3 \omega_1^2 u^3 \omega_2 - \frac{3}{4} v^2 \omega_4^2 - \\
& \frac{1}{2} \omega_3 \omega_4 c_s^2 \omega_1 \omega_2 - \frac{1}{2} \omega_3^2 \omega_1 u^2 \omega_2 - \frac{1}{4} v^2 \omega_4 \omega_2 - \frac{1}{4} \omega_3 \omega_2^2 - \omega_4 \omega_1^2 u^3 \omega_2 - \frac{1}{2} \omega_3 \omega_4 \omega_1 u^2 \omega_2 + \omega_1^2 u^2 \omega_2 - \frac{11}{4} \omega_3 \omega_1 u^2 - \\
& \frac{1}{2} \omega_3^2 \omega_4 u^2 + \frac{1}{2} \omega_3 \omega_4^2 u^3 + \frac{1}{2} \omega_3 \omega_2^2 - \frac{1}{2} \omega_3 c_s^2 \omega_1 + \frac{1}{2} v^2 \omega_4^2 \omega_1 u \omega_2 - \frac{3}{2} \omega_4 \omega_2 + \frac{3}{4} v^2 \omega_3 \omega_2^2 - \frac{1}{4} v^2 \omega_3 \omega_1 \omega_2 - \frac{5}{2} \omega_1 \omega_2 - \\
& \frac{1}{5} \omega_3 \omega_4 c_s^2 \omega_2^2 + \omega_2 - \frac{1}{4} \omega_4 u^2 \omega_2^2 - \frac{1}{2} \omega_4 \omega_2 - \frac{1}{2} v^2 \omega_3^2 \omega_1 u \omega_2 + \frac{1}{2} v^2 \omega_3 \omega_1 u + \frac{1}{4} \omega_3 \omega_1 \omega_2 + 2 \omega_1^2 u^3 \omega_2 + \frac{1}{2} \omega_1 \omega_2^2 + \\
& \frac{1}{5} \omega_3^2 \omega_4 c_s^2 u \omega_2 - \frac{1}{2} \omega_4 \omega_1^2 u^2 \omega_2 + 2 \omega_3 \omega_4 \omega_1 u^3 \omega_2 + 3 \omega_3 \omega_4 c_s^2 \omega_2 - \omega_4 u^2 - \frac{1}{2} \omega_3^2 c_s^2 - \frac{1}{2} \omega_4^2 \omega_1 u^3 + \frac{1}{2} \omega_3^2 c_s^2 \omega_2 + \\
& \frac{1}{2} \omega_4^2 \omega_1 u^3 \omega_2 + \frac{5}{4} \omega_4 u^2 \omega_2 - 2 \omega_1^2 u^3 - \frac{5}{2} \omega_3 \omega_4 c_s^2 + \frac{1}{2} \omega_4 \omega_1^2 u^2 - \frac{7}{4} \omega_3 \omega_1 u - \frac{1}{2} \omega_3 \omega_1^2 u^2 \omega_2 + \frac{1}{2} \omega_3 \omega_4 c_s^2 u + \frac{1}{4} \omega_3^2 \omega_1^3 \omega_2 + \\
& \frac{1}{4} \omega_4 \omega_2^2 + \frac{1}{2} \omega_3^2 c_s^2 u + \frac{1}{4} v^2 \omega_3 \omega_2 + \frac{1}{2} \omega_3 \omega_4 u^3 \omega_2 + \frac{1}{2} \omega_3^2 \omega_1 u^3 \omega_2 + \omega_4 \omega_1^2 u^3 + v^2 \omega_4 - \omega_1^2 u^2 - \frac{1}{4} \omega_4 \omega_1 \omega_2 + \frac{1}{2} \omega_4^2 \omega_1 u^2 - \\
& \frac{1}{2} \omega_3^2 c_s^2 u \omega_2 + \frac{3}{4} \omega_4 \omega_1 u \omega_2 - \frac{3}{4} v^2 \omega_4 \omega_2^2 + \frac{1}{2} \omega_3 \omega_4 u^2 \omega_2^2 - \frac{1}{2} \omega_3 \omega_4 c_s^2 u \omega_2 - \frac{1}{2} v^2 \omega_4 \omega_1 u + \frac{9}{4} \omega_3 \omega_1 u \omega_2 - \frac{1}{2} \omega_3 u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_1,y}^{[\mu_2],t-3\delta_t} = & 3 + \frac{3}{4} \omega_3 \omega_4 \omega_1 \omega_2 - \frac{1}{2} \omega_4^2 u^2 \omega_2 - \frac{3}{4} \omega_3^2 \omega_2 + \frac{3}{4} \omega_4 \omega_1 - \frac{15}{4} \omega_3 + 2 \omega_4 \omega_1 u^2 \omega_2 - \frac{15}{4} \omega_3 \omega_4 \omega_2 + \frac{1}{4} \omega_3^2 \omega_1 \omega_2 - \omega_3 \omega_4 \omega_1 \omega_2 - \\
& \frac{1}{2} \omega_1 \omega_2^2 - \omega_3 \omega_4 u \omega_2^2 + 2 \omega_3 \omega_1 u^2 \omega_2 - \omega_3^2 u + \omega_3^2 \omega_4 u^2 \omega_2 - 6 \omega_3 \omega_4 u - \frac{1}{2} \omega_3^2 \omega_1 u + \frac{1}{2} \omega_4 \omega_1^2 u \omega_2 - v^2 \omega_4 \omega_1 \omega_2 - 2 \omega_4 \omega_1 u^2 + \\
& \frac{13}{4} \omega_3 \omega_4 + \frac{1}{2} \omega_4^2 u^2 - 3 \omega_4 \omega_1 \omega_2 + \frac{1}{2} \omega_3 \omega_1^2 \omega_2 + \frac{1}{2} v^2 \omega_3^2 - \frac{1}{2} \omega_3 \omega_2^2 u - \frac{1}{2} v^2 \omega_3^2 \omega_2 - \omega_3 \omega_1^2 u^2 - \frac{3}{4} \omega_4 \omega_1 \omega_2 + \frac{7}{4} \omega_3 \omega_1 - \\
& \frac{1}{4} \omega_2^2 \omega_2 + \omega_3 \omega_4^2 u^2 \omega_2 + v^2 \omega_4 \omega_1 \omega_2^2 - \frac{1}{2} \omega_3 \omega_2^2 - \frac{11}{4} \omega_4 + \frac{7}{2} \omega_4 \omega_1 u + \frac{1}{2} \omega_4 \omega_2^2 - \omega_4^2 u + \frac{1}{2} v^2 \omega_3 \omega_1 \omega_2 + 3 \omega_3 \omega_4 \omega_1 u^2 + \\
& 7 \omega_3 \omega_4 \omega_2 + 2 \omega_1 \omega_2 + \frac{1}{2} \omega_3 \omega_1 \omega_2 + \omega_3^2 \omega_2 + \frac{1}{2} \omega_3^2 \omega_2^2 - \frac{3}{2} \omega_1 + \frac{1}{2} \omega_3^2 \omega_1 u^2 + \omega_3 \omega_4 u^2 + \frac{1}{2} \omega_4^2 \omega_1 \omega_2 - 5 \omega_1 u - \omega_1^2 \omega_2 + \\
& \frac{1}{2} v^2 \omega_4^2 \omega_2 + \omega_3 \omega_4 \omega_1 \omega_2 + \frac{1}{2} \omega_4^2 + \frac{1}{2} \omega_3 \omega_4 \omega_2^2 - \frac{1}{2} \omega_3^2 \omega_1 u^2 \omega_2 - \omega_3 \omega_4 u^2 \omega_2 - \omega_3 \omega_2^2 \omega_2^2 - \frac{1}{2} \omega_3^2 u^2 \omega_2 + \frac{1}{2} \omega_3 \omega_1 \omega_2^2 + \\
& \omega_1^2 u - \frac{1}{2} v^2 \omega_4^2 - \frac{1}{2} \omega_4^2 \omega_1 u^2 \omega_2 - \frac{1}{2} \omega_4^2 \omega_1 u + v^2 \omega_4 \omega_2 - \frac{1}{2} v^2 \omega_3 \omega_1 - \omega_3 \omega_2^2 - 3 \omega_3 \omega_4 \omega_1 u^2 \omega_2 - 2 \omega_1^2 u^2 \omega_2 + \frac{1}{2} \omega_4 \omega_1 \omega_2^2 - \\
& 2 \omega_3 \omega_1 u^2 - \omega_3^2 \omega_4 u^2 - 3 \omega_3 \omega_2 \omega_2 - \frac{3}{2} \omega_3 \omega_2^2 \omega_2 - \frac{1}{2} \omega_3^2 \omega_1 + \frac{13}{4} \omega_4 \omega_2 + v^2 \omega_3 \omega_2^2 - \frac{3}{4} \omega_3 \omega_4 \omega_1 + v^2 \omega_3 \omega_1 \omega_2 + \frac{1}{2} \omega_3 \omega_1 \omega_2^2 + \\
& 6 \omega_1 \omega_2 + \omega_2^2 - 4 \omega_2 + \frac{5}{2} \omega_4 u - \frac{1}{2} \omega_4 \omega_1^2 u + \frac{1}{2} \omega_3^2 \omega_4 \omega_2 - \frac{9}{4} \omega_3 \omega_1 \omega_2 - \omega_1 \omega_2^2 + \omega_4 \omega_1^2 \omega_2^2 - \frac{1}{2} \omega_3^2 \omega_4 - \omega_4 \omega_1^2 u^2 + \\
& \frac{3}{2} \omega_3^2 \omega_4 u + \frac{7}{2} \omega_3 \omega_1 u + \omega_3 \omega_1^2 \omega_2 + \frac{1}{2} \omega_3 \omega_2^2 - \frac{1}{2} \omega_4 \omega_2^2 + \frac{1}{2} v^2 \omega_4^2 \omega_1 - v^2 \omega_3 \omega_2 - v^2 \omega_3 \omega_1 \omega_2^2 + \frac{3}{4} \omega_3^2 + 2 \omega_1^2 u^2 + \omega_4^2 \omega_1 \omega_2 + \\
& \frac{1}{2} \omega_4^2 \omega_1 u^2 - \frac{1}{2} v^2 \omega_4^2 \omega_1 \omega_2 + \frac{1}{2} \omega_3 \omega_4^2 \omega_2 - 4 \omega_4 \omega_1 \omega_2 - v^2 \omega_4 \omega_2^2 + \frac{19}{4} \omega_3 \omega_2 + \frac{3}{2} \omega_3 \omega_4 \omega_2 - 4 \omega_3 \omega_1 \omega_2 + \frac{5}{2} \omega_3 u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_1],t-3\delta_t} = & 2 v^2 \omega_3 \omega_4^2 \omega_1 u - 2 \omega_4 \omega_1 u^3 + v^2 \omega_3^2 \omega_2 + 4 \omega_3 c_s^2 \omega_1 u + 2 \omega_3 \omega_4 \omega_1 u + \omega_3 \omega_4^2 \omega_2 + \omega_3^2 u + 2 \omega_3 \omega_4^2 c_s^2 u + \\
& 2 \omega_3 \omega_4 u - \omega_4 \omega_1^2 \omega_2 - v^2 \omega_3^2 \omega_4 \omega_2 + 4 v^2 \omega_3 \omega_1 \omega_2 + v^2 \omega_3^2 u + \omega_4 \omega_1 \omega_2 - 2 v^2 \omega_4 \omega_1 \omega_2 + \omega_3 \omega_4 u^3 + \omega_3^2 \omega_4 u^3 \omega_2 - \\
& 2 v^2 \omega_4 \omega_1 \omega_2 + 4 v^2 \omega_4 \omega_1 \omega_2^2 + 4 \omega_3 \omega_1 u^3 \omega_2 + \omega_3^2 u^3 + 4 \omega_3 \omega_4 \omega_1 u^3 + 2 \omega_3^2 \omega_4 c_s^2 u - 4 \omega_3 c_s^2 \omega_1 \omega_2 + 2 \omega_4 \omega_1 u^3 \omega_2 + \\
& 2 v^2 \omega_3^2 \omega_4 \omega_1 u - 6 \omega_4 \omega_1 u + 4 \omega_3 \omega_4 c_s^2 \omega_1 \omega_2 + \omega_4^2 u - 2 \omega_3 \omega_4 \omega_2 - \omega_3^2 \omega_2 \omega_2 - 2 \omega_3 \omega_4 c_s^2 \omega_2 + v^2 \omega_3 \omega_4 \omega_2 - \\
& 2 v^2 \omega_3^2 \omega_1 u - v^2 \omega_3 \omega_4^2 \omega_2 - \omega_4^2 \omega_1 \omega_2 + 5 \omega_1 u + \omega_1^2 \omega_2 - 2 \omega_3 \omega_4 \omega_1 \omega_2 - 4 \omega_3 \omega_4 c_s^2 \omega_1 u - \omega_3^2 \omega_4 u^3 - \\
& 4 \omega_3 \omega_1 u^3 + 2 v^2 \omega_4^2 \omega_1 \omega_2 - \omega_1^2 u + \omega_4^2 \omega_1 u - v^2 \omega_3 \omega_4^2 \omega_2 + 4 \omega_4 \omega_1^2 \omega_2^2 - \omega_3 \omega_4^2 u^3 + \omega_3 \omega_2 \omega_2 - \\
& 4 v^2 \omega_1 \omega_2^2 + \omega_3 \omega_4^2 \omega_2 - 2 v^2 \omega_4^2 \omega_1 \omega_2 - 6 \omega_1 \omega_2 + 3 v^2 \omega_3 \omega_4 \omega_2 - \omega_4 \omega_1 - v^2 \omega_3^2 \omega_4 \omega_2 + \omega_4 \omega_1^2 u - 2 v^2 \omega_3 \omega_1 \omega_2 - \\
& 4 v^2 \omega_3 \omega_4 \omega_1 \omega_2 - 4 \omega_1^2 u^3 \omega_2 + \omega_1 \omega_2^2 - 2 \omega_3 \omega_4 c_s^2 \omega_2 - 4 \omega_3 \omega_4 \omega_1 u^3 \omega_2 + 2 \omega_4 \omega_1 u^3 - 2 \omega_4^2 \omega_1 \omega_2^2 - \\
& 2 v^2 \omega_3 \omega_4 \omega_1 \omega_2 + 4 \omega_1^2 u^3 - \omega_3^2 \omega_4 u - 2 \omega_3 \omega_1 u - 2 \omega_3 \omega_4 c_s^2 u - \omega_3^2 u^3 \omega_2 - 2 \omega_3^2 c_s^2 u - \omega_3 \omega_4 u^3 \omega_2 + 4 v^2 \omega_1 \omega_2 - \\
& 4 \omega_4 \omega_1^2 u^3 - \omega_4^2 \omega_1 \omega_2 + 2 \omega_3^2 c_s^2 \omega_2 + 7 \omega_4 \omega_1 \omega_2 + 2 \omega_3 \omega_4 c_s^2 \omega_2 - \omega_3 \omega_4^2 u + \omega_3^2 \omega_4 \omega_2 + 2 \omega_3 \omega_1 \omega_2 - \omega_3 u,
\end{aligned}$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_2],t-\delta_t} = & 3 + 5\omega_4\omega_1 - 2\omega_4\omega_1u^2\omega_2 - 2v^2\omega_2^2\omega_4\omega_1 - \omega_1\omega_2^2 - 6\omega_3\omega_1u^2\omega_2 - 2\omega_3^2\omega_4u^2\omega_2 + \omega_1^2 - 2v^2\omega_3\omega_4 + 4v^2\omega_1\omega_2^2 - \\ & 2v^2\omega_3\omega_2^2\omega_1 - 2v^2\omega_4\omega_1\omega_2 + 2\omega_4\omega_1u^2 - 2v^2\omega_3^2 + \omega_4\omega_1\omega_2^2 - 6\omega_4\omega_1\omega_2 - \omega_4^2\omega_2 - 2\omega_3\omega_4^2u^2\omega_2 - 4v^2\omega_2^2 - 4v^2\omega_4\omega_1\omega_2^2 - \\ & 4\omega_4 - 6v^2\omega_3\omega_4\omega_2 - 6\omega_3\omega_4\omega_1u^2 + 5\omega_1\omega_2 - 2\omega_3^2u^2 - 4\omega_1 - 2\omega_3\omega_4u^2 + 2v^2\omega_3\omega_4^2 - 2v^2\omega_4^2\omega_2 - \omega_4\omega_1^2 + \omega_4^2 - \\ & \omega_1^2\omega_2 + 2\omega_3\omega_4u^2\omega_2 + \omega_4^2\omega_1\omega_2 + 2\omega_3\omega_4^2u^2 + 2\omega_3^2u^2\omega_2 + 2\omega_4^2\omega_1u^2\omega_2 + 2v^2\omega_4\omega_2 + 2v^2\omega_3^2\omega_1 + 6\omega_3\omega_4\omega_1u^2\omega_2 + \\ & 4\omega_1^2u^2\omega_2 + 6\omega_3\omega_1u^2 + 2\omega_3^2\omega_4u^2 + 5\omega_4\omega_2 + \omega_4\omega_1^2\omega_2 - 6v^2\omega_3\omega_1\omega_2 + \omega_2^2 - 4\omega_2 + 2v^2\omega_3\omega_4\omega_1 - 4\omega_4\omega_1^2u^2\omega_2 + \\ & 4\omega_4\omega_1^2u^2 - \omega_4\omega_2^2 + 6v^2\omega_3\omega_2 + 6v^2\omega_3\omega_4\omega_1\omega_2 - 4\omega_1^2u^2 - 2\omega_4^2\omega_1u^2 + 2v^2\omega_4^2\omega_1\omega_2 + 4v^2\omega_4\omega_2^2 - \omega_4^2\omega_1 + 2v^2\omega_3^2\omega_4, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_i,y}^{[\mu_1,t-3\delta_t]} = & 1 - \frac{1}{2}\omega_3^2 w_4 c_s^2 - \frac{1}{4}\omega_4^2 u^3 + \frac{3}{2}w_4 w_1 u^3 + \frac{1}{4}v^2 w_3^2 u w_2 + \frac{5}{2}w_3 c_s^2 \omega_2 - w_3 c_s^2 w_1 u - 4w_1 u^2 + \frac{1}{4}\omega_4^2 u^2 \omega_2 + \frac{1}{4}\omega_4 w_1 - \\ & \frac{1}{4}w_3 + \frac{1}{2}w_3 w_4^2 c_s^2 \omega_2 - \frac{13}{4}w_4 w_1 u^2 \omega_2 - \frac{1}{4}w_3 w_4 \omega_2 + \frac{1}{4}w_3 w_4 w_1 u - \frac{1}{2}w_3 c_s^2 w_1 \omega_2 - \frac{1}{2}w_3 w_4^2 u^3 \omega_2 - \frac{13}{4}w_3 w_1 u^2 \omega_2 + \\ & \frac{1}{4}w_3^2 u - \frac{1}{2}w_3 w_4^2 c_s^2 u - \frac{1}{2}w_3^2 w_4 u^2 \omega_2 + \frac{1}{2}w_3 w_4 u + \frac{1}{4}w_3^2 w_1 u - w_1 u^2 \omega_2^2 - \frac{3}{2}v^2 w_3 w_1 u \omega_2 - \frac{1}{4}v^2 w_4 w_1 \omega_2 + \frac{11}{4}w_4 w_1 u^2 - \\ & \frac{1}{2}w_3 w_4^2 c_s^2 + \frac{1}{4}w_3 w_4 - \frac{1}{4}w_4^2 u^2 - \frac{1}{4}v^2 w_3^2 u - 2w_3 c_s^2 + \frac{1}{2}w_4 u \omega_2 + \frac{3}{2}v^2 w_4 w_1 u \omega_2 - \frac{3}{4}v^2 w_3^2 + \frac{1}{4}w_3 u^2 \omega_2^2 - \\ & \frac{1}{2}v^2 w_4 w_1 u + \frac{1}{4}v^2 w_4 w_1 + \frac{3}{4}v^2 w_3^2 \omega_2 - \frac{1}{2}w_3 w_4 u^3 - \frac{1}{2}w_3^2 w_4 u^3 \omega_2 + v^2 w_3 - \frac{5}{4}w_3 u^2 \omega_2 - \frac{1}{2}w_3^2 w_1 u^3 - v^2 w_4 w_1 u \omega_2^2 - \\ & \frac{3}{2}w_3 w_1 u^3 \omega_2 - \frac{1}{2}w_3 w_2^2 u^2 - \frac{1}{4}w_3^2 u^3 - \frac{1}{4}w_4 w_1 \omega_2 + \frac{1}{4}w_3 w_1 - \frac{1}{4}w_4^2 \omega_2 - \frac{1}{2}w_3 w_2^2 u^2 \omega_2 - 2w_3 w_4 w_1 u^3 - \frac{1}{2}w_3^2 w_4 c_s^2 u + \\ & w_3 c_s^2 w_1 u \omega_2 + v^2 w_3 w_1 u \omega_2 - \frac{3}{2}w_4 w_1 u^3 \omega_2 + 5w_1 u^2 \omega_2 - \frac{5}{4}w_4 - \frac{3}{4}w_4 w_1 u - w_3 w_4 c_s^2 w_1 u \omega_2 + \frac{1}{4}w_4^2 u + \frac{1}{4}w_4^2 u^3 \omega_2 + \\ & \frac{1}{2}w_3^2 w_4 c_s^2 \omega_2 - \frac{1}{2}w_3 w_4 w_1 u^2 - \frac{1}{2}w_3 w_4 u \omega_2 - \frac{1}{2}w_3 w_4 c_s^2 w_1 + \frac{1}{2}w_1 \omega_2 - \frac{1}{4}w_3^2 w_1 \omega_2 - \frac{1}{4}w_3^2 u \omega_2 + \frac{1}{4}v^2 w_4^2 u - \frac{1}{4}w_3^2 u^2 + \\ & w_3 w_1 u^3 - \frac{1}{2}w_1 + \frac{1}{2}w_3 w_1 u^2 \omega_2^2 - \frac{1}{2}w_3^2 w_1 u^2 + \frac{1}{2}w_3 w_4^2 c_s^2 u \omega_2 - \frac{5}{2}w_3 w_4 u^2 + \frac{1}{2}v^2 w_3^2 w_1 u + 2w_1 u - \frac{1}{2}w_3 c_s^2 \omega_2^2 + \\ & \frac{1}{2}w_4 w_1 u^2 \omega_2^2 - \frac{3}{4}v^2 w_4^2 \omega_2 - \frac{1}{4}v^2 w_3 w_1 - \frac{1}{4}w_3 w_4 w_1 \omega_2 + \frac{1}{4}w_4^2 + w_3 w_4 c_s^2 w_1 u + \frac{1}{2}w_3^2 w_1 u^2 \omega_2 + 3w_3 w_4 u^2 \omega_2 + \\ & \frac{1}{2}w_3 w_4^2 u^2 + \frac{1}{4}w_3^2 u^2 \omega_2 + w_3 u^2 + \frac{1}{2}w_3^2 w_4 u^3 + \frac{3}{2}w_3 w_1 u^3 - \frac{1}{4}v^2 w_4^2 u \omega_2 - \frac{1}{2}w_3 w_1 u \omega_2^2 - w_3 w_1^2 u^3 \omega_2 + \frac{3}{4}v^2 w_4^2 + \\ & \frac{1}{2}w_3 w_4 c_s^2 w_1 \omega_2 + \frac{1}{2}w_4^2 w_1 u^2 \omega_2 + \frac{1}{4}v^2 w_4 w_2 + \frac{1}{4}w_3 \omega_2^2 - w_4 w_1 u^3 \omega_2 + \frac{1}{2}w_3 w_4 w_1 u^2 \omega_2 - w_1^2 u^2 \omega_2 + \frac{11}{4}w_3 w_1 u^2 + \\ & \frac{1}{2}w_3^2 w_4 u^2 + \frac{1}{2}w_3 w_4^2 u^3 + \frac{1}{2}w_3 u \omega_2 + \frac{1}{2}w_3 c_s^2 w_1 + \frac{1}{2}v^2 w_4^2 w_1 u \omega_2 + \frac{3}{2}w_4 \omega_2 - \frac{3}{4}v^2 w_3 \omega_2^2 + \frac{1}{4}v^2 w_3 w_1 \omega_2 - \frac{5}{2}w_1 u \omega_2 + \\ & \frac{1}{2}w_3 w_4 c_s^2 \omega_2^2 - w_2 + \frac{1}{4}w_4 u^2 \omega_2^2 - \frac{1}{2}w_4 u - \frac{1}{2}v^2 w_3^2 w_1 u \omega_2 + \frac{1}{2}v^2 w_3 w_1 u - \frac{1}{4}w_3 w_1 \omega_2 + 2w_1^2 u^3 \omega_2 + \frac{1}{2}w_1 u \omega_2^2 + \\ & \frac{1}{2}w_3^2 w_4 c_s^2 u \omega_2 + \frac{1}{2}w_4 w_1 u^2 \omega_2 + 2w_3 w_4 w_1 u^3 \omega_2 - 3w_3 w_4 c_s^2 \omega_2 + w_4 u^2 + \frac{1}{2}w_3^2 c_s^2 - \frac{1}{2}w_4^2 w_1 u^3 - \frac{1}{2}w_3^2 c_s^2 \omega_2 + \\ & \frac{1}{2}w_4 w_1 u^3 \omega_2 - \frac{5}{4}w_4 u^2 \omega_2 - 2w_1^2 u^3 + \frac{5}{2}w_3 w_4 c_s^2 - \frac{1}{2}w_4 w_1^2 u^2 - \frac{7}{4}w_3 w_1 u + \frac{1}{2}w_3 w_2^2 u^2 \omega_2 + \frac{1}{2}w_3 w_4 c_s^2 u + \frac{1}{4}w_3^2 u^3 \omega_2 - \\ & \frac{1}{4}w_4 w_2^2 + \frac{1}{2}w_3^2 c_s^2 u - \frac{1}{4}v^2 w_3 w_2 + \frac{1}{2}w_3 w_4 u^3 \omega_2 + \frac{1}{2}w_3^2 w_1 u^3 \omega_2 + w_4 w_1^2 u^3 - v^2 w_4 + w_1^2 u^2 - \frac{1}{4}w_4^2 u \omega_2 - \frac{1}{2}w_4^2 w_1 u^2 - \\ & \frac{1}{2}w_3^2 c_s^2 u \omega_2 + \frac{3}{4}w_4 w_1 u \omega_2 + \frac{3}{4}v^2 w_4 w_2^2 - \frac{1}{2}w_3 w_4 u^2 \omega_2^2 - \frac{1}{2}w_3 w_4 c_s^2 u \omega_2 - \frac{1}{2}v^2 w_4^2 w_1 u + \frac{9}{4}w_3 w_1 u \omega_2 - \frac{1}{2}w_3 u, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta t, y}^{[\mu_2], t-3\delta t} = & 3 + \frac{3}{4}w_3 w_4 w_1 w_2 - \frac{1}{2}w_4^2 u^2 w_2 - \frac{3}{4}w_3^2 w_2 + \frac{3}{4}w_4 w_1 - \frac{15}{4}w_3 + 2w_4 w_1 u^2 w_2 - \frac{15}{4}w_3 w_4 w_2 + \frac{1}{4}w_3^2 w_1 w_2 + w_3 w_4 w_1 u - \\ & \frac{1}{2}w_1 w_2^2 + w_3 w_4 u w_2^2 + 2w_3 w_1 u^2 w_2 + w_3^2 u + w_3^2 w_4 u^2 w_2 + 6w_3 w_4 u + \frac{1}{2}w_3^2 w_1 u - \frac{1}{2}w_4 w_1^2 u w_2 - v^2 w_4 w_1 w_2 - 2w_4 w_1 u^2 + \\ & \frac{13}{4}w_3 w_4 + \frac{1}{2}w_4^2 u^2 + 3w_4 u w_2 - \frac{1}{2}w_3 w_1^2 u w_2 + \frac{1}{2}v^2 w_3^2 + \frac{1}{2}w_3 w_1^2 u - \frac{1}{2}v^2 w_3^2 w_2 - w_3 w_1^2 u^2 - \frac{3}{4}w_4 w_1 w_2 + \frac{7}{4}w_3 w_1 - \\ & \frac{1}{2}w_4^2 w_2 + w_3 w_4 u^2 w_2 + v^2 w_4 w_1 w_2^2 - \frac{1}{2}w_3 w_4^2 - \frac{11}{4}w_4 - \frac{7}{2}w_4 w_1 u - \frac{1}{2}w_4 u w_2^2 + w_4^2 u + \frac{1}{2}v^2 w_3^2 w_1 w_2 + 3w_3 w_4 w_1 u^2 - \\ & 7w_3 w_4 u w_2 + 2w_1 w_2 - \frac{1}{2}w_3^2 w_1 u w_2 - w_3^2 u w_2 + \frac{1}{2}w_3^2 u^2 - \frac{3}{2}w_1 + \frac{1}{2}w_3^2 w_1 u^2 + w_3 w_4 u^2 - \frac{1}{2}w_4^2 w_1 u w_2 + 5w_1 u + w_1^2 u w_2 + \\ & \frac{1}{2}v^2 w_4^2 w_2 - w_3 w_4 w_1 u w_2 + \frac{1}{2}w_4^2 + \frac{1}{2}w_3 w_4 w_2^2 - \frac{1}{2}w_3^2 w_1 u^2 w_2 - w_3 w_4 u^2 w_2 - w_3 w_4^2 u^2 - \frac{1}{2}w_3^2 u^2 w_2 - \frac{1}{2}w_3 w_1 u w_2^2 - \\ & w_1^2 u - \frac{1}{2}v^2 w_4^2 - \frac{1}{2}w_4^2 w_1 u^2 w_2 + \frac{1}{2}w_4^2 w_1 u + v^2 w_4 w_2 - \frac{1}{2}v^2 w_3^2 w_1 - w_3 w_2^2 - 3w_3 w_4 w_1 u^2 w_2 - 2w_2^2 u^2 w_2 - \frac{1}{2}w_4 w_1 u w_2^2 - \\ & 2w_3 w_1 u^2 - w_3^2 w_4 u^2 + 3w_3 u w_2 + \frac{3}{2}w_3 w_4^2 u w_2 - \frac{1}{4}w_3^2 w_1 + \frac{13}{4}w_4 w_2 + v^2 w_3 w_2^2 - \frac{3}{4}w_3 w_4 w_1 + v^2 w_3 w_1 w_2 + \frac{1}{2}w_3 w_1 w_2^2 - \\ & 6w_1 u w_2 + w_2^2 - 4w_2 - \frac{5}{2}w_4 u + \frac{1}{2}w_4 w_1^2 u + \frac{1}{2}w_3^2 w_4 w_2 - \frac{9}{4}w_3 w_1 w_2 + w_1 u w_2^2 + w_4 w_1^2 u^2 w_2 - \frac{1}{2}w_3^2 w_4 - w_4 w_1^2 u^2 - \\ & \frac{3}{2}w_3^2 w_4 u - \frac{7}{2}w_3 w_1 u + w_3 w_1^2 u^2 w_2 - \frac{1}{2}w_3 w_1 u w_2^2 - \frac{1}{2}w_4 w_2^2 + \frac{1}{2}v^2 w_4^2 w_1 - v^2 w_3 w_2 - v^2 w_3 w_1 w_2^2 + \frac{3}{4}w_3^2 + 2w_1^2 u^2 - w_4^2 u w_2 + \\ & \frac{1}{2}w_4^2 w_1 u^2 - \frac{1}{2}v^2 w_4^2 w_1 w_2 + \frac{1}{2}w_3 w_4^2 w_2 + 4w_4 w_1 u w_2 - v^2 w_4 w_2^2 + \frac{19}{4}w_3 w_2 - \frac{3}{2}w_3 w_4^2 u + \frac{3}{2}w_3 w_4 u w_2 + 4w_3 w_1 u w_2 - \frac{5}{2}w_3 u, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y+\delta t}^{[\mu],t-\delta t} = & -v^2\omega_3\omega_2^2\omega_1u - \frac{7}{2}vw_4\omega_1uw_2 + \frac{1}{4}\omega_4^2u^3 - \frac{1}{2}\omega_4\omega_1u^3 - \frac{3}{4}v^2\omega_3^2uw_2 - \omega_3c_s^2\omega_1u - vw_3\omega_4^2u - \frac{7}{2}vw_3\omega_1uw_2 + \\ & \frac{17}{4}\omega_3\omega_4\omega_1u + \frac{1}{2}vw_3^2\omega_4uw_2 - vw_3\omega_4\omega_1^2u + \frac{3}{4}\omega_3^2u - \frac{1}{2}\omega_3\omega_4^2c_s^2u + \frac{3}{2}\omega_3\omega_4u + \frac{3}{4}\omega_3^2\omega_1u + \frac{1}{2}v^2\omega_3^2\omega_4uw_2 - \\ & \frac{1}{2}v^2\omega_3\omega_1uw_2 - \frac{7}{2}vw_3\omega_1u - vw_3^2\omega_4u - \frac{1}{4}v^2\omega_3^2u + \frac{1}{2}\omega_4uw_2 - \frac{1}{2}v^2\omega_4\omega_1uw_2 - vw_1uw_2^2 - \frac{1}{2}\omega_3\omega_1^2uw_2 - \\ & \frac{3}{2}vw_3\omega_4^2\omega_1u + \frac{1}{2}v^2\omega_4\omega_1u + \omega_3\omega_1^2u + \frac{1}{2}\omega_3^2\omega_1u^3 + v^2\omega_4uw_2 + 6vw_1uw_2 - v^2\omega_4\omega_1uw_2^2 - \frac{1}{2}\omega_3\omega_1u^3\omega_2 + \\ & \frac{1}{2}vw_3\omega_4^2uw_2 - \frac{1}{4}\omega_3^2u^3 + \frac{1}{2}vw_4\omega_1^2u - \frac{1}{2}\omega_3^2\omega_4c_s^2u + \omega_3c_s^2\omega_1uw_2 - v^2\omega_3\omega_1uw_2^2 - \frac{1}{2}vw_3\omega_2u + \frac{1}{2}\omega_4\omega_1u^3\omega_2 - \\ & v^2\omega_3^2\omega_4\omega_1u - \frac{17}{4}\omega_4\omega_1u - \omega_3\omega_4c_s^2\omega_1uw_2 + \frac{3}{4}\omega_2^2u - \frac{1}{4}\omega_4^2u^3\omega_2 + vw_4^2\omega_1u + \frac{1}{2}vw_3\omega_1uw_2^2 - \frac{1}{2}\omega_3\omega_4uw_2 - \\ & \frac{3}{2}vw_3^2\omega_4\omega_1u - \frac{1}{4}\omega_2^2\omega_1uw_2 - \frac{1}{4}\omega_3^2\omega_2u - \frac{1}{4}v^2\omega_4^2u - \omega_3\omega_1^2u^3 + \frac{1}{2}\omega_3\omega_4^2c_s^2uw_2 - \frac{1}{2}v^2\omega_3\omega_4u + \frac{1}{2}v^2\omega_3^2\omega_1u + \\ & \frac{1}{2}vw_4\omega_1uw_2^2 + \frac{1}{2}v^2\omega_3\omega_4^2uw_2 + 5w_1u + \frac{1}{2}\omega_1^2uw_2 - \frac{3}{4}\omega_3\omega_4\omega_1uw_2 + \omega_3\omega_4c_s^2\omega_1u - \frac{1}{2}\omega_3^2\omega_4\omega_1u + \frac{1}{2}vw_3^2\omega_1uw_2 + \\ & \frac{1}{2}\omega_3\omega_1u^3 - \frac{3}{4}v^2\omega_4^2uw_2 - vw_1^2\omega_2u + \omega_3\omega_1^2u^3\omega_2 - \omega_1^2u + \frac{1}{2}\omega_4^2\omega_1u + \frac{1}{2}v^2\omega_3\omega_4^2u + \frac{1}{2}vw_4^2\omega_1uw_2 - \omega_4\omega_1^2u^3\omega_2 + \\ & \frac{1}{2}\omega_3\omega_2u + \frac{1}{2}vw_4^2u + 2v^2\omega_1\omega_2^2 + \frac{1}{2}v^2\omega_4^2\omega_1uw_2 - \frac{7}{2}vw_4\omega_1u - \frac{5}{2}\omega_1\omega_2u - \frac{3}{2}v^2\omega_3\omega_4\omega_2u - \omega_4u + \frac{1}{2}v^2\omega_3^2\omega_1\omega_2 + \\ & \frac{1}{2}v^2\omega_3^2\omega_4u + \frac{1}{2}\omega_4\omega_1^2u + \frac{1}{2}v^2\omega_3\omega_1u + 2v^2\omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}vw_3\omega_1^2u + \frac{1}{2}\omega_3^2\omega_4c_s^2\omega_2 - \frac{1}{2}\omega_4^2\omega_1u^3 + \frac{1}{2}\omega_4^2\omega_1u^3\omega_2 + \\ & v^2\omega_3\omega_2u + \frac{1}{2}vw_4\omega_1^2\omega_2 - \frac{1}{2}\omega_3^2\omega_4u - \frac{21}{4}\omega_3\omega_1u + \frac{1}{2}\omega_3\omega_4c_s^2u + \frac{1}{4}\omega_3^2\omega_3^2\omega_2 + \frac{1}{2}\omega_3^2c_s^2u - \frac{1}{2}vw_4\omega_2u - \end{aligned}$$

$$\begin{aligned}
& \frac{1}{2}\omega_3^2\omega_1u^3\omega_2 - 2v^2\omega_1u\omega_2 + \frac{1}{2}v\omega_3\omega_1^2u\omega_2 - \frac{1}{2}\omega_3\omega_4^2\omega_1u + \omega_4\omega_1^2u^3 + \frac{1}{2}v\omega_3^2u - \frac{1}{4}\omega_4^2u\omega_2 + v\omega_3^2\omega_1u - \frac{1}{2}\omega_3^2c_s^2u\omega_2 + \\ 
& v\omega_3\omega_4u + \frac{5}{4}\omega_4\omega_1u\omega_2 - \frac{1}{2}\omega_3\omega_4c_s^2u\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1^2u + \frac{1}{2}v^2\omega_4^2\omega_1u - \frac{1}{2}\omega_3\omega_4^2u + \frac{9}{4}\omega_3\omega_1u\omega_2 + 8v\omega_3\omega_4\omega_1u - \omega_3u, \\ 
\alpha_{x,y+\delta_l}^{[\mu_2],t-3\delta_t} &= 3 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 - \frac{5}{2}v\omega_4 + \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{1}{4}\omega_3^2\omega_2 + \frac{13}{4}\omega_4\omega_1 - \frac{15}{4}\omega_3 - \omega_4\omega_1u^2\omega_2 + v^2\omega_3^2\omega_4\omega_1 - \frac{3}{4}\omega_3\omega_4\omega_2 + \\ 
& \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{7}{2}v\omega_3\omega_2 - v\omega_4^2\omega_1 + \omega_3\omega_1u^2\omega_2 + \omega_1^2 + v^2\omega_3\omega_4 - 2v^2\omega_1\omega_2^2 + \frac{1}{2}v\omega_4\omega_2^2 + v^2\omega_3\omega_4^2\omega_1 + 2v^2\omega_4\omega_1\omega_2 + \\ 
& \frac{1}{2}\omega_3\omega_1^2\omega_2 + v\omega_3\omega_4\omega_1^2 + \omega_4\omega_1u^2 + \frac{13}{4}\omega_3\omega_4 - \frac{1}{2}\omega_4^2u^2 + \frac{1}{2}v^2\omega_3^2 + 4v\omega_3\omega_1\omega_2 - \frac{3}{2}v\omega_3^2\omega_4 - \omega_3\omega_1^2 + \frac{1}{2}v^2\omega_3^2\omega_2 + \\ 
& \omega_3\omega_1^2u^2 - \frac{1}{2}v\omega_3\omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_4^2\omega_1 - \frac{3}{4}\omega_4\omega_1\omega_2 + \frac{19}{4}\omega_3\omega_1 - v\omega_3^2\omega_1 - \frac{7}{2}v\omega_4\omega_2 + 2v^2\omega_2^2 + v^2\omega_4\omega_1\omega_2^2 - \frac{1}{2}\omega_3\omega_4^2 - \\ 
& \frac{11}{4}\omega_4 - 7v\omega_3\omega_4\omega_1 - \frac{1}{2}v\omega_4\omega_1^2\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_1 + 3v^2\omega_3\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1\omega_2 + 2\omega_1\omega_2 + \frac{1}{2}v\omega_3\omega_2^2 + \frac{1}{2}\omega_3^2u^2 - 4\omega_1 - \\ 
& \frac{5}{2}\omega_3^2\omega_1u^2 - v^2\omega_3\omega_4^2 - \frac{1}{2}v\omega_4^2\omega_1\omega_2 + v\omega_4^2 + \frac{1}{2}v^2\omega_4^2\omega_2 - \frac{1}{2}\omega_4\omega_1^2 + v\omega_1^2\omega_2 + \frac{1}{2}\omega_4^2 - \frac{1}{2}\omega_1^2\omega_2 - \frac{1}{2}v\omega_4\omega_1^2 + \frac{1}{2}\omega_3^2\omega_1u^2\omega_2 - \\ 
& \frac{1}{2}\omega_3^2u^2\omega_2 + \frac{1}{2}v^2\omega_4^2 - \frac{1}{2}\omega_4^2\omega_1u^2\omega_2 + \frac{3}{2}v\omega_3^2\omega_4\omega_1 - 2v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1 - 6v\omega_1\omega_2 - \omega_3\omega_1u^2 - \frac{3}{2}v\omega_3\omega_4^2 - \frac{5}{2}v\omega_3 - \\ 
& \frac{3}{4}\omega_3\omega_1 + \frac{3}{4}\omega_4\omega_2 - v^2\omega_3\omega_2^2 - \frac{15}{4}\omega_3\omega_4\omega_1 + 2v^2\omega_3\omega_1\omega_2 - v\omega_2^2 + 3v\omega_3\omega_1 + \frac{1}{2}v\omega_4^2\omega_2 - \frac{3}{2}\omega_2 + \frac{3}{2}v\omega_3\omega_4^2\omega_1 + 4v\omega_4\omega_1\omega_2 + \\ 
& 5v\omega_2 - v^2\omega_3\omega_4\omega_1 - \frac{9}{4}\omega_3\omega_1\omega_2 - \frac{1}{2}v\omega_3\omega_2^2 + \omega_4\omega_1^2u^2\omega_2 - \frac{1}{2}\omega_3^2\omega_4 - \frac{1}{2}v\omega_4\omega_1\omega_2^2 - \omega_4\omega_1^2u^2 + 6v\omega_3\omega_4 - \frac{1}{2}v\omega_3\omega_1\omega_2 - \\ 
& \omega_3\omega_1^2u^2\omega_2 + v\omega_3^2 - \frac{1}{2}v^2\omega_4^2\omega_1 - 2v^2\omega_3\omega_2 - 3v^2\omega_3\omega_4\omega_1\omega_2 + v^2\omega_3\omega_1\omega_2^2 + \frac{3}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_4\omega_1^2 + \frac{1}{2}\omega_4^2\omega_1u^2 - \frac{1}{2}v^2\omega_4^2\omega_1\omega_2 + \\ 
& v\omega_1\omega_2^2 - v\omega_3\omega_4\omega_1\omega_2 - v^2\omega_4\omega_2^2 + \frac{7}{4}\omega_3\omega_2 - \frac{1}{2}\omega_4^2\omega_1 + \frac{1}{2}v\omega_3^2\omega_2 + 3v\omega_4\omega_1 - \frac{1}{2}v\omega_3^2\omega_1\omega_2 + v\omega_3\omega_4\omega_2 - v^2\omega_3^2\omega_4, \\ 
\alpha_{x,y}^{[\mu_1],t-4\delta_t} &= -\omega_3\omega_4\omega_1u\omega_2^2 - 8\omega_3\omega_4\omega_1u - \omega_3^2u - 2\omega_3\omega_4u - \omega_3^2\omega_1u + \omega_4\omega_1^2u\omega_2 - \omega_4u\omega_2 + \omega_3\omega_1^2u\omega_2 - \omega_3\omega_1^2u - \\ 
& \omega_3^2\omega_4\omega_1u\omega_2 + 7\omega_4\omega_1u - \omega_4^2u + 2\omega_3\omega_4u\omega_2 + \omega_3^2\omega_1u\omega_2 + \omega_3^2u\omega_2 + \omega_4^2\omega_1u\omega_2 - 6\omega_1u - \omega_1^2u\omega_2 + \\ 
& 9\omega_3\omega_4\omega_1u\omega_2 + \omega_3^2\omega_4\omega_1u + \omega_3\omega_1u\omega_2^2 + \omega_1^2u - \omega_4^2\omega_1u + \omega_4\omega_1u\omega_2^2 - \omega_3u\omega_2 - \omega_3\omega_4^2u\omega_2 + 7\omega_1u\omega_2 - \\ 
& \omega_3\omega_4\omega_1^2u\omega_2 + \omega_4u - \omega_4\omega_1^2u - \omega_1u\omega_2^2 + \omega_3^2\omega_4u + 7\omega_3\omega_1u + \omega_3\omega_4^2\omega_1u - \omega_3\omega_4^2\omega_1u\omega_2 + \omega_4^2u\omega_2 - 8\omega_4\omega_1u\omega_2 + \\ 
& \omega_3\omega_4\omega_1^2u + \omega_3\omega_4^2u - \omega_3^2\omega_4u\omega_2 - 8\omega_3\omega_1u\omega_2 + \omega_3u, \\ 
\alpha_{x,y}^{[\mu_2],t-4\delta_t} &= -4 - 8\omega_3\omega_4\omega_1\omega_2 + \omega_3^2\omega_2 - 6\omega_4\omega_1 + 5\omega_3 + 7\omega_3\omega_4\omega_2 - \omega_3^2\omega_1\omega_2 + \omega_1\omega_2^2 - \omega_1^2 - \omega_3\omega_1^2\omega_2 - 6\omega_3\omega_4 - \omega_4\omega_1\omega_2^2 + \\ 
& \omega_3\omega_1^2 - \omega_3\omega_4^2\omega_1 + 7\omega_4\omega_1\omega_2 - 6\omega_3\omega_1 + \omega_4^2\omega_2 + \omega_3\omega_4^2 + 5\omega_4 - \omega_3^2\omega_4\omega_1 - 6\omega_1\omega_2 + 5\omega_1 + \omega_3\omega_4\omega_1\omega_2^2 + \omega_4\omega_1^2 - \\ 
& \omega_4^2 - \omega_3\omega_4\omega_2^2 + \omega_1^2\omega_2 - \omega_4^2\omega_1\omega_2 + \omega_3^2\omega_4\omega_1\omega_2 + \omega_3\omega_2^2 + \omega_3^2\omega_1 - 6\omega_4\omega_2 + 7\omega_3\omega_4\omega_1 - \omega_4\omega_1^2\omega_2 - \omega_3\omega_1\omega_2^2 - \omega_2^2 + \\ 
& 5\omega_2 - \omega_3^2\omega_4\omega_2 + 7\omega_3\omega_1\omega_2 + \omega_3^2\omega_4 + \omega_3\omega_4^2\omega_1\omega_2 + \omega_4\omega_2^2 - \omega_3^2 - \omega_3\omega_4\omega_1^2\omega_2 + \omega_3\omega_4\omega_1\omega_2 - 6\omega_3\omega_2 + \omega_4^2\omega_1, 
\end{aligned}$$

#### 8.4 EFDE for $\mu_3$

$$\mu_{3,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_3],t-\ell\delta_t} \mu_{3,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_1],t} &= 1 + \frac{1}{2}v\omega_4 - \frac{1}{4}\omega_3 + v^2\omega_2 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_4 - \frac{1}{4}\omega_3u^2 + \frac{1}{2}v\omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}v\omega_2 + \frac{1}{4}\omega_4u^2 - \frac{1}{4}v^2\omega_4. \\ 
\alpha_{x,y+\delta_l}^{[\mu_1],t} &= -1 + \frac{1}{2}v\omega_4 + \frac{1}{4}\omega_3 - v^2\omega_2 - \frac{1}{2}\omega_3c_s^2 + \frac{1}{4}v^2\omega_3 + \frac{1}{4}\omega_4 + \frac{1}{4}\omega_3u^2 + \frac{1}{2}v\omega_3 + \frac{1}{2}\omega_2 - \frac{1}{2}v\omega_2 - \frac{1}{4}\omega_4u^2 + \frac{1}{4}v^2\omega_4. \\ 
\alpha_{x-\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{8}\omega_4^2u^3 - \frac{1}{2}\omega_4\omega_1u^3 + \frac{1}{4}\omega_3c_s^2\omega_2 - \frac{1}{2}v\omega_4 - \omega_1u^2 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_3 - \frac{1}{4}v\omega_3\omega_2 - \frac{1}{8}\omega_3^2u - \frac{1}{8}v^2\omega_3\omega_4 + \\ 
& \frac{1}{4}\omega_3\omega_4u + \frac{1}{4}v\omega_3\omega_1u + \frac{3}{4}\omega_4\omega_1u^2 + \frac{1}{4}v^3\omega_4\omega_2 - \frac{1}{8}\omega_3\omega_4 - \frac{3}{8}\omega_4^2u^2 - \frac{1}{8}v^2\omega_3^2u - \frac{1}{2}\omega_3c_s^2 + \frac{1}{4}\omega_4u\omega_2 - \frac{1}{4}v\omega_3^2c_s^2 - \\ 
& \frac{1}{4}v\omega_3\omega_4c_s^2 - \frac{1}{4}v\omega_4u^2\omega_2 + \frac{1}{4}v^2\omega_3 - \frac{1}{8}\omega_3u^2\omega_2 - \frac{1}{2}v\omega_1u\omega_2 - \frac{1}{8}\omega_3^2u^3 - \frac{1}{4}v\omega_4\omega_2 + \frac{1}{2}v\omega_3\omega_2 + \frac{1}{2}\omega_1u^2\omega_2 - \\ 
& \frac{1}{5}v\omega_3\omega_1u^2 + \frac{3}{8}\omega_4 + \frac{3}{8}\omega_4^2u - \frac{1}{4}\omega_1\omega_2 + \frac{1}{8}v^3\omega_3^2 - \frac{1}{8}v^2\omega_2^2u + \frac{1}{4}\omega_3^2u^2 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_3\omega_4u^2 - \frac{1}{4}v^3\omega_3\omega_2 + \frac{1}{4}v^2\omega_3\omega_4u + \\ 
& \frac{1}{2}\omega_1u + \frac{1}{8}v\omega_4^2 - \frac{1}{8}\omega_2^2 + \frac{1}{4}\omega_3u^2 + \frac{1}{2}\omega_3\omega_1u^3 + \frac{1}{8}v\omega_2^2u^2 + \frac{1}{8}v^2\omega_4^2u^2 + \frac{1}{4}v\omega_3\omega_4u^2 + \frac{1}{8}v^2\omega_4\omega_2 - \frac{1}{2}v\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u^2 + \\ 
& v\omega_1u^2\omega_2 + \frac{1}{4}\omega_3u\omega_2 - \frac{1}{4}v\omega_4^2u - \frac{1}{2}v\omega_3 - \frac{1}{8}\omega_4\omega_2 + \frac{1}{4}v\omega_4\omega_1u - \frac{1}{4}\omega_1u\omega_2 + \frac{1}{4}v\omega_3\omega_1 - \frac{1}{4}v\omega_3u^2\omega_2 + \frac{1}{2}\omega_2 - \omega_4u + \\ 
& v\omega_2 + \frac{1}{4}\omega_4u^2 - \frac{1}{8}\omega_4u^2\omega_2 - \frac{1}{8}\omega_4^2u^2 + \frac{1}{4}v^3\omega_4^2 + \frac{1}{4}\omega_3\omega_4c_s^2 + \frac{1}{4}v\omega_3\omega_4 - \frac{1}{4}\omega_3\omega_1u + \frac{1}{8}v\omega_3^2 + \frac{1}{8}v\omega_4^2u^2 - \frac{1}{4}\omega_3\omega_4c_s^2u + \\ 
& \frac{1}{4}\omega_3^2c_s^2u + \frac{1}{2}v\omega_4u\omega_2 - \frac{1}{8}v^2\omega_3\omega_2 - \frac{1}{2}v\omega_4\omega_1u^2 - \frac{1}{4}v\omega_3^2u - \frac{1}{4}v^2\omega_4 - \frac{1}{2}v\omega_3\omega_4u - \frac{1}{8}\omega_3\omega_2 + \frac{1}{4}v\omega_4\omega_1 + \frac{1}{2}v\omega_3c_s^2\omega_2, 
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_3], t-\delta_t} &= 1 + v\omega_4 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}v\omega_3\omega_2 - \frac{1}{2}v\omega_3\omega_1u - \frac{1}{2}\omega_4\omega_1u^2 + \frac{1}{4}\omega_4^2u^2 - \frac{1}{4}\omega_4u\omega_2 - \frac{1}{4}v^2\omega_3^2 + v\omega_1u\omega_2 + \\
&\quad \frac{1}{4}v\omega_4\omega_2 - \frac{1}{2}v\omega_3u\omega_2 - \omega_4 + \frac{1}{4}\omega_4\omega_1u - \frac{1}{2}\omega_4^2u + \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_3^2u^2 - \frac{1}{2}\omega_1 - \omega_1u - \frac{1}{2}v\omega_4^2 + \frac{1}{4}\omega_4^2 + \frac{1}{4}v^2\omega_4^2 - \\
&\quad \frac{1}{2}v^2\omega_4\omega_2 + \frac{1}{2}v\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1u^2 - \frac{1}{4}\omega_3u\omega_2 + \frac{1}{2}v\omega_4^2u + \frac{1}{4}\omega_4\omega_2 - \frac{1}{2}v\omega_4\omega_1u + \frac{1}{2}\omega_1u\omega_2 - \frac{1}{4}v\omega_3\omega_1 - \frac{1}{2}\omega_2 + \\
&\quad \omega_4u - v\omega_2 + \frac{1}{4}\omega_3\omega_1u - \frac{1}{2}v\omega_4u\omega_2 + \frac{1}{2}v^2\omega_3\omega_2 + \frac{1}{2}v\omega_3^2u - \frac{1}{4}v\omega_4\omega_1, \\
\alpha_{x, y-\delta_l}^{[\mu_1], t-\delta_t} &= -1 - \omega_3c_s^2\omega_2 - \frac{1}{2}v\omega_4 + 2\omega_1u^2 + \frac{1}{4}\omega_3 - 2v^3\omega_2^2 + \frac{1}{4}v^2\omega_3\omega_4 + 2v^2\omega_2 - \frac{1}{2}\omega_4\omega_1u^2 + v^3\omega_4\omega_2 + 2\omega_3c_s^2 + \\
&\quad v\omega_3^2c_s^2 + \frac{1}{4}v^2\omega_3^2 + v\omega_3\omega_4c_s^2 - v^2\omega_3 + \frac{1}{2}\omega_3u^2\omega_2 - \omega_1u^2\omega_2 - v^2\omega_2^2 + v\omega_3\omega_1u^2 + \frac{1}{4}\omega_4 - \frac{1}{2}v^3\omega_3^2 + \frac{1}{4}\omega_3^2u^2 + \\
&\quad \frac{1}{4}\omega_3\omega_4u^2 + 2v^3\omega_3\omega_2 - \omega_3u^2 - \frac{1}{2}v\omega_3^2u^2 - \frac{1}{2}v\omega_3\omega_4u^2 - \frac{1}{2}\omega_3\omega_1u^2 - 2v\omega_1u^2\omega_2 - \frac{1}{2}v\omega_3 - \\
&\quad \frac{1}{2}v^3\omega_3\omega_4 + v\omega_3u^2\omega_2 + \frac{1}{2}\omega_2 + v\omega_2 - \frac{1}{2}\omega_3^2c_s^2 + v\omega_4\omega_1u^2 - 2v\omega_3c_s^2\omega_2, \\
\alpha_{x, y-\delta_l}^{[\mu_3], t-\delta_t} &= 1 + \frac{1}{2}v\omega_4 - \frac{5}{4}\omega_3 + \frac{1}{2}v\omega_3\omega_2 + v^2\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_4 + v^2\omega_3^2 + \frac{1}{2}v\omega_4\omega_2 + 2v^2\omega_2^2 - \frac{1}{4}\omega_4 - v^2\omega_4\omega_2 + \frac{5}{2}v\omega_3 + \\
&\quad v\omega_2^2 - \frac{1}{2}\omega_2 - 3v\omega_2 - v\omega_3\omega_4 - v\omega_3^2 - 3v^2\omega_3\omega_2 + \frac{1}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_2, \\
\alpha_{x+\delta_l, y-\delta_l}^{[\mu_1], t-\delta_t} &= -1 - \frac{1}{8}\omega_4^2u^3 + \frac{1}{2}\omega_4\omega_1u^3 + \frac{1}{4}\omega_3c_s^2\omega_2 - \frac{1}{2}v\omega_4 - \omega_1u^2 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_3 - \frac{1}{4}v\omega_3\omega_2 + \frac{1}{8}\omega_3^2u - \frac{1}{8}v^2\omega_3\omega_4 - \\
&\quad \frac{1}{4}\omega_3\omega_4u - \frac{1}{4}v\omega_3\omega_1u + \frac{3}{4}\omega_4\omega_1u^2 + \frac{1}{4}v^3\omega_4\omega_2 - \frac{1}{8}\omega_3\omega_4 - \frac{3}{8}\omega_4^2u^2 + \frac{1}{8}v^2\omega_3^2u - \frac{1}{2}\omega_3c_s^2 - \frac{1}{4}\omega_4u\omega_2 - \frac{1}{4}v\omega_3^2c_s^2 - \\
&\quad \frac{1}{4}v\omega_3\omega_4c_s^2 - \frac{1}{4}v\omega_4u^2\omega_2 + \frac{1}{4}v^2\omega_3 - \frac{1}{8}\omega_3u^2\omega_2 + \frac{1}{8}v\omega_1u\omega_2 + \frac{1}{8}\omega_3^2u^3 - \frac{1}{4}v\omega_4\omega_2 - \frac{1}{2}v\omega_3u\omega_2 + \frac{1}{2}\omega_1u\omega_2 - \\
&\quad \frac{1}{2}v\omega_3\omega_1u^2 + \frac{3}{4}\omega_4u - \frac{3}{8}\omega_4^2u - \frac{1}{4}\omega_1\omega_2 + \frac{1}{8}v^3\omega_3 + \frac{1}{8}v^2\omega_4u + \frac{1}{4}\omega_3^2u^2 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_3\omega_4u^2 - \frac{1}{4}v^3\omega_3\omega_2 - \frac{1}{4}v^2\omega_3\omega_4u - \\
&\quad \frac{1}{2}v\omega_1u + \frac{1}{8}v\omega_4^2 - \frac{1}{8}\omega_4^2 + \frac{1}{4}\omega_3u^2 - \frac{1}{2}\omega_3\omega_1u^3 + \frac{1}{8}v\omega_3^2u^2 + \frac{1}{8}v^2\omega_4^2 + \frac{1}{4}v\omega_3\omega_4u^2 + \frac{1}{8}v^2\omega_4\omega_2 - \frac{1}{2}v\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u^2 + \\
&\quad v\omega_1u^2\omega_2 - \frac{1}{4}\omega_3u\omega_2 + \frac{1}{4}v\omega_4^2u - \frac{1}{2}v\omega_3 - \frac{1}{8}\omega_4\omega_2 - \frac{1}{4}v\omega_4\omega_1u + \frac{1}{4}\omega_1u\omega_2 + \frac{1}{4}v\omega_3\omega_1 - \frac{1}{4}v\omega_3u^2\omega_2 + \frac{1}{2}\omega_2 + \omega_4u + \\
&\quad v\omega_2 + \frac{1}{4}\omega_4u^2 - \frac{1}{8}\omega_4u^2\omega_2 - \frac{1}{8}v^3\omega_4^2 + \frac{1}{4}\omega_3\omega_4c_s^2 + \frac{1}{4}v\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_1u + \frac{8}{8}v\omega_3^2 + \frac{1}{8}v\omega_4^2u^2 + \frac{1}{4}\omega_3\omega_4c_s^2u - \\
&\quad \frac{1}{4}\omega_3^2c_s^2u - \frac{1}{2}v\omega_4u\omega_2 - \frac{1}{8}v^2\omega_3\omega_2 - \frac{1}{2}v\omega_4\omega_1u^2 + \frac{1}{4}v\omega_3^2u - \frac{1}{4}v^2\omega_4 + \frac{1}{2}v\omega_3\omega_4u - \frac{1}{8}\omega_3\omega_2 + \frac{1}{4}v\omega_4\omega_1 + \frac{1}{2}v\omega_3c_s^2\omega_2, \\
\alpha_{x+\delta_l, y-\delta_l}^{[\mu_3], t-\delta_t} &= 1 + v\omega_4 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}v\omega_3\omega_2 + \frac{1}{2}v\omega_3\omega_1u - \frac{1}{2}\omega_4\omega_1u^2 + \frac{1}{4}\omega_4^2u^2 + \frac{1}{4}\omega_4u\omega_2 - \frac{1}{4}v^2\omega_3^2 - v\omega_1u\omega_2 + \\
&\quad \frac{1}{4}v\omega_4\omega_2 + \frac{1}{2}v\omega_3u\omega_2 - \omega_4 - \frac{1}{4}\omega_4\omega_1u + \frac{1}{2}\omega_4^2u + \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_3^2u^2 - \frac{1}{2}\omega_1 + \omega_1u - \frac{1}{2}v\omega_4^2 + \frac{1}{4}\omega_4^2 + \frac{1}{4}v^2\omega_4^2 - \\
&\quad \frac{1}{2}v^2\omega_4\omega_2 + \frac{1}{2}v\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1u^2 + \frac{1}{4}\omega_3u\omega_2 - \frac{1}{2}v\omega_4^2u + \frac{1}{4}\omega_4\omega_2 + \frac{1}{2}v\omega_4\omega_1u - \frac{1}{2}\omega_1u\omega_2 - \frac{1}{4}v\omega_3\omega_1 - \frac{1}{2}\omega_2 + \\
&\quad \omega_4u - v\omega_2 - \frac{1}{4}\omega_3\omega_1u + \frac{1}{2}v\omega_4u\omega_2 + \frac{1}{2}v^2\omega_3\omega_2 - \frac{1}{2}v\omega_3^2u - \frac{1}{4}v\omega_4\omega_1, \\
\alpha_{x-\delta_l, y}^{[\mu_3], t-\delta_t} &= 1 - \frac{5}{4}\omega_3 - \omega_3^2u - \omega_3\omega_4u - \omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_4 + \frac{1}{2}\omega_3\omega_1 - \frac{1}{4}\omega_4 + \frac{1}{2}\omega_4\omega_1u + \omega_3^2u^2 - \frac{1}{2}\omega_1 + \omega_3\omega_4u^2 - \\
&\quad 3\omega_1u + \omega_1^2u - 3\omega_3\omega_1u^2 + \frac{1}{2}\omega_4u + \frac{1}{2}\omega_3\omega_1u + \frac{1}{4}\omega_3^2 + 2\omega_1^2u^2 + \frac{5}{2}\omega_3u, \\
\alpha_{x, y}^{[\mu_1], t-\delta_t} &= -v\omega_4 + 4v^3\omega_2^2 - v\omega_3\omega_2 - 3v^3\omega_4\omega_2 - v\omega_3^2c_s^2 + v\omega_4u^2\omega_2 - v\omega_4\omega_2 + \frac{1}{2}v^3\omega_3^2 - 3v^3\omega_3\omega_2 + \\
&\quad \frac{1}{2}v\omega_4^2 + \frac{1}{2}v\omega_3^2u^2 - v\omega_3 + v^3\omega_3\omega_4 - v\omega_2^2 - v\omega_3u^2\omega_2 + 3v\omega_2 + \frac{1}{2}v^3\omega_4^2 + v\omega_3\omega_4 + \frac{1}{2}v\omega_3^2 - \frac{1}{2}v\omega_4^2u^2 + 2v\omega_3c_s^2\omega_2, \\
\alpha_{x, y}^{[\mu_3], t-\delta_t} &= 2 + \omega_1^2 - 2v^2\omega_3\omega_4 + 4\omega_4\omega_1u^2 - \omega_4^2u^2 - v^2\omega_3^2 - 4v^2\omega_2^2 - \omega_3^2u^2 - 2\omega_1 - 2\omega_3\omega_4u^2 - v^2\omega_4^2 + 4v^2\omega_4\omega_2 + \\
&\quad 4\omega_3\omega_1u^2 + \omega_2^2 - 2\omega_2 + 4v^2\omega_3\omega_2 - 4\omega_1^2u^2, \\
\alpha_{x+\delta_l, y}^{[\mu_3], t-\delta_t} &= 1 - \frac{5}{4}\omega_3 + \omega_3^2u + \omega_3\omega_4u - \omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_4 + \frac{1}{2}\omega_3\omega_1 - \frac{1}{4}\omega_4 - \frac{1}{2}\omega_4\omega_1u + \omega_3^2u^2 - \frac{1}{2}\omega_1 + \omega_3\omega_4u^2 + \\
&\quad 3\omega_1u - \omega_1^2u - 3\omega_3\omega_1u^2 - \frac{1}{2}\omega_4u - \frac{1}{2}\omega_3\omega_1u + \frac{1}{4}\omega_3^2 + 2\omega_1^2u^2 - \frac{5}{2}\omega_3u, \\
\alpha_{x-\delta_l, y+\delta_l}^{[\mu_1], t-\delta_t} &= 1 - \frac{1}{8}\omega_4^2u^3 + \frac{1}{2}\omega_4\omega_1u^3 - \frac{1}{4}\omega_3c_s^2\omega_2 - \frac{1}{2}v\omega_4 + \omega_1u^2 + \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_3 - \frac{1}{4}v\omega_3\omega_2 + \frac{1}{8}\omega_3^2u + \frac{1}{8}v^2\omega_3\omega_4 - \\
&\quad \frac{1}{4}\omega_3\omega_4u + \frac{1}{4}v\omega_3\omega_1u - \frac{3}{4}\omega_4\omega_1u^2 + \frac{1}{4}v^3\omega_4\omega_2 + \frac{1}{8}\omega_3\omega_4 + \frac{3}{8}\omega_4^2u^2 + \frac{1}{8}v^2\omega_3^2u + \frac{1}{2}\omega_3c_s^2 - \frac{1}{4}\omega_4u\omega_2 - \frac{1}{4}v\omega_3^2c_s^2 - \\
&\quad \frac{1}{4}v\omega_3\omega_4c_s^2 - \frac{1}{4}v\omega_4u^2\omega_2 - \frac{1}{4}v^2\omega_3 + \frac{1}{8}\omega_3u^2\omega_2 - \frac{1}{2}v\omega_1u\omega_2 + \frac{1}{8}\omega_3^2u^3 - \frac{1}{4}v\omega_4\omega_2 + \frac{1}{2}v\omega_3u\omega_2 - \frac{1}{2}\omega_1u\omega_2 - \\
&\quad \frac{1}{2}v\omega_3\omega_1u^2 - \frac{3}{4}\omega_4u - \frac{3}{8}\omega_4^2u + \frac{1}{4}\omega_1\omega_2 + \frac{1}{8}v^3\omega_3 + \frac{1}{8}v^2\omega_4^2u - \frac{1}{4}\omega_3^2u^2 - \frac{1}{2}\omega_1 + \frac{1}{8}\omega_3\omega_4u^2 - \frac{1}{4}v^3\omega_3\omega_2 - \frac{1}{4}v^2\omega_3\omega_4u - \\
&\quad \frac{1}{2}v\omega_1u + \frac{1}{8}v\omega_4^2 + \frac{1}{8}\omega_4^2 - \frac{1}{4}\omega_3u^2 - \frac{1}{2}\omega_3\omega_1u^3 + \frac{1}{8}v\omega_3^2u^2 - \frac{1}{8}v^2\omega_4^2 + \frac{1}{4}v\omega_3\omega_4u^2 - \frac{1}{8}v^2\omega_4\omega_2 - \frac{1}{2}v\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1u^2 + \\
&\quad v\omega_1u^2\omega_2 - \frac{1}{4}\omega_3u\omega_2 - \frac{1}{4}v\omega_4^2u - \frac{1}{2}v\omega_3 + \frac{1}{8}\omega_4\omega_2 + \frac{1}{4}v\omega_4\omega_1u + \frac{1}{4}\omega_1u\omega_2 + \frac{1}{4}v\omega_3\omega_1 - \frac{1}{4}v\omega_3u^2\omega_2 - \frac{1}{2}\omega_2 + \omega_4u + \\
&\quad v\omega_2 - \frac{1}{4}\omega_4u^2 + \frac{1}{8}\omega_4u^2\omega_2 - \frac{1}{8}v^3\omega_4^2 - \frac{1}{4}\omega_3\omega_4c_s^2 + \frac{1}{4}v\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_1u + \frac{8}{8}v\omega_3^2 + \frac{1}{8}v\omega_4^2u^2 + \frac{1}{4}\omega_3\omega_4c_s^2u - \\
&\quad \frac{1}{4}\omega_3^2c_s^2u + \frac{1}{2}v\omega_4u\omega_2 + \frac{1}{8}v^2\omega_3\omega_2 - \frac{1}{2}v\omega_4\omega_1u^2 - \frac{1}{4}v\omega_3^2u + \frac{1}{4}v^2\omega_4 - \frac{1}{2}v\omega_3\omega_4u + \frac{1}{8}\omega_3\omega_2 + \frac{1}{4}v\omega_4\omega_1 + \frac{1}{2}v\omega_3c_s^2\omega_2, \\
\alpha_{x-\delta_l, y+\delta_l}^{[\mu_3], t-\delta_t} &= 1 - v\omega_4 + \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}v\omega_3\omega_2 + \frac{1}{2}v\omega_3\omega_1u - \frac{1}{2}\omega_4\omega_1u^2 + \frac{1}{4}\omega_4^2u^2 - \frac{1}{4}\omega_4u\omega_2 - \frac{1}{4}v^2\omega_3^2 - v\omega_1u\omega_2 - \\
&\quad \frac{1}{4}v\omega_4\omega_2 + \frac{1}{2}v\omega_3u\omega_2 - \omega_4 + \frac{1}{4}\omega_4\omega_1u - \frac{1}{2}\omega_4^2u + \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_3^2u^2 - \frac{1}{2}\omega_1 - \omega_1u + \frac{1}{2}v\omega_4^2 + \frac{1}{4}\omega_4^2 + \frac{1}{4}v^2\omega_4^2 - \\
&\quad \frac{1}{2}v^2\omega_4\omega_2 - \frac{1}{2}v\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1u^2 - \frac{1}{4}\omega_3u\omega_2 - \frac{1}{2}v\omega_4^2u + \frac{1}{4}\omega_4\omega_2 + \frac{1}{2}v\omega_4\omega_1u + \frac{1}{2}\omega_1u\omega_2 + \frac{1}{4}v\omega_3\omega_1 - \frac{1}{2}\omega_2 +
\end{aligned}$$



$$\begin{aligned}
& \alpha_{x-\delta_l, y-\delta_l}^{[\mu_3], t-2\delta_t} = \\
& -2 + v\omega_4\omega_1u\omega_2 + \frac{1}{2}v^2\omega_3^2u\omega_2 - \frac{3}{2}v\omega_4 + \frac{1}{8}\omega_3^2\omega_2 - \frac{3}{8}\omega_4\omega_1 + \frac{5}{2}\omega_3 - \frac{1}{2}\omega_4\omega_1u^2\omega_2 + \frac{3}{8}\omega_3\omega_4\omega_2 + 2v\omega_3\omega_4^2u + v\omega_3\omega_1u\omega_2 + \\
& \frac{1}{2}\omega_3\omega_4\omega_1u + \frac{1}{2}v\omega_4^2\omega_1u^2 - \frac{3}{4}v\omega_4^2u\omega_2 - 2v\omega_3\omega_2 - \frac{3}{2}\omega_3\omega_1u^2\omega_2 + \omega_3^2u - v^2\omega_3\omega_4 + \frac{7}{4}\omega_3\omega_4u + \frac{1}{4}\omega_3^2\omega_1u + v^2\omega_1\omega_2^2 - \\
& 2v^2\omega_3\omega_1u\omega_2 - \frac{1}{2}v\omega_3u\omega_2 + \frac{1}{4}v\omega_4\omega_2^2 + 3v\omega_3\omega_1u - \frac{1}{2}v^2\omega_4\omega_1\omega_2 + 2v\omega_3^2\omega_4u + \frac{3}{2}\omega_4\omega_1u^2 - \frac{7}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4^2u^2 + \frac{1}{2}\omega_4u\omega_2 - \\
& 2v^2\omega_4\omega_1u\omega_2 + v\omega_1u\omega_2^2 - v^2\omega_4u\omega_2^2 - \frac{3}{4}v^2\omega_3^2 + \frac{1}{2}v\omega_3\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1^2u - \frac{3}{4}v\omega_3^2\omega_4 - v\omega_4\omega_1^2u^2 - \frac{1}{4}v^2\omega_3^2\omega_2 - 6v\omega_1u\omega_2 + \\
& \frac{1}{2}\omega_3\omega_1^2u^2 - \frac{1}{2}v\omega_4\omega_1^2u - \frac{9}{8}\omega_3\omega_1 - \frac{1}{2}v\omega_3^2\omega_1 - 2v\omega_4\omega_2 + 3v\omega_3u\omega_2 - 2v^2\omega_2^2 - v\omega_3^2\omega_4u^2 + \frac{1}{4}\omega_3\omega_4^2 + \frac{3}{2}\omega_4 - 2\omega_4\omega_1u - \\
& v\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2u - \frac{3}{2}v^2\omega_3\omega_4\omega_2 - \frac{3}{4}v\omega_4^2\omega_1u - \frac{3}{2}\omega_3\omega_4\omega_1u^2 - \omega_3\omega_4u\omega_2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}v\omega_3\omega_2^2 + 2v\omega_1^2u^2\omega_2 - \frac{1}{2}\omega_3^2u\omega_2 - \\
& \frac{3}{2}\omega_3^2u^2 + \omega_1 + v\omega_3\omega_4u^2\omega_2 - \frac{1}{4}\omega_3^2\omega_1u^2 - \omega_3\omega_4u^2 + \frac{1}{2}v^2\omega_3\omega_4^2 + \frac{1}{2}v^2\omega_3^2\omega_1u + 4\omega_1u + \frac{1}{2}v\omega_4^2 + \frac{1}{2}\omega_1^2u\omega_2 - \frac{1}{4}\omega_4^2\omega_2 + \\
& \frac{1}{2}v\omega_3^2u^2\omega_2 - v\omega_3\omega_4^2u^2 - \frac{1}{4}\omega_4^2 + \frac{1}{2}\omega_3\omega_4u^2\omega_2 - \frac{3}{2}\omega_3\omega_4u\omega_2 + \frac{1}{2}\omega_3\omega_4^2u^2 + 3v\omega_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3^2u^2\omega_2 + \frac{1}{2}v^2\omega_4^2u\omega_2 + \\
& v\omega_1^2u\omega_2 - \omega_1^2u - \frac{1}{4}v^2\omega_4^2 + \frac{1}{4}\omega_4^2\omega_1u - v^2\omega_3\omega_4^2u + \frac{1}{2}v\omega_2^2\omega_1u^2 + \frac{3}{2}v^2\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_1 - \frac{3}{4}v\omega_3^2u\omega_2 - 2v\omega_1\omega_2 + \omega_1^2u\omega_2 + \\
& \frac{5}{2}\omega_3\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_4u^2 - \frac{3}{4}v\omega_3\omega_4^2 + \frac{3}{2}\omega_3u\omega_2 - \frac{1}{2}v\omega_4^2u - \frac{5}{8}\omega_3\omega_1 + \frac{1}{8}\omega_4\omega_2 - \frac{1}{2}v\omega_4u\omega_2 + \frac{1}{2}v^2\omega_3\omega_2^2 + \\
& \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{3}{2}v^2\omega_3\omega_1\omega_2 + 3v\omega_4\omega_1u - v\omega_3\omega_1^2u^2 - v\omega_2^2 - 2\omega_1u\omega_2 + \frac{3}{2}v\omega_3\omega_1 + \frac{1}{4}v\omega_4^2 + 3v^2\omega_3\omega_4u\omega_2 + \omega_2 - \frac{3}{2}\omega_4u - \\
& v^2\omega_3u\omega_2^2 - v^2\omega_3^2\omega_4u + \frac{1}{4}\omega_4\omega_1^2u + \frac{1}{2}v\omega_4\omega_1\omega_2 + 4v\omega_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1 - \frac{1}{2}v\omega_3\omega_1u + \frac{1}{2}\omega_3\omega_4\omega_1u + \frac{1}{4}\omega_3\omega_4 + \\
& \frac{1}{2}\omega_4\omega_1^2u^2 + \frac{7}{2}v\omega_3\omega_4 - \frac{3}{4}\omega_3^2\omega_4u - 2\omega_3\omega_1u + v\omega_3^2 + 3v\omega_4u\omega_2 - \frac{5}{2}\omega_3^2 - \frac{1}{2}v\omega_3^2u - 2v\omega_4\omega_1u^2\omega_2 - \\
& \frac{1}{4}\omega_4^2\omega_1u^2 - \frac{3}{4}v\omega_3^2\omega_1u - 5v\omega_3\omega_4u + \frac{1}{2}\omega_4\omega_1u\omega_2 + \frac{1}{2}v\omega_1\omega_2^2 + \frac{1}{2}v^2\omega_4\omega_2^2 - \frac{9}{8}\omega_3\omega_2 + \frac{1}{4}v\omega_3^2\omega_2 + \frac{1}{2}v\omega_4\omega_1 + \\
& \frac{1}{2}v\omega_4u^2\omega_2 - 2v\omega_3\omega_1u^2\omega_2 + \frac{1}{2}v^2\omega_4^2\omega_1u - \frac{3}{4}\omega_3\omega_4^2u + \frac{1}{2}v\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_1u\omega_2 - \frac{3}{2}v\omega_3\omega_4\omega_1u - \frac{5}{2}\omega_3u, \\
& \alpha_{x,y-\delta_l}^{[\mu_1], t-2\delta_t} = 1 + \frac{1}{2}v^2\omega_3^2\omega_1u^2 - \frac{1}{2}\omega_3c_s^2\omega_2 + \frac{1}{2}v\omega_4 + 2\omega_1u^2 + \frac{1}{4}v^2\omega_3\omega_2^2 + \frac{3}{2}\omega_4\omega_1 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_4\omega_1u^2\omega_2 - \frac{1}{4}v\omega_4^2\omega_1u^2 + \\
& \frac{1}{2}v\omega_3\omega_2 + \frac{1}{4}v\omega_4^2\omega_1 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 + \frac{1}{4}v^2\omega_3\omega_4 - \omega_4\omega_1^2u^4 + \frac{1}{4}v^2\omega_4\omega_1\omega_2 - v^2\omega_2 - v^2\omega_3\omega_1^2u^2 - \\
& \frac{5}{2}\omega_4\omega_1u^2 + \frac{1}{4}v^3\omega_3^2\omega_1 - \frac{1}{2}v^3\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_4 + \frac{3}{4}\omega_4^2u^2 + \frac{1}{2}\omega_3c_s^2 + \frac{1}{2}v\omega_3^2\omega_2 + \frac{1}{2}\omega_4^2\omega_1u^4 - \frac{1}{2}v\omega_3\omega_1\omega_2 + \\
& \frac{1}{2}v\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_3^2\omega_4c_s^2u^2 + \frac{1}{4}\omega_3\omega_1^2 - v^2\omega_4\omega_1 + \frac{1}{2}v\omega_4u^2\omega_2 - \frac{1}{4}v^2\omega_3\omega_3 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 - \frac{5}{4}\omega_3\omega_1^2u^2 + \frac{1}{2}v^3\omega_4\omega_1\omega_2 - \\
& \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{4}v^2\omega_4\omega_1^2 + \frac{1}{4}v\omega_3^2\omega_1 + \frac{1}{2}v\omega_4\omega_2 + 2v\omega_2 + \frac{1}{2}v\omega_3\omega_1u^2 - \frac{5}{4}\omega_4\omega_1 + \frac{1}{2}v\omega_3\omega_4\omega_1 + \\
& 2v^2\omega_3\omega_4u^2\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 + \frac{1}{2}\omega_1\omega_2 + 2v\omega_1^2u^2\omega_2 - \frac{1}{4}v^3\omega_3^2 + \omega_3\omega_2^2c_s^2u^2 - \frac{1}{2}\omega_3^2u^2 + \\
& v^2\omega_4^2u^2\omega_2 - \omega_1 + v\omega_3\omega_4u^2\omega_2 + \frac{1}{2}\omega_3^2\omega_1u^2 + \frac{1}{4}\omega_3\omega_4u^2 + \frac{1}{2}v^3\omega_3\omega_2 - \frac{1}{4}v^3\omega_4\omega_1 - \frac{1}{4}v\omega_4^2 - \frac{1}{4}\omega_4\omega_1^2 + \frac{1}{2}v\omega_3\omega_1\omega_2 + \\
& \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{4}v^2\omega_4\omega_1^2 + \frac{1}{4}v\omega_3^2\omega_1 + \frac{1}{2}v\omega_4\omega_2 + 2v\omega_2 + \frac{1}{2}v\omega_3\omega_1u^2 - \frac{1}{4}v^2\omega_4\omega_1^2u^2 - 2v\omega_1\omega_2 + \frac{1}{2}v\omega_3\omega_4\omega_1 + \\
& 2v^2\omega_3\omega_4u^2\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 + \frac{1}{2}\omega_1\omega_2 + 2v\omega_1^2u^2\omega_2 - \frac{1}{4}v^3\omega_3^2 + \omega_3\omega_2^2c_s^2u^2 - \frac{1}{2}\omega_3^2u^2 + \\
& v^2\omega_4^2u^2\omega_2 - \frac{1}{2}\omega_4^2 - \frac{1}{2}v\omega_3\omega_4c_s^2\omega_1 + \frac{1}{2}v^2\omega_4^2\omega_1u^2 - \frac{1}{2}v\omega_3\omega_4u^2 - \frac{1}{4}v\omega_3^2u^2 + 2\omega_3c_s^2\omega_1^2u^2 - \frac{1}{4}v\omega_3^2u^2 + \\
& \omega_3\omega_1^4u^4 - \frac{1}{2}v\omega_3\omega_4u^2 - \frac{1}{4}v\omega_3^2\omega_1u^2 - \frac{1}{4}v^2\omega_4\omega_2 - \frac{1}{2}v\omega_3\omega_4u^2 - \frac{1}{2}v\omega_3^2c_s^2\omega_1 + 2v\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1u^2 - v^2\omega_4\omega_1^2u^2 - 2v\omega_1\omega_2 + \\
& \frac{1}{2}v\omega_3 + \frac{1}{4}\omega_4\omega_2 - \frac{1}{4}\omega_3\omega_4\omega_1 - \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{2}v\omega_3\omega_1 - v^2\omega_1^2\omega_2 + \frac{1}{2}v\omega_3u^2\omega_2 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3\omega_1u^4 - \frac{1}{2}v\omega_4\omega_1\omega_2 + \\
& 3v^2\omega_3\omega_4\omega_1u^2 - \frac{1}{2}v^3\omega_3\omega_1\omega_2 - \frac{3}{2}v\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_1\omega_2 - 4v^2\omega_3\omega_1u^2\omega_2 - \frac{3}{4}\omega_4u^2 + \frac{1}{4}\omega_4u^2\omega_2 + \frac{1}{4}v^3\omega_4^2 - \\
& v^2\omega_3^2\omega_4u^2 - \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{5}{4}\omega_4\omega_1^2u^2 - \frac{1}{2}v\omega_3\omega_4 - \frac{1}{2}\omega_3c_s^2\omega_1^2 - \frac{1}{4}v\omega_3^2 - \frac{1}{4}v\omega_4^2u^2 - 4v^2\omega_4\omega_1u^2\omega_2 + \frac{1}{4}v^2\omega_4^2\omega_1 + \\
& \frac{1}{4}v^2\omega_3\omega_2 + v\omega_4\omega_1u^2 + v^2\omega_3^2u^2\omega_2 + \frac{3}{4}v^2\omega_4 - \frac{3}{2}v\omega_4\omega_1u^2\omega_2 - \frac{1}{4}\omega_4^2\omega_1u^2 - v^2\omega_3\omega_4^2u^2 - \omega_3^2c_s^2\omega_1u^2 + \frac{1}{4}\omega_3\omega_2 - \\
& \frac{1}{4}\omega_4^2\omega_1 + 4v^2\omega_1^2u^2\omega_2 - \frac{1}{2}v\omega_4\omega_1 + \frac{1}{2}v\omega_4u^2\omega_2 - 3\omega_3\omega_4c_s^2\omega_1u^2 - v\omega_3c_s^2\omega_2 - \frac{3}{2}v\omega_3\omega_1u^2\omega_2 + v\omega_3c_s^2\omega_1\omega_2, \\
& \alpha_{x,y-\delta_l}^{[\mu_3], t-2\delta_t} = -2 - 2v\omega_4 - \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{5}{2}\omega_4\omega_1 + 2\omega_4\omega_1u^2\omega_2 - v\omega_4^2\omega_1u^2 - \frac{1}{2}v\omega_3\omega_2 - v\omega_4^2\omega_1 + 2\omega_3\omega_1u^2\omega_2 - \omega_1^2 - \\
& v^2\omega_4\omega_1\omega_2 - 3\omega_4\omega_1u^2 + \frac{1}{2}\omega_4^2u^2 + \frac{1}{2}v^2\omega_3^2 + \frac{1}{2}v\omega_3\omega_1\omega_2 + 2v\omega_4\omega_1^2u^2 + \frac{1}{2}\omega_4\omega_1\omega_2 - \frac{1}{2}v\omega_4\omega_2 + 2v\omega_3^2\omega_4u^2 + \\
& 2\omega_4 + 3\omega_3\omega_4\omega_1u^2 - \frac{3}{2}\omega_1\omega_2 - 4v\omega_1^2u^2\omega_2 + \frac{3}{2}\omega_3^2u^2 + 3\omega_1 - 2v\omega_3\omega_4u^2\omega_2 + 2\omega_3\omega_4u^2 + v\omega_4^2 + \frac{1}{2}\omega_4\omega_1^2 - \\
& v\omega_3^2u^2\omega_2 + v\omega_1^2\omega_2 + 2v\omega_3\omega_2^2u^2 - \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_1^2\omega_2 - \frac{1}{2}v\omega_4\omega_1^2 - \omega_3\omega_4u^2\omega_2 - \omega_3\omega_4^2u^2 - 6v\omega_3\omega_4\omega_1\omega_2 - \\
& \frac{1}{2}\omega_3^2u^2\omega_2 - \frac{1}{2}v^2\omega_4^2 - v\omega_3^2\omega_1u^2 + v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3\omega_1\omega_2 - 3v\omega_1\omega_2 - 2\omega_1^2\omega_2 - 5\omega_3\omega_1u^2 - \omega_3\omega_4u^2 - \frac{1}{2}\omega_4\omega_2 + \\
& v^2\omega_3\omega_1\omega_2 + 2v\omega_3\omega_2^2u^2 + \frac{1}{2}v\omega_3\omega_1 + \omega_2 + \frac{1}{2}v\omega_4\omega_1\omega_2 + 2v\omega_2 - \frac{1}{2}v\omega_3\omega_1^2 - 2\omega_4\omega_1^2u^2 + \frac{1}{2}v^2\omega_4^2\omega_1 - v^2\omega_3\omega_2 + \\
& 4\omega_1^2u^2 + 4v\omega_4\omega_1u^2\omega_2 + \omega_4^2\omega_1u^2 + \frac{1}{2}v\omega_4\omega_1 - v\omega_4u^2\omega_2 + 4v\omega_3\omega_1u^2\omega_2, \\
& \alpha_{x+\delta_l, y-\delta_l}^{[\mu_1], t-2\delta_t} = 1 - \frac{1}{4}v^2\omega_3^2\omega_1u^2 + \frac{1}{4}v\omega_4\omega_1u\omega_2 - \frac{1}{4}\omega_3^2\omega_4c_s^2 + \frac{1}{8}\omega_4^2u^3 + \frac{3}{4}\omega_4\omega_1u^3 - \frac{3}{4}v^2\omega_3^2u\omega_2 + \frac{3}{4}\omega_3c_s^2\omega_2 - \frac{5}{2}\omega_3c_s^2\omega_1u + \\
& \frac{1}{2}v\omega_4 - \omega_1u^2 + \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_3 - \frac{1}{4}\omega_4\omega_1u^2\omega_2 + v^3\omega_3\omega_4\omega_2 + 2v^3\omega_2^2 - \frac{1}{4}v\omega_3\omega_1u\omega_2 - \frac{1}{8}\omega_3\omega_4\omega_1u + \frac{1}{4}v\omega_4^2\omega_1u^2 + \\
& \frac{7}{8}\omega_3\omega_2 - \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{2}v^3\omega_3\omega_4\omega_1u + v^2\omega_1^2u\omega_2 - \frac{1}{8}\omega_3^2u - \frac{3}{4}\omega_3\omega_4c_s^2u + \frac{1}{4}v^3\omega_3^2\omega_1u - \frac{11}{8}v^2\omega_3\omega_4 - \frac{1}{2}v^3\omega_3\omega_2 + \\
& \frac{1}{2}\omega_4\omega_1^4 + \frac{1}{4}\omega_3\omega_4u - \frac{1}{8}\omega_3^2\omega_1u - \frac{1}{2}v^2\omega_1^2\omega_2 + \frac{3}{4}\omega_2^2\omega_3\omega_1\omega_2 + \frac{1}{4}v\omega_3\omega_1u - \frac{1}{2}v^2\omega_4\omega_1\omega_2 - 3v^2\omega_2 - v\omega_3\omega_4c_s^2\omega_2 + \\
& \frac{1}{2}v^2\omega_3\omega_1^2u^2 - \frac{1}{2}v\omega_3\omega_4c_s^2\omega_2 + \frac{7}{8}\omega_4\omega_1u^2 - \frac{1}{4}v^3\omega_3\omega_4c_s^2 - \frac{1}{4}v^3\omega_3^2\omega_1 - \frac{5}{4}v^3\omega_4\omega_2 + \frac{1}{8}\omega_3\omega_4 + \frac{3}{8}\omega_4^2u^2 - \frac{1}{8}v^2\omega_3^2u - 2\omega_3c_s^2 + \\
& \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{3}{4}v^2\omega_4\omega_1u\omega_2 - \frac{1}{2}v^2\omega_4\omega_1u^2 - \frac{3}{4}v\omega_3^2c_s^2 - \frac{1}{4}v^2\omega_3^2 - \frac{1}{4}\omega_4^2\omega_1u^4 + \frac{5}{4}v^2\omega_4\omega_1u - \frac{1}{4}v\omega_3\omega_1\omega_2 - \frac{3}{4}v\omega_3\omega_4c_s^2 - \\
& \frac{1}{2}\omega_3\omega_4c_s^2u^2 - \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_3^2\omega_2 + \frac{1}{4}v\omega_4u^2\omega_2 + \frac{1}{4}v\omega_4^2\omega_1u^3 + v^2\omega_3 - \frac{3}{8}\omega_3\omega_4u^2\omega_2 + \frac{1}{2}\omega_3^2\omega_1u^3 + \frac{5}{2}v^2\omega_4\omega_1\omega_2 - \\
& 2v\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1u^3\omega_2 + \frac{1}{4}\omega_3\omega_1^2u^2 - \frac{1}{8}\omega_3^3u^3 + \frac{1}{2}v^3\omega_4\omega_1\omega_2 - \frac{1}{4}v^3\omega_3\omega_4\omega_2 - \frac{3}{4}\omega_3\omega_4c_s^2u + \frac{3}{8}v\omega_4\omega_2 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \\
& \frac{3}{2}v^2\omega_1\omega_2 + \frac{1}{4}v\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_4\omega_1u^3\omega_2 + \frac{1}{2}\omega_1u^2\omega_2 + v^2\omega_2^2 - \frac{1}{2}v\omega_3\omega_1u^2 - \frac{3}{4}\omega_4 - \frac{1}{2}v^3\omega_4\omega_2^2 - \frac{1}{8}\omega_4\omega_1u - \frac{1}{4}v^2\omega_3\omega_1^2u
\end{aligned}$$

$$\begin{aligned}
& \frac{1}{2}vw_3\omega_4c_s^2\omega_1u + \frac{3}{8}\omega_4^2u - v^2\omega_3\omega_4u^2\omega_2 - v^3\omega_4u\omega_2^2 - \frac{1}{4}v^2\omega_3\omega_4\omega_2 - \frac{1}{8}\omega_3\omega_4\omega_1u^2 + 2v^3\omega_3\omega_4\omega_1u\omega_2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 + \\
& \frac{1}{4}\omega_1\omega_2 - vw_1^2u^2\omega_2 + \frac{3}{8}v^3\omega_3^2 - \frac{1}{2}\omega_3\omega_4^2c_s^2u^2 + \frac{1}{2}v^3\omega_3^2\omega_2\omega_2 - \frac{1}{4}\omega_2^2c_s^2\omega_1 - \frac{1}{8}v^2\omega_4^2u - \frac{1}{2}\omega_3^2u^2 - \frac{1}{2}v^2\omega_4^2u^2\omega_2 - \frac{1}{4}\omega_3\omega_1^3 - \\
& \frac{1}{2}\omega_1 - \frac{1}{2}vw_3\omega_4u^2\omega_2 + \frac{1}{8}\omega_3^2\omega_1u^2 - \frac{1}{8}\omega_3\omega_4u^2 - \frac{7}{4}v^3\omega_3\omega_2 + \frac{1}{2}v^2\omega_3\omega_4^2 - \frac{9}{4}v^2\omega_3\omega_4u - \frac{1}{4}v^2\omega_3^2\omega_1u - \frac{1}{2}vw_3^2c_s^2\omega_1u + \\
& \frac{1}{2}\omega_1u - \frac{1}{8}vw_4^2 - \frac{1}{4}v^2\omega_4^2\omega_2 - \frac{5}{8}v^2\omega_3\omega_1u - \frac{1}{2}vw_3^2u^2\omega_2 + \frac{1}{8}\omega_4^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1u + \frac{1}{4}v^3\omega_3^2\omega_2 + \frac{1}{2}vw_3\omega_4c_s^2\omega_1 - \\
& \frac{1}{2}vw_3\omega_4u\omega_2 - \frac{1}{4}v^2\omega_4^2\omega_1u^2 + vw_3c_s^2\omega_1u\omega_2 + \frac{1}{4}vw_3\omega_4\omega_1u^2 + \omega_3u^2 - \frac{3}{4}\omega_3\omega_1u^3 - \frac{3}{4}v^2\omega_4^2u\omega_2 + \frac{1}{2}vw_1^2u\omega_2 + \\
& \frac{3}{8}vw_3^2u^2 - \omega_3c_s^2\omega_1u^2 - \frac{1}{8}v^2\omega_4^2u^2 - v^3\omega_1\omega_2^2 + \frac{1}{4}v^3\omega_3^2\omega_1u + \frac{3}{4}v^2\omega_3\omega_4u^2 - \frac{1}{2}\omega_3\omega_1u^4 + \frac{1}{4}vw_3\omega_4u^2 + \frac{13}{8}v^2\omega_4\omega_2 + \\
& \frac{1}{8}v^2\omega_3^2\omega_1 + \frac{1}{2}vw_3^2c_s^2\omega_1 - \frac{1}{8}vw_3^2u\omega_2 + \frac{3}{4}vw_1\omega_2 + \frac{1}{2}\omega_3^2c_s^2\omega_1u + \frac{1}{8}\omega_3\omega_1u^2 + \frac{1}{2}vw_3^2\omega_4c_s^2u + \frac{1}{2}v^2\omega_4\omega_1u^2 + vw_1u^2\omega_2 + \\
& \frac{1}{4}\omega_3\omega_2 + \frac{5}{4}\omega_3c_s^2\omega_1 - \frac{1}{4}vw_4^2u + \frac{1}{2}vw_3 + v^2\omega_1\omega_2^2 + \frac{1}{2}v^3\omega_3\omega_4 + \frac{1}{8}\omega_4\omega_2 - \frac{1}{4}v^2\omega_3\omega_2^2 - \frac{1}{4}v^2\omega_3\omega_1\omega_2 + \frac{1}{2}vw_3\omega_1u^3\omega_2 + \\
& \frac{1}{4}vw_4\omega_1u - \frac{1}{4}v^3\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}vw_3^2\omega_1u^3 - \frac{1}{4}vw_3\omega_1u - \frac{3}{4}vw_3u^2\omega_2 - v^2\omega_3\omega_4u\omega_2 - \frac{1}{2}\omega_2 - \omega_4u - \frac{1}{2}v^2\omega_3\omega_2^2 + \\
& \frac{3}{4}v^2\omega_3^2\omega_4u + \frac{1}{4}\omega_3^2\omega_1u^4 + \frac{5}{4}v^2\omega_3\omega_1u - \frac{3}{2}v^2\omega_3\omega_4\omega_1u^2 - \frac{1}{2}vw_4\omega_1u^3\omega_2 + v^3\omega_3\omega_1\omega_2 - \frac{3}{2}vw_2 + \frac{3}{8}v^2\omega_3\omega_4\omega_1 + \\
& 2v^2\omega_3\omega_1u^2\omega_2 + 2v^3\omega_1u\omega_2^2 - \frac{1}{4}\omega_3\omega_4c_s^2\omega_2 - \frac{1}{2}\omega_4u^2 + \frac{1}{2}\omega_3^2c_s^2 - \frac{1}{2}\omega_4^2\omega_1u^3 + \frac{5}{2}v^2\omega_3\omega_2u + \frac{1}{8}\omega_4u^2\omega_2 + \frac{1}{8}v^3\omega_4^2 + \\
& \frac{1}{4}v^3\omega_2^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1u + \frac{1}{2}v^3\omega_3^2\omega_4u^2 + \frac{3}{4}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_4\omega_1u^2 - \frac{1}{4}vw_3\omega_4 - \frac{1}{2}v^3\omega_3^2\omega_4u - \frac{1}{4}v^2\omega_4\omega_1u + \frac{3}{8}\omega_3\omega_1u - \\
& \frac{1}{8}vw_4^2 - \frac{1}{2}vw_4^2u^2 - v^3\omega_3\omega_2 + 2v^2\omega_4\omega_1u^2\omega_2 + \frac{9}{4}\omega_3\omega_4c_s^2u + \frac{1}{4}\omega_3^2c_s^2u + \frac{3}{4}vw_4\omega_2 + \frac{11}{4}v^2\omega_3\omega_2 - \frac{1}{4}v^3\omega_3\omega_4^2 - \\
& 5v^2\omega_1u\omega_2 - \frac{1}{2}vw_4\omega_1u^2 + \frac{1}{4}vw_3\omega_4c_s^2 + \frac{1}{2}v^3\omega_4^2u\omega_2 - \frac{1}{2}v^2\omega_3^2u^2\omega_2 + \frac{1}{4}\omega_4\omega_1u^3 - \frac{1}{4}vw_3^2u + \frac{1}{2}v^2\omega_4 + \frac{1}{2}\omega_3c_s^2\omega_1u - \\
& \frac{1}{4}\omega_4^2\omega_1u^2 + \frac{1}{2}v^2\omega_3\omega_2u^2 + \frac{1}{4}vw_3^2\omega_1u - \frac{1}{2}vw_3\omega_4u - \frac{3}{2}v^3\omega_4\omega_1u\omega_2 + \frac{1}{2}\omega_3^2c_s^2\omega_1u^2 - \frac{1}{4}v^2\omega_4\omega_2^2 + \frac{1}{8}\omega_3\omega_2 - 2v^2\omega_1^2u^2\omega_2 - \\
& \frac{1}{8}vw_3^2\omega_2 - \frac{1}{4}vw_4\omega_1 + \frac{3}{2}\omega_3\omega_4c_s^2\omega_1u^2 + \frac{3}{2}vw_3c_s^2\omega_2 + \frac{1}{4}vw_3^2\omega_4c_s^2u + \frac{1}{2}vw_3\omega_4c_s^2u\omega_2 + \frac{3}{2}vw_3\omega_1u^2\omega_2 - \\
& \frac{1}{4}v^2\omega_4\omega_1u - \frac{1}{8}vw_3\omega_4\omega_2 - \frac{3}{2}v^3\omega_3\omega_1u\omega_2 - vw_3c_s^2\omega_1\omega_2 + \frac{1}{4}v^2\omega_3^2\omega_4u - \frac{1}{2}vw_3\omega_1u\omega_2 + \frac{1}{4}vw_3\omega_4\omega_1u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l, y-\delta_l}^{[\mu_3], t-2\delta_t} = & -2 - vw_4\omega_1u\omega_2 - \frac{1}{2}v^2\omega_3^2u\omega_2 - \frac{3}{2}vw_4 + \frac{1}{8}\omega_3^2\omega_2 - \frac{3}{8}\omega_4\omega_1 + \frac{5}{2}\omega_3 - \frac{1}{2}\omega_4\omega_1u^2\omega_2 + \frac{3}{8}\omega_3\omega_4\omega_2 - 2vw_3\omega_4^2u - vw_3\omega_1u\omega_2 - \\
& \frac{1}{2}\omega_3\omega_4\omega_1u + \frac{1}{2}vw_4^2\omega_1u^2 + \frac{3}{2}vw_4^2u\omega_2 - 2vw_3\omega_2 - \frac{3}{2}\omega_3\omega_1u^2\omega_2 - \omega_3^2u - v^2\omega_3\omega_4 - \frac{1}{2}\omega_3^2\omega_1u + v^2\omega_1\omega_2^2 + \\
& 2v^2\omega_3\omega_1u\omega_2 + \frac{1}{2}vw_3u\omega_2 + \frac{1}{4}vw_4\omega_2^2 - 3vw_3\omega_1u - \frac{1}{2}v^2\omega_4\omega_1\omega_2 - 2vw_3^2\omega_4u + \frac{3}{2}\omega_4\omega_1u^2 - \frac{7}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4^2u^2 - \frac{1}{2}\omega_4u\omega_2 + \\
& 2v^2\omega_4\omega_1u\omega_2 - vw_1\omega_2 + v^2\omega_4u\omega_2^2 - \frac{3}{4}v^2\omega_3^2 + \frac{1}{2}vw_3\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u - \frac{3}{4}vw_3^2\omega_4 - vw_4\omega_1u^2 - \frac{1}{4}v^2\omega_3\omega_2 + 6vw_1u\omega_2 + \\
& \frac{1}{2}\omega_3\omega_1u^2 + \frac{1}{2}vw_4\omega_1u^2 - \frac{9}{8}\omega_3\omega_1 - \frac{1}{2}vw_3^2\omega_1 - 2vw_4\omega_2 - 3vw_3u\omega_2 - 2v^2\omega_3^2 - vw_3^2\omega_4u^2 + \frac{1}{4}\omega_3\omega_4^2 + \frac{3}{2}\omega_4 + 2\omega_4\omega_1u - \\
& vw_3\omega_4\omega_1 - \frac{1}{2}\omega_4^2u - \frac{3}{2}v^2\omega_3\omega_4\omega_2 + \frac{3}{2}vw_4^2\omega_1u - \frac{3}{2}\omega_3\omega_4\omega_1u^2 + \omega_3\omega_4u\omega_2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}vw_3\omega_2^2 + 2vw_1^2\omega_2 + \frac{1}{2}\omega_3^2\omega_2\omega_2 - \\
& \frac{3}{4}\omega_3^2u^2 + \omega_1 + vw_3\omega_4u^2\omega_2 - \frac{1}{4}\omega_3^2\omega_1u^2 - \omega_3\omega_4u^2 + \frac{1}{2}v^2\omega_3\omega_4^2 - \frac{1}{2}v^2\omega_3^2\omega_1u - 4\omega_1u + \frac{1}{2}vw_4^2 - \frac{1}{2}\omega_1^2\omega_2 - \frac{1}{4}v^2\omega_4^2\omega_2 + \\
& \frac{1}{2}vw_3^2\omega_2^2 - vw_3\omega_4^2u^2 - \frac{1}{4}\omega_2^2 + \frac{1}{2}\omega_3\omega_4u^2\omega_2 + \frac{3}{2}vw_3\omega_4\omega_2u + \frac{1}{2}\omega_3\omega_4^2u^2 + 3vw_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_2^2 - \frac{1}{2}v^2\omega_4^2\omega_2 - \\
& vw_1^2\omega_2 + \omega_1^2u - \frac{1}{4}v^2\omega_2^2 - \frac{1}{4}\omega_4^2\omega_1u + v^2\omega_3\omega_4u^2 + \frac{1}{2}vw_3^2\omega_1u^2 + \frac{3}{2}v^2\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_1u + \frac{3}{4}vw_3^2\omega_2u - 2vw_1\omega_2 + \omega_1^2u^2\omega_2 + \\
& \frac{5}{2}\omega_3\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_4u^2 - \frac{3}{4}vw_3\omega_4^2 - \frac{3}{2}\omega_3\omega_2u + \frac{1}{2}vw_4^2u - \frac{5}{2}vw_3 - 2v^2\omega_1u\omega_2 + \frac{1}{8}\omega_3\omega_1 - \frac{3}{8}\omega_4\omega_2 + \frac{1}{2}vw_4\omega_2^2 + \frac{1}{2}v^2\omega_3\omega_2^2 + \\
& \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{3}{2}v^2\omega_3\omega_1\omega_2 - 3vw_4\omega_1u - vw_3\omega_1u^2 - v\omega_2^2 + 2\omega_1u\omega_2 + \frac{3}{2}vw_3\omega_1 + \frac{1}{4}vw_4^2\omega_2 - 3v^2\omega_3\omega_4u\omega_2 + \omega_2 + \frac{3}{2}\omega_4u + \\
& v^2\omega_3u\omega_2^2 + v^2\omega_3^2\omega_4u - \frac{1}{4}\omega_4\omega_1u + \frac{1}{2}vw_4\omega_1u^2 + 4vw_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1u + \frac{1}{2}vw_3\omega_1u + \frac{1}{2}\omega_3\omega_1\omega_2 - v^2\omega_3\omega_4\omega_1u + \frac{1}{4}\omega_3\omega_4 + \\
& \frac{1}{2}\omega_4\omega_1u^2 + \frac{7}{2}vw_3\omega_4 + \frac{4}{3}\omega_3^2\omega_4u + 2\omega_3\omega_1u + vw_2^3 - 3vw_4u\omega_2 + \frac{5}{2}v^2\omega_3\omega_2 - \frac{1}{2}\omega_3^2 + \frac{1}{2}vw_3^2u - 2\omega_1^2u^2 - 2vw_4\omega_1u^2\omega_2 - \\
& \frac{1}{4}\omega_4^2\omega_1u^2 + \frac{3}{4}vw_3^2\omega_1u + 5vw_3\omega_4u - \frac{1}{2}\omega_4\omega_1u\omega_2 + \frac{1}{2}vw_1\omega_2^2 + \frac{1}{2}v^2\omega_4\omega_2^2 - \frac{9}{8}\omega_3\omega_2 + \frac{1}{4}vw_3^2\omega_2 + \frac{1}{2}vw_4\omega_1 + \\
& \frac{1}{2}vw_3^2\omega_2^2 - 2vw_3\omega_1u^2\omega_2 - \frac{1}{2}v^2\omega_4^2\omega_1u + \frac{3}{4}\omega_3\omega_4^2u + \frac{1}{2}v^2\omega_3^2\omega_4 - \frac{1}{2}\omega_3\omega_1u\omega_2 + \frac{3}{2}vw_3\omega_4\omega_1u + \frac{5}{2}\omega_3\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l, y}^{[\mu_1], t-2\delta_t} = & -\frac{1}{2}vw_4\omega_1u\omega_2 + vw_4 - 2v^3\omega_3\omega_4\omega_2 - 4v^3\omega_2^2 - vw_3\omega_4^2u - \frac{3}{2}vw_3\omega_1u\omega_2 - \frac{3}{4}vw_4^2\omega_1u^2 + vw_4^2u\omega_2 + \frac{3}{2}vw_3\omega_2 + \\
& \frac{1}{4}vw_4^2\omega_1 + v^3\omega_3\omega_4\omega_1u + \frac{1}{2}v^3\omega_3^2\omega_1u + \frac{1}{2}vw_3u\omega_2^2 - \frac{1}{2}vw_4\omega_2^2 - \frac{1}{2}vw_3\omega_1u - vw_3^2\omega_4u - 2vw_3\omega_4c_s^2u\omega_2 + 2vw_3\omega_4c_s^2\omega_2 + \\
& \frac{1}{4}v^3\omega_3^2\omega_1 + \frac{5}{2}v^3\omega_4\omega_2 - vw_1\omega_2^2 + \frac{3}{2}vw_2^2c_s^2 - \frac{1}{2}vw_3\omega_1\omega_2 + \frac{1}{2}vw_3^2\omega_4 + \frac{3}{2}vw_3\omega_4c_s^2 - \frac{1}{2}vw_4u^2\omega_2 + \frac{1}{2}vw_4^2\omega_1u^3 + \\
& 3vw_1u\omega_2 - \frac{3}{2}v^3\omega_4\omega_1\omega_2 + \frac{1}{2}v^3\omega_3^2\omega_4 + \frac{1}{4}vw_3^2\omega_1 + \frac{7}{2}vw_4\omega_2 - vw_3\omega_2 + \frac{1}{2}vw_3^2\omega_4u^2 + vw_3\omega_1u^2 + 2v^3\omega_4\omega_2^2 + \\
& \frac{1}{2}vw_3\omega_4\omega_1 - vw_3\omega_4c_s^2\omega_1u - 2v^3\omega_4u\omega_2 + 4v^3\omega_3^2\omega_4\omega_2 - \frac{3}{4}v^3\omega_3^2 + v^3\omega_3^2\omega_2u - vw_3\omega_4u\omega_2^2 + \frac{7}{2}v^3\omega_3\omega_2 + \frac{1}{4}v^3\omega_4^2\omega_1 - \\
& \frac{1}{4}vw_3^2\omega_1u - \frac{3}{4}vw_2^2 + \frac{1}{2}vw_3^2u^2\omega_2 + \frac{1}{2}vw_3\omega_4u^2 - \frac{1}{2}vw_3\omega_4c_s^2\omega_1 + 2vw_3\omega_4u\omega_2 + 2vw_3c_s^2\omega_1u\omega_2 - vw_3\omega_4\omega_1u^2 - \\
& \frac{3}{4}vw_3^2u^2 + 2v^3\omega_1\omega_2^2 + \frac{1}{2}v^3\omega_2^2\omega_1u - \frac{1}{2}vw_3\omega_4u^2 - \frac{1}{4}vw_3^2\omega_1u^2 - \frac{1}{2}vw_3^2c_s^2\omega_1 + 2vw_1\omega_2 + vw_3^2\omega_4c_s^2u + \frac{1}{2}vw_3\omega_4^2\omega_1 - \\
& 2vw_1u^2\omega_2 + \frac{1}{2}vw_4^2u + vw_3 - v^3\omega_3\omega_4 + \frac{1}{2}vw_4u\omega_2^2 + vw_3\omega_1u^3\omega_2 - \frac{1}{2}vw_4\omega_1u + \frac{1}{2}v^3\omega_3\omega_4\omega_1 + vw_2^2 - \frac{1}{2}vw_3^2\omega_1u^3 - \\
& \frac{1}{2}vw_3\omega_1 - \frac{1}{2}vw_4^2\omega_2 + \frac{3}{2}vw_3u^2\omega_2 - vw_4\omega_1\omega_2 - vw_4\omega_1u^3\omega_2 - \frac{3}{2}v^3\omega_3\omega_1\omega_2 - 4vw_2 + 4v^3\omega_1\omega_2^2 - \frac{1}{4}v^3\omega_4^2\omega_2 - \frac{3}{4}v^3\omega_4^2\omega_2 - \\
& \frac{3}{2}vw_3\omega_4 - v^3\omega_3^2\omega_4u - \frac{3}{4}vw_3^2 + \frac{1}{4}vw_2^2u^2 - 2v^3\omega_3\omega_4u^2 - 3vw_4u\omega_2 + \frac{1}{2}v^3\omega_3\omega_4^2 + vw_4\omega_1u^2 - vw_3\omega_4c_s^2 + v^3\omega_2^2\omega_2 + \\
& \frac{1}{2}vw_3^2u + \frac{5}{2}vw_4\omega_1u^2\omega_2 + \frac{1}{2}vw_3^2\omega_1u + vw_3\omega_4u - 3v^3\omega_4\omega_1u\omega_2 - \frac{1}{2}vw_1\omega_2^2 - \frac{1}{2}vw_4\omega_1 - \frac{1}{2}vw_4^2u^2\omega_2 - 3vw_3\omega_2^2\omega_2 - \\
& vw_3^2\omega_4c_s^2 + vw_3\omega_4c_s^2u - \frac{1}{2}vw_3\omega_1u^2\omega_2 - vw_3\omega_4\omega_2 - 3v^3\omega_3\omega_1u\omega_2 + vw_3c_s^2\omega_1\omega_2 - v^3\omega_3\omega_4u^2 + \frac{1}{2}vw_3\omega_4\omega_1u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l, y}^{[\mu_3], t-2\delta_t} = & -2 - v^2\omega_3^2\omega_2 + \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{1}{2}\omega_4\omega_1 - \omega_4\omega_1u^2\omega_2 + \frac{1}{2}\omega_1\omega_2^2 + \omega_3\omega_1u^2\omega_2 + 2v^2\omega_3\omega_4 - 2v^2\omega_1\omega_2^2 + \\
& 4v^2\omega_3\omega_1u\omega_2 + 2v^2\omega_4\omega_1\omega_2 + \omega_4\omega_1u^2 - \frac{1}{2}\omega_4^2u^2 + \frac{5}{2}\omega_4u\omega_2 + 4v^2\omega_4\omega_1u\omega_2 + 2v^2\omega_4u\omega_2^2 + \frac{3}{2}v^2\omega_3^2 + \frac{1}{2}\omega_4\omega_1\omega_2 +
\end{aligned}$$

$$\begin{aligned} & \frac{1}{2}\omega_4^2\omega_2 + 4v^2\omega_2^2 + 2\omega_4 - \frac{1}{2}\omega_4u\omega_2 - \frac{1}{2}\omega_4u\omega_2^2 + \omega_4^2u + 3v^2\omega_3\omega_4\omega_2 - \frac{3}{2}\omega_1\omega_2 + \frac{1}{2}\omega_3^2u^2 + \omega_1 - v^2\omega_3\omega_4^2 - \\ & v^2\omega_3^2\omega_1u + 2\omega_1u + v^2\omega_4^2\omega_2 - \frac{1}{2}\omega_4^2 - \frac{1}{2}\omega_3^2u^2\omega_2 - v^2\omega_4^2u\omega_2 + \frac{1}{2}v^2\omega_4^2 + 2v^2\omega_3\omega_4^2u - 3v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1 - \\ & \omega_3\omega_1u^2 + \frac{1}{2}\omega_3u\omega_2 - 4v^2\omega_1u\omega_2 - \frac{5}{2}\omega_4\omega_2 + 2v^2\omega_3\omega_1\omega_2 - 3\omega_1u\omega_2 - 6v^2\omega_3\omega_4u\omega_2 - \omega_2^2 + 3\omega_2 - 2\omega_4u + \\ & 2v^2\omega_3u\omega_2^2 + 2v^2\omega_3^2\omega_4u - v^2\omega_3\omega_4\omega_1 + \omega_1u\omega_2^2 - 2v^2\omega_3\omega_4\omega_1u - \frac{1}{2}\omega_3\omega_1u - \frac{1}{2}\omega_3u\omega_2^2 + \frac{1}{2}\omega_4\omega_2^2 - \frac{1}{2}v^2\omega_4^2\omega_1 - \\ & 5v^2\omega_3\omega_2 - \omega_4^2u\omega_2 + \frac{1}{2}\omega_4\omega_1u\omega_2 - 2v^2\omega_4\omega_2^2 - v^2\omega_4^2\omega_1u - v^2\omega_3^2\omega_4 + \frac{1}{2}\omega_3\omega_1u\omega_2, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_1],t-2\delta_t} = & vw_4 + vw_4^2\omega_1u^2 + \frac{7}{2}vw_3\omega_2 + 2v^3\omega_3\omega_2^2 - 2vw_3\omega_4c_s^2\omega_2 + v^3\omega_4\omega_2 - vw_3^2c_s^2 - vw_3\omega_4c_s^2 - vw_4u^2\omega_2 + \\ & \frac{3}{2}vw_4\omega_2 - vw_3^2\omega_4u^2 - 2vw_3\omega_1u^2 - 2v^3\omega_4\omega_2^2 - vw_3\omega_2^2 + \frac{1}{2}v^3\omega_3^2 + 2vw_3\omega_4u^2\omega_2 - v^3\omega_3\omega_2 - \frac{1}{2}vw_4^2 - \\ & vw_3\omega_4^2u^2 - v^3\omega_3^2\omega_2 + 2vw_3\omega_4\omega_1u^2 + \frac{1}{2}v\omega_3^2u^2 + vw_3\omega_4u^2 + vw_3^2\omega_1u^2 + 4vw_1u^2\omega_2 + vw_3 + vw_2^2 - vw_3u^2\omega_2 - \\ & 4vw_2 - \frac{1}{2}v^3\omega_4^2 + v^3\omega_4^2\omega_2 - vw_3\omega_4 - \frac{1}{2}vw_3^2 + \frac{1}{2}vw_4^2u^2 - 2vw_4\omega_1u^2 + vw_3\omega_4^2c_s^2 - 2vw_4\omega_1u^2\omega_2 - \frac{1}{2}vw_3^2\omega_2 + \\ & 2vw_3c_s^2\omega_2 + vw_3^2\omega_4c_s^2 - 2vw_3\omega_1u^2\omega_2 - \frac{1}{2}vw_3\omega_4\omega_2, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_3],t-2\delta_t} = & -4 + \frac{1}{2}\omega_3^2\omega_2 - \frac{1}{2}\omega_4\omega_1 + 5\omega_3 + \frac{1}{2}\omega_3\omega_4\omega_2 - \omega_1^2 - 2\omega_4\omega_1u^2 - \omega_3\omega_4 + \omega_4^2u^2 - v^2\omega_3^2 + \omega_3\omega_1^2 + v^2\omega_3^2\omega_2 - \\ & 2\omega_3\omega_1^2u^2 - \frac{7}{2}\omega_3\omega_1 + \omega_4 - \omega_3^2u^2 + 3\omega_1 + \omega_3^2\omega_1u^2 - v^2\omega_4^2\omega_2 + v^2\omega_4^2 - 2v^2\omega_4\omega_2 + \omega_3\omega_2^2 + 2\omega_3\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_1 - \\ & \frac{1}{2}\omega_4\omega_2 - 2v^2\omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_1 - \omega_2^2 + 3\omega_2 + 2\omega_4\omega_1^2u^2 + 2v^2\omega_3\omega_2 - \omega_3^2 - \omega_4^2\omega_1u^2 + 2v^2\omega_4\omega_2^2 - \frac{7}{2}\omega_3\omega_2, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_l,y}^{[\mu_1],t-2\delta_t} = & \frac{1}{2}vw_4\omega_1u\omega_2 + vw_4 - 2v^3\omega_3\omega_4\omega_2 - 4v^3\omega_2^2 + vw_3\omega_4^2u + \frac{3}{2}vw_3\omega_1u\omega_2 - \frac{3}{4}vw_4^2\omega_1u^2 - vw_4^2u\omega_2 + \frac{3}{2}vw_3\omega_2 + \\ & \frac{1}{2}vw_4^2\omega_1 - v^3\omega_3\omega_4\omega_1u - \frac{1}{2}v^3\omega_3^2\omega_1u - \frac{1}{2}vw_3u\omega_2^2 - \frac{1}{2}vw_4\omega_2^2 + \frac{1}{2}vw_3\omega_1u + vw_3^2\omega_4u + 2vw_3\omega_4c_s^2u\omega_2 + 2vw_3\omega_4c_s^2\omega_2 + \\ & \frac{1}{4}v^3\omega_3^2\omega_1 + \frac{5}{2}v^3\omega_4\omega_2 + vw_1u\omega_2^2 + \frac{3}{2}vw_3^2c_s^2 - \frac{1}{2}vw_3\omega_1\omega_2 + \frac{1}{2}vw_3^2\omega_4 + \frac{3}{2}vw_3\omega_4c_s^2 - \frac{1}{2}vw_4u^2\omega_2 - \frac{1}{2}vw_4^2\omega_1u^3 - \\ & 3vw_1u\omega_2 - \frac{3}{2}v^3\omega_4\omega_1\omega_2 + \frac{1}{2}v^3\omega_3^2\omega_4 + \frac{1}{4}vw_3^2\omega_1 + \frac{7}{2}vw_4\omega_2 + vw_3u\omega_2 + \frac{1}{2}vw_3^2\omega_4u^2 + vw_3\omega_1u^2 + 2v^3\omega_4\omega_2^2 + \\ & \frac{1}{2}vw_3\omega_4\omega_1 + vw_3\omega_4c_s^2\omega_1 + 2v^3\omega_4u\omega_2^2 - 4v^3\omega_3\omega_4u\omega_2 - \frac{3}{4}v^3\omega_3^2 - v^3\omega_3^2\omega_2 - vw_3\omega_4u^2\omega_2 + \frac{7}{2}v^3\omega_3\omega_2 + \frac{1}{4}v^3\omega_4^2\omega_1 + \\ & vw_3^2c_s^2\omega_1u - \frac{3}{4}vw_4^2 + \frac{1}{2}vw_3^2u^2\omega_2 + \frac{1}{2}vw_3\omega_4^2u^2 - \frac{1}{2}vw_3\omega_4c_s^2\omega_1 - 2vw_3\omega_4u\omega_2 - 2vw_3c_s^2\omega_1u\omega_2 - vw_3\omega_4\omega_1u^2 - \\ & \frac{3}{4}vw_3^2u^2 + 2v^3\omega_1\omega_2^2 - \frac{1}{2}v^3\omega_4\omega_1u - \frac{1}{2}vw_3\omega_4u^2 - \frac{1}{4}vw_3^2\omega_1u^2 - \frac{1}{2}vw_3^2c_s^2\omega_1 + 2vw_1\omega_2 - vw_3^2\omega_4c_s^2u + \frac{1}{2}vw_3\omega_4^2 - \\ & 2vw_1u^2\omega_2 - \frac{1}{2}vw_4^2u + vw_3 - v^3\omega_3\omega_4 - \frac{1}{2}vw_4u\omega_2^2 - vw_3\omega_1u^3\omega_2 + \frac{1}{2}vw_4\omega_1u + \frac{1}{2}v^3\omega_3\omega_4\omega_1 + vw_2^2 + \frac{1}{2}vw_3^2\omega_1u^3 - \\ & \frac{1}{2}vw_3\omega_1 - \frac{1}{2}vw_4^2\omega_2 + \frac{3}{2}vw_3u^2\omega_2 - vw_4\omega_1\omega_2 + vw_4\omega_1u^3\omega_2 - \frac{3}{2}v^3\omega_3\omega_1\omega_2 - 4vw_2 - 4v^3\omega_1u\omega_2^2 - \frac{1}{4}v^3\omega_4^2 - v^3\omega_4^2\omega_2 - \\ & \frac{3}{2}vw_3\omega_4 + v^3\omega_3^2\omega_4u - \frac{3}{4}vw_3^2 + \frac{1}{4}vw_4^2u^2 + 2v^3\omega_3u\omega_2^2 + 3vw_4u\omega_2 + \frac{1}{2}v^3\omega_3\omega_4^2 + vw_4\omega_1u^2 - vw_3\omega_4^2c_s^2 - v^3\omega_4^2\omega_2 - \\ & \frac{1}{2}vw_3^2u^2 + \frac{5}{2}vw_4\omega_1u^2\omega_2 - \frac{1}{2}vw_3^2\omega_1u - vw_3\omega_4u + 3v^3\omega_4\omega_1u\omega_2 - \frac{1}{2}vw_1\omega_2^2 - \frac{1}{2}vw_4\omega_1 - \frac{1}{2}vw_4^2u^2\omega_2 - 3vw_3c_s^2\omega_2 - \\ & vw_3^2\omega_4c_s^2 - vw_3\omega_4^2c_s^2u - \frac{1}{2}vw_3\omega_1u^2\omega_2 - vw_3\omega_4\omega_2 + 3v^3\omega_3\omega_1u\omega_2 + vw_3c_s^2\omega_1u\omega_2 + v^3\omega_3\omega_4^2u - \frac{1}{2}vw_3\omega_4\omega_1u, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_l,y}^{[\mu_3],t-2\delta_t} = & -2 + v^2\omega_3^2u\omega_2 + \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{1}{2}\omega_4\omega_1 - \omega_4\omega_1u^2\omega_2 + \frac{1}{2}\omega_1\omega_2^2 + \omega_3\omega_1u^2\omega_2 + 2v^2\omega_3\omega_4 - 2v^2\omega_1\omega_2^2 - \\ & 4v^2\omega_3\omega_1u\omega_2 + 2v^2\omega_4\omega_1\omega_2 + \omega_4\omega_1u^2 - \frac{1}{2}\omega_4^2u^2 - \frac{5}{2}\omega_4u\omega_2 - 4v^2\omega_4\omega_1u\omega_2 - 2v^2\omega_4u\omega_2^2 + \frac{3}{2}v^2\omega_3^2 + \frac{1}{2}\omega_4\omega_1\omega_2 + \\ & \frac{1}{2}\omega_4^2\omega_2 + 4v^2\omega_2^2 + 2\omega_4 + \frac{1}{2}\omega_4\omega_1u + \frac{1}{2}\omega_4u\omega_2^2 - \omega_4^2u + 3v^2\omega_3\omega_4\omega_2 - \frac{3}{2}\omega_1\omega_2 + \frac{1}{2}\omega_3^2u^2 + \omega_1 - v^2\omega_3\omega_4^2 + \\ & v^2\omega_3^2\omega_1u - 2\omega_1u + v^2\omega_4^2\omega_2 - \frac{1}{2}\omega_4^2 - \frac{1}{2}\omega_3^2u^2\omega_2 + v^2\omega_4^2u\omega_2 + \frac{1}{2}v^2\omega_4^2 - 2v^2\omega_3\omega_4^2u - 3v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1 - \\ & \omega_3\omega_1u^2 - \frac{1}{2}\omega_3u\omega_2 + 4v^2\omega_1\omega_2^2 - \frac{5}{2}\omega_4\omega_2 + 2v^2\omega_3\omega_1\omega_2 + 3\omega_1u\omega_2 + 6v^2\omega_3\omega_4u\omega_2 - \omega_2^2 + 3\omega_2 + 2\omega_4u - \\ & 2v^2\omega_3u\omega_2^2 - 2v^2\omega_3^2\omega_4u - v^2\omega_3\omega_4\omega_1 - \omega_1u\omega_2^2 + 2v^2\omega_3\omega_4\omega_1u + \frac{1}{2}\omega_3\omega_1u + \frac{1}{2}\omega_3u\omega_2^2 + \frac{1}{2}\omega_4\omega_2^2 - \frac{1}{2}v^2\omega_4^2\omega_1 - \\ & 5v^2\omega_3\omega_2 + \omega_4^2u\omega_2 - \frac{1}{2}\omega_4\omega_1u\omega_2 - 2v^2\omega_4\omega_2^2 + v^2\omega_4^2\omega_1u - v^2\omega_3^2\omega_4 - \frac{1}{2}\omega_3\omega_1u\omega_2, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_l,y+\delta_l}^{[\mu_1],t-2\delta_t} = & -1 + \frac{1}{4}v^2\omega_3^2\omega_1u^2 - \frac{1}{4}vw_4\omega_1u\omega_2 + \frac{1}{4}\omega_3^2\omega_4c_s^2 + \frac{1}{8}\omega_4^2u^3 + \frac{3}{4}\omega_4\omega_1u^3 - \frac{3}{4}v^2\omega_3^2u\omega_2 - \frac{3}{4}\omega_3c_s^2\omega_2 - \frac{5}{2}\omega_3c_s^2\omega_1u + \\ & \frac{1}{2}vw_4 + \omega_1u^2 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_3 + \frac{1}{4}\omega_4\omega_1u^2\omega_2 + v^3\omega_3\omega_4\omega_2 + 2v^3\omega_2^2 + \frac{1}{4}vw_3\omega_1u\omega_2 - \frac{1}{8}vw_3\omega_4\omega_1u + \frac{1}{4}vw_4^2\omega_1u^2 + \\ & \frac{7}{8}vw_3\omega_2 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{4}v^3\omega_3\omega_4\omega_1u + v^2\omega_1^2u\omega_2 - \frac{1}{8}\omega_3^2u - \frac{3}{4}vw_3^2c_s^2u - \frac{1}{4}v^3\omega_3^2\omega_1u + \frac{11}{8}v^2\omega_3\omega_4 - \frac{1}{2}v^3\omega_3\omega_2^2 - \\ & \frac{1}{2}\omega_4\omega_1^4 + \frac{1}{4}\omega_3\omega_4u - \frac{1}{8}\omega_3^2\omega_1u + \frac{1}{2}v^2\omega_1^2\omega_2^2 + \frac{3}{4}v^2\omega_3\omega_1u\omega_2 - \frac{1}{4}vw_3\omega_1u + \frac{1}{2}v^2\omega_4\omega_1\omega_2 + 3v^2\omega_2 + vw_3\omega_4c_s^2u\omega_2 - \\ & \frac{1}{2}v^2\omega_3\omega_1^2u^2 - \frac{1}{2}vw_3\omega_4c_s^2\omega_2 - \frac{7}{8}vw_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_4c_s^2\omega_2 - \frac{1}{4}v^3\omega_3\omega_2\omega_1 - \frac{5}{4}v^3\omega_4\omega_2 - \frac{1}{8}\omega_3\omega_4 - \frac{3}{8}\omega_4^2u^2 - \frac{1}{8}\omega_3^2u + 2\omega_3c_s^2 + \\ & \frac{1}{4}\omega_4u\omega_2 + \frac{3}{4}v^2\omega_4\omega_1u\omega_2 - \frac{1}{2}v^2\omega_4u\omega_2^2 - \frac{3}{4}vw_3^2c_s^2 + \frac{1}{4}v^2\omega_3\omega_2 + \frac{1}{4}\omega_4^2\omega_1u^4 + \frac{5}{4}v^2\omega_4\omega_1u - \frac{1}{4}vw_3\omega_1\omega_2 - \frac{3}{4}vw_3\omega_4c_s^2 + \\ & \frac{1}{2}\omega_3^2\omega_4c_s^2u^2 + \frac{1}{8}v^2\omega_4\omega_1 + \frac{1}{4}v^2\omega_3^2\omega_2 + \frac{1}{4}vw_4u^2\omega_2 - \frac{1}{4}vw_4\omega_1u^3 - v^2\omega_3 + \frac{3}{8}\omega_3u^2\omega_2 + \frac{1}{2}\omega_3^2\omega_1u^3 + \frac{5}{2}v^2\omega_4u\omega_2 + \\ & 2vw_1u\omega_2 + \frac{1}{4}\omega_3\omega_1u^3\omega_2 - \frac{1}{4}\omega_3\omega_1u^2\omega_2 - \frac{1}{8}\omega_3^2u^3 + \frac{1}{2}v^3\omega_3\omega_4\omega_1u - \frac{1}{4}v^3\omega_3\omega_2\omega_4 - \frac{3}{4}\omega_3^2\omega_4c_s^2u + \frac{3}{8}vw_4\omega_2 + \frac{1}{2}\omega_3c_s^2\omega_1u\omega_2 - \\ & \frac{3}{2}v^2\omega_1\omega_2 - \frac{1}{4}vw_3u\omega_2 - \frac{1}{4}\omega_4\omega_1u^3\omega_2 - \frac{1}{2}\omega_1u\omega_2^2 - v^2\omega_2^2 - \frac{1}{2}vw_3\omega_1u^2 + \frac{3}{4}\omega_4 - \frac{1}{4}v^3\omega_4\omega_2^2 - \frac{1}{8}\omega_4\omega_1u - \frac{1}{4}v^2\omega_3\omega_1^2u + \\ & \frac{1}{2}vw_3\omega_4c_s^2\omega_1u + \frac{3}{8}\omega_4^2u + v^2\omega_3\omega_4u\omega_2 + v^3\omega_4u\omega_2^2 + \frac{1}{4}v^2\omega_3\omega_4\omega_2 + \frac{1}{8}\omega_3\omega_4\omega_1u^2 - 2v^3\omega_3\omega_4u\omega_2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 - \\ & \frac{1}{4}\omega_1\omega_2 - vw_1^2u^2\omega_2 + \frac{3}{8}\omega_3^2\omega_2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2^2 - \frac{1}{2}v^3\omega_3\omega_2\omega_2 + \frac{1}{4}\omega_3^2c_s^2\omega_1 - \frac{1}{8}v^2\omega_4^2u + \frac{1}{2}\omega_3^2u^2 + \frac{1}{2}v^2\omega_4^2u^2\omega_2 - \frac{1}{4}\omega_3\omega_1^2u^3 + \\ & \frac{1}{2}\omega_1 - \frac{1}{2}vw_3\omega_4u^2\omega_2 - \frac{1}{8}\omega_3^2\omega_1u^2 + \frac{1}{8}\omega_3\omega_4u^2 - \frac{7}{4}v^3\omega_3\omega_2 - \frac{1}{4}v^2\omega_3\omega_4\omega_2 - \frac{9}{4}v^2\omega_3\omega_4u - \frac{1}{4}v^2\omega_3\omega_2\omega_1u + \frac{1}{2}vw_3^2c_s^2\omega_1u + \\ & \frac{1}{2}\omega_1u - \frac{1}{8}vw_4^2 + \frac{1}{4}v^2\omega_4^2\omega_2 + \frac{5}{8}v^2\omega_3\omega_1 - \frac{1}{2}vw_3^2u^2\omega_2 - \frac{1}{8}\omega_4^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1u + \frac{1}{4}v^3\omega_3^2\omega_2\omega_1 + \frac{1}{2}vw_3\omega_4c_s^2\omega_1 + \end{aligned}$$

$$\begin{aligned}
& \frac{1}{2}vw_3\omega_1u\omega_2 + \frac{1}{4}v^2\omega_4^2\omega_1u^2 - v\omega_3c_s^2\omega_1u\omega_2 + \frac{1}{4}vw_3\omega_4\omega_1u^2 - \omega_3u^2 - \frac{3}{4}\omega_3\omega_1u^3 - \frac{3}{4}v^2\omega_4^2u\omega_2 - \frac{1}{2}v\omega_1^2u\omega_2 + \\
& \frac{3}{8}v\omega_3^2u^2 + \omega_3c_s^2\omega_1^2u^2 + \frac{1}{8}v^2\omega_4^2 - v^3\omega_1\omega_2 - \frac{1}{4}v^3\omega_4^2\omega_1u + \frac{3}{4}v^2\omega_3\omega_4^2u + \frac{1}{2}\omega_3\omega_1u^4 + \frac{1}{4}vw_3\omega_4u^2 - \frac{13}{8}v^2\omega_4\omega_2 - \\
& \frac{1}{8}v^2\omega_3^2\omega_1 + \frac{1}{2}v\omega_3^2c_s^2\omega_1 + \frac{1}{2}vw_3^2u\omega_2 + \frac{3}{4}vw_1\omega_2 + \frac{1}{2}\omega_3^2c_s^2\omega_1u - \frac{1}{8}\omega_3\omega_1u^2 - \frac{1}{2}vw_3^2\omega_4c_s^2u - \frac{1}{2}v^2\omega_4\omega_1u^2 + vw_1u^2\omega_2 + \\
& \frac{1}{4}\omega_3u\omega_2 - \frac{5}{4}\omega_3c_s^2\omega_1 + \frac{1}{4}vw_4^2u + \frac{1}{2}vw_3 + v^2\omega_1u\omega_2 + \frac{1}{2}v^3\omega_3\omega_4 - \frac{1}{8}\omega_4\omega_2 + \frac{1}{4}v^2\omega_3\omega_2 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{2}vw_3\omega_1u^3 - \\
& \frac{1}{4}vw_4\omega_1u - \frac{1}{4}v^3\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_1u\omega_2 + \frac{1}{4}vw_3^2\omega_1u^3 - \frac{1}{4}vw_3\omega_1 - \frac{3}{4}vw_3u^2\omega_2 - v^2\omega_3\omega_4u\omega_2 + \frac{1}{2}\omega_2 - \omega_4u - \frac{1}{2}v^2\omega_3u\omega_2 + \\
& \frac{3}{4}v^2\omega_3^2\omega_4u - \frac{1}{4}\omega_3^2\omega_1u^4 + \frac{1}{4}v^2\omega_3\omega_4\omega_1u^2 + \frac{3}{2}v^2\omega_3\omega_4\omega_1u^2 + \frac{1}{2}vw_4\omega_1u^3\omega_2 + v^3\omega_3\omega_1\omega_2 - \frac{3}{2}vw_2 - \frac{3}{8}v^2\omega_3\omega_4\omega_1 - \\
& 2v^2\omega_3\omega_1u^2\omega_2 - 2v^3\omega_1u\omega_2 + \frac{1}{4}\omega_3\omega_4c_s^2\omega_2 + \frac{1}{2}\omega_4u^2 - \frac{1}{2}\omega_3^2c_s^2 - \frac{1}{2}\omega_4^2\omega_1u^3 + \frac{5}{2}v^2\omega_3u\omega_2 - \frac{1}{8}\omega_4u^2\omega_2 + \frac{1}{8}v^3\omega_4^2 + \\
& \frac{1}{4}v^3\omega_4^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1u - \frac{1}{2}v^3\omega_3^2\omega_4u^2 - \frac{3}{2}\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_4\omega_1u^2 - \frac{1}{4}vw_3\omega_4 + \frac{1}{2}v^3\omega_3^2\omega_4u - \frac{1}{4}v^2\omega_4\omega_1u + \frac{3}{8}\omega_3\omega_1u - \\
& \frac{1}{8}vw_3^2 - \frac{1}{8}vw_4^2u^2 + v^3\omega_3u\omega_2 - 2v^2\omega_4\omega_1u^2\omega_2 + \frac{9}{4}\omega_3\omega_4c_s^2u + \frac{1}{4}\omega_3^2c_s^2u - \frac{3}{4}vw_4\omega_1u\omega_2 - \frac{11}{8}v^2\omega_3\omega_2 - \frac{1}{4}v^3\omega_3\omega_4^2 - \\
& 5v^2\omega_1u\omega_2 - \frac{1}{2}vw_4\omega_1u^2 + \frac{1}{4}vw_3\omega_4c_s^2 - \frac{1}{2}v^3\omega_4^2u\omega_2 + \frac{1}{2}v^2\omega_3^2u^2\omega_2 + \frac{1}{4}\omega_4\omega_1u^3 + \frac{1}{4}v^2\omega_3^2u - \frac{1}{2}v^2\omega_4 + \frac{1}{2}\omega_3c_s^2\omega_1u + \\
& \frac{1}{4}\omega_4^2\omega_1u^2 - \frac{1}{2}v^2\omega_3\omega_4u^2 - \frac{1}{4}vw_3^2\omega_1u + \frac{1}{2}vw_3\omega_4u + \frac{3}{2}v^3\omega_4\omega_1u\omega_2 - \frac{1}{2}\omega_3^2c_s^2\omega_1u^2 + \frac{1}{4}v^2\omega_4\omega_2 - \frac{1}{8}\omega_3\omega_2 + 2v^2\omega_1^2u^2\omega_2 - \\
& \frac{1}{8}vw_3^2\omega_2 - \frac{1}{4}vw_4\omega_1 - \frac{3}{2}\omega_3\omega_4c_s^2\omega_1u^2 + \frac{3}{2}vw_3\omega_4c_s^2\omega_2 + \frac{1}{4}vw_3^2\omega_4c_s^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1\omega_2 + \frac{3}{2}vw_3\omega_4\omega_1u^2\omega_2 - \\
& \frac{1}{4}v^2\omega_4^2\omega_1u - \frac{1}{8}vw_3\omega_4\omega_2 + \frac{3}{2}v^3\omega_3\omega_1u\omega_2 - vw_3c_s^2\omega_1\omega_2 - \frac{1}{4}v^2\omega_3^2\omega_4u + \frac{1}{2}v^3\omega_3\omega_4\omega_1u - \frac{1}{4}vw_3\omega_4\omega_1u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_i, y+\delta_i}^{[\mu_3], t-2\delta_t} = & -2 - vw_4\omega_1u\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_2 + \frac{3}{2}vw_4 + \frac{1}{8}\omega_3^2\omega_2 - \frac{3}{8}\omega_4\omega_1u^2\omega_2 + \frac{3}{8}\omega_3\omega_4\omega_2 - 2vw_3\omega_4^2u - vw_3\omega_1u\omega_2 + \\
& \frac{1}{2}\omega_3\omega_4\omega_1u - \frac{1}{2}vw_4^2\omega_1u^2 + \frac{3}{4}vw_4^2\omega_2 + 2vw_3\omega_2 - \frac{3}{2}\omega_3\omega_1u^2\omega_2 + \omega_3^2u - v^2\omega_3\omega_4 + \frac{7}{2}\omega_3\omega_4u + \frac{1}{4}\omega_3^2\omega_1u + v^2\omega_1\omega_2^2 - \\
& 2v^2\omega_3\omega_1u\omega_2 + \frac{1}{2}vw_3\omega_2 - \frac{1}{4}vw_4\omega_2^2 - 3vw_3\omega_1u - \frac{1}{2}v^2\omega_4\omega_1\omega_2 - 2vw_3^2\omega_4u + \frac{3}{2}\omega_4\omega_1u^2 - \frac{7}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4^2u^2 + \frac{1}{2}\omega_4u\omega_2 - \\
& 2v^2\omega_4\omega_1u\omega_2 - vw_1u\omega_2 - v^2\omega_4\omega_2^2 - \frac{3}{4}v^2\omega_3^2 - \frac{1}{2}vw_3\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1u + \frac{3}{4}vw_3^2\omega_4 + vw_4\omega_1u^2 - \frac{1}{4}v^2\omega_3^2\omega_2 + 6vw_1u\omega_2 + \\
& \frac{1}{2}\omega_3\omega_1^2u^2 + \frac{1}{2}vw_4\omega_1u - \frac{9}{8}\omega_3\omega_1 + \frac{1}{2}vw_3^2\omega_1 + 2vw_4\omega_2 - 3vw_3\omega_2 - 2v^2\omega_2^2 + vw_3^2\omega_4u^2 + \frac{1}{4}\omega_3\omega_4^2 + \frac{3}{2}\omega_4 - 2\omega_4\omega_1u + \\
& vw_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2u - \frac{3}{2}v^2\omega_3\omega_4\omega_2 + \frac{3}{4}vw_4^2\omega_1u - \frac{3}{2}\omega_3\omega_4\omega_1u^2 - \omega_3\omega_4u\omega_2 - \frac{1}{2}\omega_1\omega_2 - \frac{1}{4}vw_3\omega_2^2 - \frac{1}{2}\omega_3^2\omega_2 - \\
& \frac{3}{4}\omega_3^2u^2 + \omega_1 - vw_3\omega_4u^2\omega_2 - \frac{1}{4}\omega_3^2\omega_1u^2 - \omega_3\omega_4u^2 + \frac{1}{2}v^2\omega_3\omega_4 + \frac{1}{2}v^2\omega_3^2\omega_1u + 4\omega_1u - \frac{1}{2}vw_4^2 + \frac{1}{2}\omega_1^2\omega_2 - \frac{1}{4}v^2\omega_4^2\omega_2 - \\
& \frac{1}{2}vw_3^2\omega_2 + vw_3\omega_4^2u^2 - \frac{1}{4}\omega_4^2 + \frac{1}{2}\omega_3\omega_4u^2\omega_2 + \frac{3}{2}vw_3\omega_4\omega_2 - 3vw_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_2^2 + \frac{1}{2}v^2\omega_4\omega_2^2 - \\
& vw_1^2\omega_2 - \omega_1^2u - \frac{1}{4}v^2\omega_4^2 + \frac{1}{4}\omega_4^2\omega_1u - v^2\omega_3\omega_4^2u - \frac{1}{2}vw_3^2\omega_1u^2 + \frac{3}{2}v^2\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_1 + \frac{3}{4}vw_3\omega_2 + 2vw_1\omega_2 + \omega_1^2\omega_2 + \\
& \frac{5}{2}\omega_3\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_4u^2 + \frac{3}{4}vw_3\omega_4^2 + \frac{3}{2}\omega_3\omega_2 + \frac{1}{2}vw_4^2u + \frac{5}{2}vw_3 + 2v^2\omega_1u\omega_2^2 + \frac{1}{8}\omega_2^2\omega_1 - \frac{3}{8}\omega_4\omega_2 + \frac{1}{2}vw_4\omega_2^2 + \frac{1}{2}v^2\omega_3\omega_2^2 + \\
& \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{3}{2}v^2\omega_3\omega_1\omega_2 - 3vw_4\omega_1u + vw_3\omega_1u^2 + vw_2^2 - 2\omega_1\omega_2 - \frac{3}{2}vw_3\omega_1 - \frac{1}{4}vw_4\omega_2^2 + 3v^2\omega_3\omega_4\omega_2 + \omega_2 - \frac{3}{2}\omega_4u - \\
& v^2\omega_3\omega_2^2 - v^2\omega_3^2\omega_4u + \frac{1}{4}\omega_4\omega_1u^2 - \frac{1}{2}vw_4\omega_1\omega_2 - 4vw_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1 + \frac{1}{2}vw_3\omega_1u^2 + \frac{1}{2}\omega_3\omega_1\omega_2 + v^2\omega_3\omega_4\omega_1u + \frac{1}{4}\omega_3\omega_4 + \\
& \frac{1}{2}\omega_4\omega_1u^2 - \frac{7}{2}vw_3\omega_4 - \frac{3}{4}\omega_2^2\omega_4u - 2\omega_3\omega_1u - vw_2^3 - 3vw_4\omega_1u + \frac{5}{2}v^2\omega_3\omega_2 - \frac{1}{2}\omega_3^2 + \frac{1}{2}vw_2^2 - 2\omega_1^2u^2 + 2vw_4\omega_1u^2\omega_2 - \\
& \frac{1}{4}\omega_4^2\omega_1u^2 + \frac{3}{4}vw_3^2\omega_1u + 5vw_3\omega_4u + \frac{1}{2}\omega_4\omega_1u\omega_2 - \frac{1}{2}vw_1\omega_2^2 + \frac{1}{2}v^2\omega_4\omega_2^2 - \frac{9}{8}\omega_3\omega_2 - \frac{1}{4}vw_3\omega_2^2 - \frac{1}{2}vw_4\omega_1 - \\
& \frac{1}{2}vw_2^2\omega_2 + 2vw_3\omega_1u^2\omega_2 + \frac{1}{2}v^2\omega_4^2\omega_1u - \frac{3}{4}\omega_3\omega_4u^2 - \frac{1}{2}vw_3\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_4 + \frac{1}{2}\omega_3\omega_1\omega_2 + \frac{3}{2}vw_3\omega_4\omega_1u - \frac{5}{2}\omega_3u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y+\delta_i}^{[\mu_1], t-2\delta_t} = & -1 - \frac{1}{2}v^2\omega_3^2\omega_1u^2 + \frac{1}{2}\omega_3c_s^2\omega_2 + \frac{1}{2}vw_4 - 2\omega_1u^2 - \frac{1}{4}v^2\omega_3\omega_1^2 - \frac{3}{2}\omega_4\omega_1 + \frac{1}{4}\omega_3 - \frac{1}{4}\omega_4\omega_1u^2\omega_2 - \frac{1}{4}v\omega_4^2\omega_1u^2 + \\
& \frac{1}{2}vw_3\omega_2 + \frac{1}{4}vw_4^2\omega_1 - \frac{1}{2}\omega_3c_s^2\omega_1 - \frac{1}{4}\omega_3\omega_1u^2\omega_2 - \frac{1}{4}v^2\omega_3\omega_4 + \omega_4\omega_1u^4 - \frac{1}{4}v^2\omega_4\omega_1\omega_2 + v^2\omega_2 + v^2\omega_3\omega_1^2u^2 + \\
& \frac{5}{2}\omega_4\omega_1u^2 + \frac{1}{4}v^3\omega_3^2\omega_1 - \frac{1}{2}v^3\omega_4\omega_2 - \frac{1}{4}\omega_3\omega_4 - \frac{3}{4}\omega_4^2u^2 - \frac{1}{2}\omega_3c_s^2 + \frac{1}{2}vw_3^2\omega_2 - \frac{1}{2}\omega_4^2\omega_1u^4 - \frac{1}{2}vw_3\omega_1\omega_2 + \\
& \frac{1}{2}vw_3\omega_4c_s^2 - \omega_3^2\omega_4c_s^2u^2 - \frac{1}{4}\omega_3\omega_1^2 + v^2\omega_4\omega_1u + \frac{1}{2}vw_4u^2\omega_2 + \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_3u^2\omega_2 + \frac{5}{4}\omega_3\omega_1u^2 + \frac{1}{2}v^3\omega_4\omega_1\omega_2 + \\
& \frac{1}{4}\omega_4\omega_1\omega_2 - \frac{1}{4}v^2\omega_4\omega_1^2 + \frac{1}{4}vw_3^2\omega_1 + \frac{1}{2}vw_4\omega_2 - 2v^2\omega_1\omega_2 + \omega_1u^2\omega_2 + \frac{5}{4}\omega_4 + \frac{1}{2}vw_3\omega_4\omega_1 - \\
& 2v^2\omega_3\omega_4u^2\omega_2 - \frac{1}{4}\omega_3\omega_4\omega_1u^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{2}\omega_1\omega_2 + 2vw_2^2u\omega_2 - \frac{1}{4}v^3\omega_3^2 - \omega_3\omega_4c_s^2u^2 + \frac{1}{2}\omega_3^2u^2 - \\
& v^2\omega_4^2u^2\omega_2 + \omega_1 + vw_3\omega_4u^2\omega_2 - \frac{1}{2}\omega_3^2\omega_1u^2 - \frac{1}{4}\omega_3\omega_4u^2 + \frac{1}{2}v^3\omega_3\omega_2 - \frac{1}{4}v^3\omega_4\omega_1\omega_1 - \frac{1}{4}vw_2^2 + \frac{1}{4}\omega_4\omega_1^2 + \frac{1}{2}v^2\omega_3\omega_2^2 - \\
& \frac{1}{2}vw_2^2\omega_2 - \frac{1}{4}\omega_4^2 - \frac{1}{2}vw_3\omega_4c_s^2\omega_1 - \frac{1}{2}v^2\omega_4^2\omega_1u^2 - \frac{1}{2}\omega_3^2u^2 - \frac{1}{4}vw_3\omega_4\omega_1u^2 + \frac{1}{4}vw_3^2u^2 - 2\omega_3c_s^2\omega_1^2u^2 + \frac{1}{4}v^2\omega_4^2 - \\
& \omega_3\omega_1^2u^4 - \frac{1}{2}vw_3\omega_4u^2 - \frac{1}{4}v^2\omega_3\omega_1u^2 + \frac{1}{2}v^2\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_2^2c_s^2\omega_1 + 2vw_1\omega_2 - \frac{1}{2}\omega_3\omega_1u^2 + v^2\omega_4\omega_2^2u^2 - 2vw_1\omega_2^2u^2 + \\
& \frac{1}{2}vw_3 - \frac{1}{4}\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_1 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_3\omega_1 + v^2\omega_1\omega_2 + \frac{1}{2}\omega_2 + \frac{1}{2}\omega_3\omega_1u^4 - \frac{1}{2}vw_4\omega_1\omega_2 - \\
& 3v^2\omega_3\omega_4\omega_1u^2 - \frac{1}{2}v^3\omega_3\omega_1\omega_2 - \frac{3}{2}vw_2 + \frac{1}{4}v^2\omega_3\omega_4\omega_1 + \frac{1}{4}\omega_3\omega_1\omega_2 + 4v^2\omega_3\omega_1u^2\omega_2 + \frac{3}{4}\omega_4\omega_2^2 - \frac{1}{4}\omega_4\omega_2^2\omega_2 + \frac{1}{4}v^3\omega_4^2 + \\
& v^2\omega_3^2\omega_4u^2 + \frac{1}{2}\omega_3\omega_4c_s^2 - \frac{5}{4}\omega_4\omega_1u^2 - \frac{1}{2}vw_3\omega_4 + \frac{1}{2}\omega_3c_s^2\omega_1^2 - \frac{1}{4}vw_3^2 - \frac{1}{4}vw_4\omega_2^2 + 4v^2\omega_4\omega_1u^2\omega_2 - \frac{1}{4}v^2\omega_4^2\omega_1 - \\
& \frac{1}{4}v^2\omega_3\omega_2 + vw_4\omega_1u^2 - v^2\omega_3^2\omega_2^2 - \frac{3}{4}v^2\omega_4 - \frac{3}{2}vw_4\omega_1u^2\omega_2 + \frac{1}{4}\omega_4^2\omega_1u^2 + v^2\omega_3\omega_4^2u^2 + \omega_3^2c_s^2\omega_1u^2 - \frac{1}{4}\omega_3\omega_2 + \\
& \frac{4}{4}\omega_4\omega_1 - 4v^2\omega_1^2u^2\omega_2 - \frac{1}{2}vw_4\omega_1 + \frac{1}{2}vw_4^2\omega_2 + 3\omega_3\omega_4c_s^2\omega_1u^2 - \frac{3}{2}vw_3\omega_1u^2\omega_2 + vw_3c_s^2\omega_2 - \frac{3}{2}vw_3\omega_1u^2\omega_2 + vw_3c_s^2\omega_1\omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y+\delta_i}^{[\mu_1], t-2\delta_t} = & -2 + 2vw_4 - \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{5}{2}\omega_4\omega_1 + 2\omega_4\omega_1u^2\omega_2 + vw_4^2\omega_1u^2 + \frac{1}{2}vw_3\omega_2 + vw_4^2\omega_1 + 2\omega_3\omega_1u^2\omega_2 - \omega_1^2 - \\
& v^2\omega_4\omega_1\omega_2 - 3\omega_4\omega_1u^2 + \frac{1}{2}\omega_4^2u^2 + \frac{1}{2}v^2\omega_3^2 - \frac{1}{2}vw_3\omega_1\omega_2 - 2vw_4\omega_1u^2 + \frac{1}{2}\omega_4\omega_1\omega_2 + \frac{1}{2}vw_4\omega_2 - 2vw_3^2\omega_4u^2 + \\
& 2\omega_4 + 3\omega_3\omega_4\omega_1u^2 - \frac{3}{2}\omega_1\omega_2 + 4vw_1^2\omega_2 + \frac{3}{2}\omega_3^2u^2 + 3\omega_1 + 2vw_3\omega_4u^2\omega_2 + 2\omega_3\omega_4u^2 - vw_4^2 + \frac{1}{2}\omega_4\omega_1^2 + \\
& vw_3^2\omega_2 - vw_1^2\omega_2 - 2vw_3\omega_4u^2 - \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_1^2\omega_2 + \frac{1}{2}vw_4\omega_1^2 - \omega_3\omega_4u^2\omega_2 - \omega_3\omega_4u^2 + 6vw_3\omega_4\omega_1u^2 -
\end{aligned}$$

$$\begin{aligned} & \frac{1}{2}\omega_3^2u^2\omega_2 - \frac{1}{2}v^2\omega_4^2 + v\omega_3^2\omega_1u^2 + v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1 + 3v\omega_1\omega_2 - 2\omega_1^2u^2\omega_2 - 5\omega_3\omega_1u^2 - \omega_3^2\omega_4u^2 - \frac{1}{2}\omega_4\omega_2 + \\ & v^2\omega_3\omega_1\omega_2 - 2v\omega_3\omega_1^2u^2 - \frac{1}{2}v\omega_3\omega_1 + \omega_2 - \frac{1}{2}v\omega_4\omega_1\omega_2 - 2v\omega_2 + \frac{1}{2}v\omega_3\omega_1^2 - 2\omega_4\omega_1^2u^2 + \frac{1}{2}v^2\omega_4^2\omega_1 - v^2\omega_3\omega_2 + \\ & 4\omega_1^2u^2 - 4v\omega_4\omega_1u^2\omega_2 + \omega_4^2\omega_1u^2 + \frac{1}{2}\omega_4^2\omega_1 - \frac{5}{2}v\omega_4\omega_1 + v\omega_4^2u^2\omega_2 - 4v\omega_3\omega_1u^2\omega_2, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_t, y+\delta_t}^{[\mu_1], t-2\delta_t} = & -1 + \frac{1}{4}v^2\omega_3^2\omega_1u^2 + \frac{1}{4}v\omega_4\omega_1u\omega_2 + \frac{1}{4}\omega_3^2\omega_4c_s^2 - \frac{1}{8}\omega_4^2u^3 - \frac{3}{4}\omega_4\omega_1u^3 + \frac{3}{4}v^2\omega_3^2u\omega_2 - \frac{3}{4}\omega_3c_s^2\omega_2 + \frac{5}{2}\omega_3c_s^2\omega_1u + \\ & \frac{1}{2}v\omega_4 + \omega_1u^2 - \frac{1}{2}\omega_4\omega_1 + \frac{1}{4}\omega_3 + \frac{1}{4}\omega_4\omega_1u^2\omega_2 + v^3\omega_3\omega_4\omega_2 + 2v^3\omega_2^2 - \frac{1}{4}v\omega_3\omega_1u\omega_2 + \frac{1}{8}\omega_3\omega_4\omega_1u + \frac{1}{4}v\omega_4^2\omega_1u^2 + \\ & \frac{7}{8}v\omega_3\omega_2 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{4}v^3\omega_3\omega_4\omega_1u - v^2\omega_1^2u\omega_2 + \frac{1}{8}\omega_3^2u + \frac{3}{4}\omega_3\omega_4c_s^2u + \frac{1}{4}v^3\omega_3^2\omega_1u + \frac{11}{8}v^2\omega_3\omega_4 - \frac{1}{2}v^3\omega_3\omega_2^2 - \\ & \frac{1}{2}\omega_4\omega_1^2u^4 - \frac{1}{4}\omega_3\omega_4u + \frac{1}{8}\omega_3^2\omega_1u + \frac{1}{2}v^2\omega_1\omega_2^2 - \frac{3}{4}v^2\omega_3\omega_1u\omega_2 + \frac{1}{4}v\omega_3\omega_1u + \frac{1}{2}v^2\omega_4\omega_1\omega_2 + 3v^2\omega_2 - v\omega_3\omega_4c_s^2u\omega_2 - \\ & \frac{1}{4}v^2\omega_3\omega_1u^2 - \frac{1}{2}v\omega_3\omega_4c_s^2\omega_2 - \frac{7}{8}\omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_4c_s^2 - \frac{1}{4}v^3\omega_3^2\omega_1 - \frac{5}{4}v^3\omega_4\omega_2 - \frac{1}{8}\omega_3\omega_4 - \frac{3}{8}\omega_4^2u^2 + \frac{1}{8}v^2\omega_3^2u + 2\omega_3c_s^2 - \\ & \frac{1}{4}\omega_4u\omega_2 - \frac{3}{4}v^2\omega_4\omega_1u\omega_2 + \frac{1}{2}v^2\omega_4u\omega_2^2 - \frac{3}{4}v\omega_3c_s^2 + \frac{1}{4}v^2\omega_3^2 + \frac{1}{4}\omega_4^2\omega_1u^4 - \frac{5}{4}v^2\omega_4\omega_1u - \frac{1}{4}v\omega_3\omega_1\omega_2 - \frac{3}{4}v\omega_3\omega_4c_s^2 + \\ & \frac{1}{2}\omega_3^2\omega_4c_s^2u^2 + \frac{1}{8}v^2\omega_4\omega_1 + \frac{1}{4}v^2\omega_3^2\omega_2 + \frac{1}{4}v\omega_4u^2\omega_2 + \frac{1}{4}v\omega_4^2\omega_1u^3 - v^2\omega_3 + \frac{3}{8}\omega_3u^2\omega_2 - \frac{1}{2}\omega_3^2\omega_1u^3 - \frac{5}{2}v^2\omega_4u\omega_2 - \\ & 2v\omega_1u\omega_2 - \frac{1}{4}\omega_3\omega_1u^3\omega_2 - \frac{1}{4}\omega_3\omega_1^2u^2 + \frac{1}{8}\omega_3^2u^3 + \frac{1}{2}v^3\omega_4\omega_1\omega_2 - \frac{1}{4}v^3\omega_3\omega_4 + \frac{3}{4}\omega_3\omega_4c_s^2u + \frac{3}{8}v\omega_4\omega_2 - \frac{1}{2}\omega_3c_s^2\omega_1u\omega_2 - \\ & \frac{3}{8}v^2\omega_1\omega_2 + \frac{1}{4}v\omega_3\omega_1u\omega_2 + \frac{1}{4}\omega_4\omega_1u^3\omega_2 - \frac{1}{2}\omega_1u^2\omega_2 - v^2\omega_2^2 - \frac{1}{2}v\omega_3\omega_1u^2 + \frac{3}{4}\omega_4 - \frac{1}{2}v^3\omega_4\omega_2^2 + \frac{1}{8}\omega_4\omega_1u + \frac{1}{4}v^2\omega_3\omega_1^2u - \\ & \frac{1}{2}v\omega_3\omega_4c_s^2\omega_1u - \frac{3}{8}\omega_4^2u + v^2\omega_3\omega_4u^2\omega_2 - v^3\omega_4\omega_1u\omega_2^2 + \frac{1}{4}v^2\omega_3\omega_4\omega_2 + \frac{1}{8}\omega_3\omega_4\omega_1u^2 + 2v^3\omega_3\omega_4u\omega_2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 - \\ & \frac{1}{4}\omega_1\omega_2 - v\omega_1^2u^2\omega_2 + \frac{3}{8}v^3\omega_3^2 + \frac{1}{2}\omega_3\omega_4c_s^2u^2 + \frac{1}{2}v^3\omega_3^2\omega_3\omega_2 + \frac{1}{4}\omega_3^2c_s^2\omega_1 + \frac{1}{8}v^2\omega_4^2u + \frac{1}{2}\omega_3^2u^2 + \frac{1}{2}v^2\omega_4^2u^2\omega_2 + \frac{1}{4}\omega_3\omega_1^3 + \\ & \frac{1}{2}\omega_1 - \frac{1}{2}v\omega_3\omega_4u^2\omega_2 - \frac{1}{8}\omega_3^2\omega_1u^2 + \frac{1}{8}v^3\omega_3\omega_2 - \frac{1}{4}v^2\omega_3\omega_4u^2 + \frac{9}{4}v^2\omega_3\omega_4u + \frac{1}{4}v^2\omega_3^2\omega_1u - \frac{1}{2}v\omega_3\omega_4c_s^2\omega_1u - \\ & \frac{1}{2}\omega_1u - \frac{1}{8}v\omega_4^2 + \frac{1}{4}v^2\omega_3^2\omega_2 + \frac{1}{8}v^2\omega_3\omega_1 - \frac{1}{2}v\omega_3^2u^2\omega_2 - \frac{1}{8}\omega_4^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1u + \frac{1}{4}v^2\omega_3^2\omega_2 + \frac{1}{2}v\omega_3\omega_4c_s^2\omega_1 - \\ & \frac{1}{2}v\omega_3\omega_4u\omega_2 + \frac{1}{4}v^2\omega_4^2\omega_1u^2 + v\omega_3c_s^2\omega_1u\omega_2 + \frac{1}{4}v\omega_3\omega_4\omega_1u^2 - w_3u^2 + \frac{3}{4}v^2\omega_4^2u\omega_2 + \frac{1}{2}v\omega_1^2u + \\ & \frac{3}{8}v\omega_3^2u^2 + w_3c_s^2\omega_1u^2 + \frac{1}{8}v^2\omega_4^2 - v^3\omega_1\omega_2^2 + \frac{1}{4}v^3\omega_4^2\omega_1u - \frac{3}{4}v^2\omega_3\omega_4u + \frac{1}{2}\omega_3\omega_1^2u^4 + \frac{1}{8}v^2\omega_4^2u^2 + \frac{13}{8}v^2\omega_4\omega_2 - \\ & \frac{1}{8}v^2\omega_3^2\omega_1 + \frac{1}{2}v\omega_3^2c_s^2\omega_1 - \frac{1}{2}v\omega_3^2u\omega_2 + \frac{3}{4}v\omega_1\omega_2 - \frac{1}{2}\omega_3^2c_s^2\omega_1u - \frac{1}{8}\omega_3\omega_1u^2 + \frac{1}{2}v\omega_3^2\omega_4c_s^2u - \frac{1}{2}v^2\omega_4\omega_1u^2 + v\omega_1u^2\omega_2 - \\ & \frac{1}{4}\omega_3uu\omega_2 - \frac{5}{4}\omega_3c_s^2\omega_1 - \frac{1}{4}v\omega_4^2u + \frac{1}{2}v\omega_3 - v^2\omega_1u\omega_2 + \frac{1}{2}v^3\omega_3\omega_4 - \frac{1}{8}\omega_4\omega_2 + \frac{1}{4}v^2\omega_3\omega_2^2 + \frac{1}{4}v^2\omega_3\omega_1u^2 + \\ & \frac{1}{4}v\omega_4\omega_1u - \frac{1}{4}v^3\omega_3\omega_4\omega_1 + \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}v\omega_3^2\omega_1u^3 - \frac{1}{4}v\omega_3\omega_1 - \frac{3}{4}v\omega_3u^2\omega_2 + v^2\omega_3\omega_4u\omega_2 + \frac{1}{2}\omega_2 + \omega_4u + \frac{1}{2}v^2\omega_3\omega_2^2 - \\ & \frac{3}{4}v^2\omega_3^2\omega_4u - \frac{1}{4}\omega_3^2\omega_1u^4 - \frac{5}{4}v^2\omega_3\omega_1u + \frac{3}{4}v^2\omega_3\omega_4\omega_1u^2 - \frac{1}{2}v\omega_4\omega_1u^3\omega_2 + v^3\omega_3\omega_1u^2 - \frac{3}{2}v\omega_2 - \frac{3}{8}v^2\omega_3\omega_4\omega_1 - \\ & 2v^2\omega_3\omega_1u^2\omega_2 + 2v^3\omega_1u\omega_2^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \frac{1}{2}\omega_4u^2 - \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{2}\omega_4^2\omega_1u^3 - \frac{5}{2}v^2\omega_3\omega_1u\omega_2 - \frac{1}{8}\omega_4u^2\omega_2 + \frac{1}{8}v^3\omega_4^2 + \\ & \frac{1}{4}v^3\omega_4^2\omega_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1u - \frac{1}{2}v^2\omega_3^2\omega_4u^2 - \frac{3}{2}\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_4\omega_1u^2 - \frac{1}{4}v\omega_3\omega_4u - \frac{1}{2}v^3\omega_3\omega_4\omega_2 + \frac{1}{8}\omega_3\omega_1u - \\ & \frac{1}{4}v\omega_3^2 - \frac{1}{8}v\omega_4^2u^2 - v^3\omega_3\omega_2^2 - 2v^2\omega_4\omega_1u^2\omega_2 - \frac{9}{4}\omega_3\omega_4c_s^2u - \frac{1}{4}\omega_3^2c_s^2u + \frac{3}{4}v\omega_4\omega_1u\omega_2 - \frac{11}{8}v^2\omega_3\omega_2 - \frac{1}{4}v^3\omega_3\omega_4^2 + \\ & 5v^2\omega_1u\omega_2 - \frac{1}{2}v\omega_4\omega_1u^2 + \frac{1}{4}v\omega_3\omega_4c_s^2 + \frac{1}{2}v^3\omega_4^2\omega_1u\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_2^2\omega_2 - \frac{1}{4}\omega_4\omega_1u^3 - \frac{1}{4}v\omega_3^2u - \frac{1}{2}v^2\omega_4 - \frac{1}{2}\omega_3c_s^2\omega_1u + \\ & \frac{1}{4}\omega_4^2\omega_1u^2 - \frac{1}{2}v^2\omega_3\omega_4u^2 + \frac{1}{4}v\omega_3^2\omega_1u - \frac{1}{2}v\omega_3\omega_4u - \frac{3}{2}v\omega_2 - \frac{3}{8}v^2\omega_3\omega_4\omega_1 - \\ & 2v^2\omega_3\omega_1u^2\omega_2 + 2v^3\omega_1u\omega_2^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \frac{1}{2}\omega_4u^2 - \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{2}\omega_4^2\omega_1u^3 - \frac{5}{2}v^2\omega_3\omega_1u\omega_2 - \frac{1}{8}\omega_4u^2\omega_2 + \frac{1}{8}v^3\omega_4^2 + \\ & \frac{1}{4}v^3\omega_4^2\omega_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1u - \frac{1}{2}v^2\omega_3^2\omega_4u^2 - \frac{3}{2}\omega_3\omega_4c_s^2 + \frac{1}{4}\omega_4\omega_1u^2 - \frac{1}{4}v\omega_3\omega_4u + \frac{1}{2}v^3\omega_3\omega_4\omega_2 - \\ & \frac{8}{8}v\omega_3^2u^2 - v^3\omega_3\omega_2^2 - 2v^2\omega_4\omega_1u^2\omega_2 - \frac{9}{4}\omega_3\omega_4c_s^2u - \frac{1}{4}\omega_3^2c_s^2u + \frac{3}{4}v\omega_4\omega_1u\omega_2 - \frac{11}{8}v^2\omega_3\omega_2 - \frac{1}{4}v^3\omega_3\omega_4^2 + \\ & 5v^2\omega_1u\omega_2 - \frac{1}{2}v\omega_4\omega_1u^2 + \frac{1}{4}v\omega_3\omega_4c_s^2 + \frac{1}{2}v^3\omega_4^2\omega_1u\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_2^2\omega_2 - \frac{1}{4}\omega_4\omega_1u^3 - \frac{1}{4}v\omega_3^2u - \frac{1}{2}v^2\omega_4 - \frac{1}{2}\omega_3c_s^2\omega_1u + \\ & \frac{1}{4}\omega_4^2\omega_1u^2 - \frac{1}{2}v^2\omega_3\omega_4u^2 + \frac{1}{4}v\omega_3^2\omega_1u - \frac{1}{2}v\omega_3\omega_4u - \frac{3}{2}v\omega_2 - \frac{3}{8}v^2\omega_3\omega_4\omega_1 - \\ & \frac{1}{4}v\omega_3^2\omega_2 - \frac{1}{4}v\omega_4\omega_1 - \frac{3}{2}\omega_3\omega_4c_s^2\omega_1u^2 + \frac{3}{4}v\omega_3c_s^2\omega_2 + \frac{1}{4}v\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1u\omega_2 + \frac{3}{2}v\omega_3\omega_1u^2\omega_2 + \\ & \frac{1}{4}v^2\omega_4^2\omega_1u - \frac{1}{8}v\omega_3\omega_4\omega_2 - \frac{3}{2}v\omega_3\omega_1u\omega_2 - v\omega_3c_s^2\omega_1u\omega_2 - \frac{1}{4}v^2\omega_3^2\omega_4u - \frac{1}{2}v^3\omega_3\omega_4u + \frac{1}{4}v\omega_3\omega_1u\omega_2 + \frac{1}{4}v\omega_3\omega_4\omega_1u, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_t, y+\delta_t}^{[\mu_3], t-2\delta_t} = & -2 + v\omega_4\omega_1u\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_2 + \frac{3}{2}v\omega_4 + \frac{1}{8}\omega_3^2\omega_2 - \frac{3}{8}\omega_4\omega_1 + \frac{5}{2}\omega_3 - \frac{1}{2}\omega_4\omega_1u^2\omega_2 + \frac{3}{8}\omega_3\omega_4\omega_2 + 2v\omega_3\omega_4c_s^2u + v\omega_3\omega_1u\omega_2 - \\ & \frac{1}{2}\omega_3\omega_4\omega_1u - \frac{1}{2}v\omega_4^2\omega_1u^2 - \frac{3}{4}v\omega_4^2u\omega_2 + 2v\omega_3\omega_2 - \frac{3}{2}\omega_3\omega_1u^2\omega_2 - \omega_3^2u - v^2\omega_3\omega_4 - \frac{7}{2}\omega_3\omega_4u - \frac{1}{4}\omega_3^2\omega_1u + v^2\omega_1\omega_2^2 + \\ & 2v^2\omega_3\omega_1u\omega_2 - \frac{1}{2}v\omega_3\omega_2 - \frac{1}{4}v\omega_4\omega_2 + 3v\omega_3\omega_1u - \frac{1}{2}v^2\omega_4\omega_1\omega_2 + 2v\omega_3^2\omega_4u + \frac{3}{2}\omega_4\omega_1u^2 - \frac{7}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4^2u^2 - \frac{1}{2}\omega_4u\omega_2 + \\ & 2v^2\omega_4\omega_1u\omega_2 + v\omega_1u\omega_2^2 + v^2\omega_4u\omega_2^2 - \frac{3}{4}v^2\omega_3^2 - \frac{1}{2}v\omega_3\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1^2u + \frac{3}{4}v\omega_3^2\omega_4 + v\omega_4\omega_1u^2 - \frac{1}{4}v^2\omega_3^2\omega_2 - 6v\omega_1u\omega_2 + \\ & \frac{1}{2}\omega_3\omega_1^2u^2 - \frac{1}{2}v\omega_4\omega_1^2u - \frac{9}{8}\omega_3\omega_1 + \frac{1}{2}v\omega_3^2\omega_1 + \frac{1}{2}v\omega_3\omega_4\omega_1u^2 - \frac{1}{2}\omega_3\omega_2^2\omega_1u^2 + \frac{1}{4}v^2\omega_4\omega_2^2 - \frac{1}{8}\omega_3\omega_2 + 2v\omega_1^2\omega_2^2 - \\ & v\omega_3\omega_2 - \frac{1}{4}v\omega_4\omega_1 - \frac{3}{2}\omega_3\omega_4c_s^2\omega_1u^2 + \frac{3}{2}v\omega_3c_s^2\omega_2 + \frac{1}{4}v\omega_3\omega_4c_s^2u + \frac{1}{2}v\omega_3\omega_4c_s^2\omega_1u\omega_2 + \frac{3}{2}v\omega_3\omega_1u^2\omega_2 + \\ & v\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_4^2u - \frac{3}{2}v^2\omega_3\omega_4\omega_2 - \frac{3}{4}v\omega_4\omega_1u - \frac{3}{2}v\omega_3\omega_4\omega_1u^2 + \frac{1}{2}v\omega_3\omega_4\omega_2u - \frac{1}{2}\omega_1\omega_2 - \frac{1}{4}v\omega_3\omega_2^2 - 2v\omega_1^2\omega_2^2 + \frac{1}{2}\omega_3^2\omega_2u - \\ & \frac{3}{4}v\omega_3^2u^2 + \omega_1 - v\omega_3\omega_4u^2\omega_2 - \frac{1}{4}\omega_3^2\omega_1u^2 - \frac{1}{2}v\omega_3\omega_4u^2 + \frac{1}{2}v^2\omega_3\omega_2^2 - \frac{1}{2}v^2\omega_3\omega_1u - \frac{1}{2}v\omega_4^2 - \frac{1}{2}\omega_1^2u\omega_2 - \frac{1}{4}v^2\omega_4\omega_2^2 - \\ & \frac{1}{2}v\omega_3^2u^2\omega_2 + v\omega_3\omega_4c_s^2u^2 - \frac{1}{4}\omega_4^2 + \frac{1}{2}v\omega_3\omega_4u^2\omega_2 - \frac{3}{2}v\omega_3\omega_4\omega_2u + \frac{1}{2}v\omega_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_2^2\omega_2 - \frac{1}{2}v\omega_4\omega_1u^3 - \\ & v\omega_1^2\omega_2 + \omega_2^2u - \frac{1}{4}v^2\omega_4^2 - \frac{1}{4}\omega_4^2\omega_1u + v^2\omega_3\omega_2^2u - \frac{1}{2}v\omega_3^2\omega_1u^2 + \frac{3}{2}v\omega_2^2\omega_4\omega_2 + \frac{1}{2}v^2\omega_3\omega_2^2\omega_2 - \frac{1}{4}v\omega_3^2\omega_1u^2 + \\ & \frac{5}{2}\omega_3\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_4u^2 + \frac{3}{4}v\omega_3\omega_4^2 - \frac{3}{2}v\omega_3\omega_2u - \frac{1}{2}v\omega_4^2u + \frac{5}{2}v\omega_3\omega_2u + \frac{1}{2}v\omega_3\omega_4\omega_2u + \frac{1}{2}v\omega_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_2u + \\ & \frac{3}{8}\omega_3\omega_4\omega_1u^2 - \frac{3}{2}v^2\omega_3\omega_1\omega_2 + 3v\omega_4\omega_1u + v\omega_3\omega_1^2u^2 + v\omega_2^2 + 2\omega_1u\omega_2 - \frac{3}{2}v\omega_3\omega_1 - \frac{1}{4}v\omega_4\omega_2^2 - 3v^2\omega_3\omega_4\omega_2u + \omega_2 + \frac{3}{2}\omega_4u + \\ & v^2\omega_3\omega_2^2 + v^2\omega_3^2\omega_4u - \frac{1}{2}\omega_4\omega_1^2u - \frac{1}{2}v\omega_4\omega_1\omega_2 - 4v\omega_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1 - \frac{1}{2}v\omega_3\omega_2^2u + \frac{1}{2}\omega_3\omega_1\omega_2 - v^2\omega_3\omega_4\omega_1u + \frac{1}{4}\omega_3^2\omega_4 + \\ & \frac{1}{2}\omega_4\omega_1^2u^2 - \frac{7}{2}v\omega_3\omega_4 + \frac{3}{4}\omega_3^2\omega_4u + 2\omega_3\omega_1u - v\omega_3^2 + 3v\omega_4\omega_1u\omega_2 + \frac{5}{2}v^2\omega_3\omega_2^2 - \frac{1}{2}\omega_3^2 - \frac{1}{2}v\omega_3^2u - 2\omega_1^2u^2 + 2v\omega_4\omega_1u^2\omega_2 - \\ & \frac{1}{4}\omega_4^2\omega_1u^2 - \frac{3}{4}v\omega_3^2\omega_1u - 5v\omega_3\omega_4u - \frac{1}{2}\omega_4\omega_1\omega_2 - \frac{1}{2}v\omega_1^2 + \frac{1}{2}v^2\omega_4\omega_2^2 - \frac{9}{8}\omega_3\omega_2 - \frac{1}{4}v\omega_3^2\omega_2 - \frac{1}{2}v\omega_4\omega_1 - \\ & \frac{1}{2}v\omega_4^2\omega_1u^2 + 2v\omega_3\omega_1u^2\omega_2 - \frac{1}{2}v^2\omega_4^2\omega_1u + \frac{3}{4}\omega_3\omega_4u - \frac{1}{2}v\omega_3\omega_4\omega_2 + \frac{1}{2}v\omega_3\omega_4\omega_1u + \frac{5}{2}\omega_3\omega_1u, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_t, y-\delta_t}^{[\mu_1], t-3\delta_t} = & -1 + \frac{1}{2}\omega_3^2\omega_4c_s^2 - \frac{1}{2}\omega_3c_s^2\omega_2 - \frac{1}{2}v\omega_4 + 2v^3\omega_3\omega_4\omega_1\omega_2 - \frac{1}{4}v^2\omega_3\omega_1^2 - \frac{3}{2}\omega_4\omega_1 + \frac{1}{4}\omega_3 + \frac{1}{4}\omega_4\omega_1u^2\omega_2 + \\ & \frac{1}{2}v^3\omega_3^2\omega_1\omega_2 - 2v^3\omega_3\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_4\omega_1 - 2v^2\omega_2^2 - \frac{1}{4}v\omega_4^2\omega_1u^2 + \frac{1}{2}v\omega_3^2\omega_4c_s^2\omega_1 - \frac{1}{4}v\omega_3\omega_2 - \frac{1}{4}v\omega_4\omega_1 + \end{aligned}$$

$$\begin{aligned}
& \frac{1}{2}\omega_3 c_s^2 \omega_1 \omega_2 - \frac{1}{2}\omega_3 \omega_4 c_s^2 \omega_1^2 - \frac{1}{4}\omega_3 \omega_1 u^2 \omega_2 + \frac{5}{2}v^2 \omega_3 \omega_4 + v^3 \omega_3 \omega_2^2 + v^2 \omega_1 \omega_2^2 + \frac{1}{2}v^2 \omega_3 \omega_4^2 \omega_1 + \frac{13}{4}v^2 \omega_4 \omega_1 \omega_2 + \\
& 4v^2 \omega_2 - v \omega_4 \omega_1^2 u^2 \omega_2 + v \omega_3 \omega_4 c_s^2 \omega_2 - \frac{1}{4}\omega_4 \omega_1 u^2 + \frac{1}{2}\omega_3 \omega_4^2 c_s^2 + \frac{1}{4}v^3 \omega_3^2 \omega_1 + \frac{3}{2}v^3 \omega_4 \omega_2 - \frac{1}{4}\omega_3 \omega_4 - \frac{3}{4}\omega_4^2 u^2 + \\
& 2\omega_3 c_s^2 + \frac{1}{2}v \omega_3^2 c_s^2 + \frac{1}{4}v^2 \omega_3^2 + \frac{9}{4}v \omega_3 \omega_1 \omega_2 + \frac{1}{2}v \omega_3 \omega_4 c_s^2 - v^3 \omega_4 \omega_1 \omega_2 + v \omega_3 \omega_1^2 u^2 \omega_2 - \frac{1}{4}\omega_3 \omega_1^2 + \frac{5}{4}v^2 \omega_4 \omega_1 + \\
& \frac{1}{2}v^2 \omega_3^2 \omega_2 - \frac{1}{2}v \omega_4 u^2 \omega_2 - v^2 \omega_3 + \frac{1}{4}\omega_3 u^2 \omega_2 + \frac{1}{2}v \omega_3 \omega_4^2 c_s^2 \omega_1 + \frac{3}{4}\omega_3 \omega_1^2 u^2 - \frac{3}{2}v^3 \omega_4 \omega_1 \omega_2 - \frac{1}{2}v^3 \omega_3 \omega_4^2 \omega_1 + \\
& \frac{1}{4}\omega_4 \omega_1 \omega_2 - \frac{1}{2}v^2 \omega_3 \omega_1^2 \omega_2 + \frac{1}{2}v^3 \omega_3^2 \omega_4 - v \omega_3 \omega_4 c_s^2 \omega_1 \omega_2 - \frac{1}{4}v^2 \omega_4 \omega_1^2 - \frac{1}{4}v \omega_2 \omega_3^2 \omega_1 - \frac{3}{4}v \omega_4 \omega_2 - 5v^2 \omega_1 \omega_2 - v^2 \omega_2^2 - \\
& \frac{1}{2}v^2 \omega_4 \omega_1 \omega_2^2 + \frac{5}{4}\omega_4 + v^3 \omega_4 \omega_2^2 - \frac{1}{2}v \omega_3 \omega_4 \omega_1 + \frac{1}{2}v^2 \omega_3 \omega_4 \omega_2 - \frac{1}{2}v^2 \omega_3^2 \omega_4 \omega_1 + 3\omega_3 \omega_4 c_s^2 \omega_1 - \frac{1}{2}\omega_1 \omega_2 - \\
& \frac{1}{4}v^3 \omega_3^2 + \frac{1}{2}\omega_3^2 c_s^2 \omega_1 + \frac{3}{4}\omega_3^2 u^2 + \omega_1 - \frac{3}{4}\omega_3^2 \omega_1 u^2 + \frac{3}{2}v^3 \omega_3 \omega_2 + \frac{1}{4}v^3 \omega_4 \omega_1 - \frac{1}{2}v^2 \omega_3 \omega_4^2 - \frac{1}{2}v \omega_3^2 \omega_1 u^2 \omega_2 + \frac{1}{4}v \omega_4^2 + \\
& \frac{5}{2}v^2 \omega_4^2 \omega_2 + \frac{5}{4}v^2 \omega_3 \omega_1 + \frac{1}{4}\omega_4 \omega_1^2 + \frac{1}{2}v \omega_3^2 \omega_2 + \frac{1}{2}v \omega_1^2 \omega_2 - \frac{1}{4}\omega_4^2 + \frac{1}{2}v \omega_4^2 \omega_1 u^2 \omega_2 + \frac{1}{2}v^3 \omega_4^2 \omega_1 \omega_2 - \frac{1}{2}v^3 \omega_3^2 \omega_2 - \\
& \frac{1}{2}v \omega_3 \omega_4 c_s^2 \omega_1 - \omega_3 u^2 - \frac{1}{4}v \omega_3^2 u^2 + \frac{1}{4}v^2 \omega_4^2 - \frac{1}{2}v \omega_3 \omega_4 c_s^2 \omega_1 \omega_2 + 2v^3 \omega_1 \omega_2^2 + \frac{1}{4}v \omega_3^2 \omega_1 u^2 - \frac{11}{4}v^2 \omega_4 \omega_2 - \frac{1}{4}v^2 \omega_3^2 \omega_1 - \\
& \frac{1}{2}v \omega_3 c_s^2 \omega_1 - \frac{5}{2}v \omega_1 \omega_2 + \frac{1}{4}\omega_3 \omega_1 u^2 - \frac{5}{2}\omega_3 c_s^2 \omega_1 - \frac{1}{2}v \omega_3 - \frac{1}{2}v \omega_3 \omega_4^2 \omega_1 - \frac{1}{4}\omega_4 \omega_2 + \frac{1}{2}v^2 \omega_3 \omega_2 + \\
& \frac{1}{4}v \omega_3 \omega_4 \omega_1 + \frac{13}{4}v^2 \omega_3 \omega_1 \omega_2 + \frac{1}{2}v^3 \omega_3 \omega_4 \omega_1 + \frac{1}{2}v^2 \omega_3 \omega_4 \omega_1^2 - v^3 \omega_3 \omega_1 \omega_2^2 + \frac{1}{2}v \omega_3 \omega_1 + v^2 \omega_1^2 \omega_2 + \frac{1}{2}v \omega_3 u^2 \omega_2 + \frac{1}{2}\omega_2 + \\
& \frac{3}{2}v \omega_4 \omega_1 \omega_2 - \frac{3}{2}v^3 \omega_3 \omega_1 \omega_2 + 2v \omega_2 - 3v^2 \omega_3 \omega_4 \omega_1 - \frac{1}{2}v^2 \omega_4 \omega_1^2 \omega_2 + \frac{1}{4}\omega_3 \omega_1 \omega_2 + \frac{1}{2}v \omega_3 \omega_4 c_s^2 \omega_2 + \omega_4 u^2 - \frac{1}{2}v \omega_3^2 \omega_1^2 - \\
& \frac{1}{4}v \omega_4^2 \omega_2 + \frac{5}{2}v^2 \omega_3 \omega_1 + \frac{1}{4}\omega_4 \omega_1^2 + \frac{1}{2}v \omega_3^2 \omega_2 + \frac{1}{2}v \omega_1^2 \omega_2 - \frac{1}{4}\omega_4^2 + \frac{1}{2}v \omega_4^2 \omega_1 u^2 \omega_2 + \frac{1}{2}v^3 \omega_3 \omega_2 - \frac{1}{2}v \omega_3 \omega_4 c_s^2 - \\
& \frac{1}{2}v \omega_3 c_s^2 \omega_1 - \frac{3}{2}v \omega_3 \omega_1 u^2 \omega_2 - \frac{1}{4}v \omega_3^2 \omega_1 \omega_2 + \frac{1}{4}v \omega_3 \omega_4 \omega_2 + v \omega_3 c_s^2 \omega_1 \omega_2 - \frac{1}{2}v^2 \omega_3^2 \omega_4 - \frac{1}{2}v \omega_3 \omega_4 c_s^2 \omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_3],t-3\delta_t} = & 3 + \frac{3}{4}\omega_3 \omega_4 \omega_1 \omega_2 + \frac{5}{2}v \omega_4 + \frac{1}{2}\omega_4^2 u^2 \omega_2 - \frac{1}{4}\omega_3^2 \omega_2 + \frac{13}{4}\omega_4 \omega_1 - \frac{15}{4}\omega_3 - \omega_4 \omega_1 u^2 \omega_2 + v^2 \omega_3^2 \omega_4 \omega_1 - \frac{3}{4}\omega_3 \omega_4 \omega_2 + \\
& \frac{1}{4}\omega_3^2 \omega_1 \omega_2 + \frac{7}{2}v \omega_3 \omega_2 + v \omega_4^2 \omega_1 + \omega_3 \omega_1 u^2 \omega_2 + \omega_1^2 + v^2 \omega_3 \omega_4 - 2v^2 \omega_1 \omega_2^2 - \frac{1}{2}v \omega_4 \omega_2^2 + v^2 \omega_3 \omega_4^2 \omega_1 + 2v^2 \omega_4 \omega_1 \omega_2 + \\
& \frac{1}{2}v \omega_3 \omega_1^2 \omega_2 - v \omega_3 \omega_4 \omega_1^2 + \omega_4 \omega_1 u^2 + \frac{13}{4}\omega_3 \omega_4 - \frac{1}{2}\omega_4^2 u^2 + \frac{1}{2}v^2 \omega_3^2 - 4v \omega_3 \omega_1 \omega_2 + \frac{3}{2}v \omega_3^2 \omega_4 - \omega_3 \omega_1^2 + \frac{1}{2}v^2 \omega_3^2 \omega_2 + \\
& \omega_3 \omega_1^2 u^2 + \frac{1}{2}v \omega_3 \omega_1 \omega_2^2 + \frac{1}{2}v \omega_3^2 \omega_1 - \frac{3}{2}\omega_4 \omega_1 \omega_2 + \frac{19}{4}\omega_3 \omega_1 + v \omega_3^2 \omega_1 + \frac{7}{2}v \omega_4 \omega_2 + 2v^2 \omega_2^2 + v^2 \omega_4 \omega_1 \omega_2^2 - \frac{1}{2}v \omega_3 \omega_2^2 - \\
& \frac{11}{4}\omega_4 + 7v \omega_3 \omega_4 \omega_1 + \frac{1}{2}v \omega_4 \omega_1^2 \omega_2 + \frac{1}{2}v \omega_3^2 \omega_4 \omega_1 + 3v^2 \omega_3 \omega_4 \omega_2 - \frac{1}{2}v^2 \omega_3^2 \omega_1 \omega_2 + 2\omega_1 \omega_2 - \frac{1}{2}v \omega_3 \omega_2^2 + \frac{1}{2}\omega_3^2 u^2 - 4\omega_1 - \\
& \frac{1}{2}\omega_3^2 \omega_1 u^2 - v^2 \omega_3 \omega_4^2 + \frac{1}{2}v \omega_4^2 \omega_1 \omega_2 - v \omega_2^2 + \frac{1}{2}v^2 \omega_4^2 \omega_2 - \frac{1}{2}\omega_4 \omega_1^2 - v \omega_1^2 \omega_2 + \frac{1}{2}\omega_4^2 - \frac{1}{2}\omega_1 \omega_2 + \frac{1}{2}v \omega_4 \omega_1^2 + \frac{1}{2}\omega_3^2 \omega_1 u^2 \omega_2 - \\
& \frac{1}{2}\omega_3^2 u^2 \omega_2 + \frac{1}{2}v^2 \omega_4^2 - \frac{1}{2}\omega_4^2 \omega_1 u^2 \omega_2 - \frac{3}{2}v \omega_3^2 \omega_4 \omega_1 - 2v^2 \omega_4 \omega_2 - \frac{1}{2}v^2 \omega_3^2 \omega_1 + 6v \omega_1 \omega_2 - \omega_3 \omega_1 u^2 + \frac{3}{2}v \omega_3 \omega_4^2 + \frac{5}{2}v \omega_3 - \\
& \frac{3}{4}\omega_3^2 \omega_1 + \frac{3}{4}\omega_4 \omega_2 - v^2 \omega_3 \omega_2^2 - \frac{15}{4}\omega_3 \omega_4 \omega_1 + 2v^2 \omega_3 \omega_1 \omega_2 + v \omega_2^2 - 3v \omega_3 \omega_1 - \frac{1}{2}v \omega_4 \omega_2^2 - \frac{3}{2}\omega_2 - \frac{3}{2}v \omega_3 \omega_4^2 \omega_1 - 4v \omega_4 \omega_1 \omega_2 - \\
& 5v \omega_2 - v^2 \omega_3 \omega_4 \omega_1 - \frac{9}{4}\omega_3 \omega_1 \omega_2 + \frac{1}{2}v \omega_3 \omega_1^2 + \omega_4 \omega_1^2 u^2 \omega_2 - \frac{1}{2}\omega_3^2 \omega_4 + \frac{1}{2}v \omega_4 \omega_1 \omega_2^2 - \omega_4 \omega_1^2 u^2 - 6v \omega_3 \omega_4 + \frac{1}{2}v \omega_3 \omega_2^2 - \\
& \omega_3 \omega_1^2 u^2 \omega_2 - v \omega_2^2 - \frac{1}{2}v^2 \omega_3 \omega_2 - 3v^2 \omega_3 \omega_4 \omega_1 \omega_2 + v^2 \omega_3 \omega_1 \omega_2^2 + \frac{3}{4}\omega_3^2 + \frac{1}{2}v \omega_3 \omega_4 \omega_1^2 + \frac{1}{2}\omega_4^2 \omega_1 u^2 - \frac{1}{2}v^2 \omega_4^2 \omega_1 \omega_2 - \\
& v \omega_1 \omega_2^2 + v \omega_3 \omega_4 \omega_1 \omega_2 - v^2 \omega_4 \omega_2^2 + \frac{7}{4}\omega_3 \omega_2 - \frac{1}{2}v \omega_4^2 \omega_1 - \frac{1}{2}v \omega_3 \omega_2 - 3v \omega_4 \omega_1 + \frac{1}{2}v \omega_3 \omega_2 \omega_1 - v \omega_3 \omega_4 \omega_2 - v^2 \omega_3^2 \omega_4,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l,y}^{[\mu_1],t-3\delta_t} = & \frac{7}{2}v \omega_4 \omega_1 \omega_2 - v \omega_4 - \frac{1}{2}v^3 \omega_3^2 \omega_1 \omega_2 + v \omega_3 \omega_4 \omega_1^2 + \frac{7}{2}v \omega_3 \omega_1 \omega_2 \omega_2 - \frac{3}{4}v \omega_4^2 \omega_1 u^2 + \frac{1}{2}v \omega_3^2 \omega_4 c_s^2 \omega_1 + \\
& \frac{3}{2}v \omega_3^2 \omega_4 u \omega_2 - v \omega_4^2 \omega_1 \omega_2 - \frac{21}{4}v \omega_3 \omega_2 - \frac{1}{4}v \omega_4^2 \omega_1 + \frac{1}{2}v \omega_3^2 \omega_4 \omega_1 \omega_2^2 - v^3 \omega_3 \omega_2^2 - \frac{1}{2}v \omega_3 \omega_4^2 \omega_2 - \frac{1}{2}v \omega_3 \omega_4 \omega_1 \omega_2^2 + \\
& \frac{1}{2}v \omega_4 \omega_2^2 + \frac{1}{2}v \omega_3 \omega_1 \omega_2 + v \omega_3 \omega_4 \omega_1 - v \omega_4 \omega_1^2 u^2 \omega_2 + v \omega_3 \omega_4 c_s^2 \omega_2 + \frac{1}{4}v^3 \omega_3^2 \omega_1 - \frac{1}{2}v^3 \omega_4 \omega_2 + v \omega_1 \omega_2^2 + \frac{1}{2}v \omega_3^2 c_s^2 - \\
& \frac{1}{2}v \omega_3 \omega_4^2 \omega_1 \omega_2 + \frac{9}{4}v \omega_3 \omega_1 \omega_2 - \frac{1}{2}v \omega_3^2 \omega_4 \omega_2 - \frac{1}{2}v \omega_3 \omega_4 c_s^2 - v^3 \omega_4 \omega_1 \omega_2^2 - v \omega_3 \omega_1^2 u^2 \omega_2 + \frac{1}{2}v \omega_4 u^2 \omega_2 + \\
& \frac{1}{2}v \omega_3 \omega_4^2 \omega_1 \omega_2^2 + 2v \omega_3 \omega_4 \omega_1 \omega_2^2 - 6v \omega_1 \omega_2 + \frac{1}{2}v \omega_3 \omega_4^2 c_s^2 \omega_1 + \frac{3}{2}v \omega_3 \omega_4^2 u \omega_2 - \frac{1}{2}v \omega_3 \omega_1 \omega_2^2 + \frac{1}{2}v^3 \omega_4 \omega_1 \omega_2 - \\
& v \omega_3 \omega_4 c_s^2 \omega_1 \omega_2 - \frac{1}{4}v \omega_3^2 \omega_1 - \frac{17}{4}v \omega_4 \omega_2 + \frac{7}{2}v \omega_3 \omega_1 \omega_2 + \frac{1}{2}v \omega_3^2 \omega_4 u^2 + v \omega_3 \omega_1 u^2 + v^3 \omega_4 \omega_2^2 - \frac{1}{2}v \omega_3 \omega_4 \omega_1 - \\
& \frac{1}{2}v \omega_3 \omega_1 \omega_2^2 - \frac{1}{2}v \omega_3^2 \omega_4 \omega_1 \omega_2 + v \omega_3 \omega_2^2 + 2v \omega_1^2 \omega_2 - \frac{4}{3}v^3 \omega_3^2 + \frac{1}{2}v^3 \omega_3 \omega_2 - \frac{1}{4}v^3 \omega_4 \omega_1 + \frac{1}{2}v \omega_3^2 \omega_1 \omega_2^2 - \\
& \frac{1}{2}v \omega_4 \omega_1 \omega_2^2 + \frac{3}{4}v \omega_4^2 + \frac{1}{2}v \omega_3^2 \omega_2 \omega_2 + \frac{1}{2}v \omega_3 \omega_4^2 u^2 + \frac{1}{2}v \omega_4^2 \omega_1 \omega_2^2 + \frac{1}{2}v^3 \omega_4^2 \omega_1 \omega_2 - \frac{1}{2}v \omega_3 \omega_1 \omega_2 \omega_2 - \\
& \frac{1}{2}v \omega_3 \omega_4 \omega_1 \omega_2 - 8v \omega_3 \omega_4 \omega_1 \omega_2 - \frac{1}{2}v \omega_3 \omega_4 \omega_2^2 - \frac{3}{2}v \omega_3 \omega_4 \omega_1 \omega_2^2 + v \omega_1^2 \omega_2 - \frac{1}{4}v \omega_3^2 \omega_2^2 - \frac{1}{2}v \omega_3 \omega_4 \omega_2^2 - \frac{3}{4}v \omega_3^2 \omega_1 \omega_2^2 - \\
& \frac{1}{2}v \omega_4^2 \omega_1 \omega_2 - \frac{1}{2}v \omega_3^2 \omega_4 \omega_1 \omega_2 - \frac{5}{2}v \omega_1 \omega_2 - v \omega_3 \omega_2^2 - \frac{1}{2}v \omega_3 \omega_4^2 \omega_2 - \frac{1}{2}v \omega_3 \omega_4 \omega_1 \omega_2^2 - \frac{1}{2}v \omega_3 \omega_2 - v \omega_3 - \\
& \frac{1}{2}v \omega_4 \omega_1 \omega_2^2 + \frac{1}{2}v \omega_3 \omega_4 \omega_1 \omega_2 + \frac{5}{2}v \omega_1 \omega_2^2 + \frac{1}{2}v \omega_3 \omega_4 \omega_2^2 - \frac{1}{2}v \omega_3 \omega_4 \omega_1 \omega_2^2 + \frac{1}{2}v \omega_4 \omega_1 \omega_2^2 - \frac{1}{2}v \omega_3 \omega_1 \omega_2 + \\
& 5v \omega_2 + \frac{1}{4}v^3 \omega_4^2 - \frac{1}{2}v^3 \omega_4^2 \omega_2 - \frac{1}{2}v \omega_4 \omega_1 \omega_2^2 + \frac{3}{2}v \omega_3 \omega_4 + \frac{3}{4}v \omega_2^2 - \frac{1}{4}v \omega_4^2 u^2 + \frac{7}{2}v \omega_4 \omega_1 \omega_2 - \frac{1}{2}v \omega_3 \omega_1 \omega_2 \omega_2 + v \omega_4 \omega_1 \omega_2^2 - \\
& \frac{1}{2}v \omega_3 \omega_4^2 c_s^2 - \frac{1}{2}v \omega_3^2 \omega_4 \omega_2 - \frac{1}{2}v \omega_4 \omega_1 \omega_2^2 - v \omega_3 \omega_4 \omega_1 + \frac{1}{2}v \omega_3 \omega_1 \omega_2^2 - \frac{4}{3}v \omega_3 \omega_4 \omega_1 \omega_2 + \frac{1}{2}v \omega_3 \omega_4 \omega_2^2 + \frac{1}{2}v \omega_4 \omega_1 \omega_2 - \\
& v \omega_3 c_s^2 \omega_2 - \frac{1}{2}v \omega_3^2 \omega_4 c_s^2 - v \omega_3^2 \omega_4 u^2 \omega_2 - \frac{1}{2}v \omega_3 \omega_1 \omega_2^2 - \frac{1}{4}v \omega_3^2 \omega_1 \omega_2 + v \omega_3 \omega_4 \omega_2 + \frac{17}{4}v \omega_3 \omega_4 \omega_1 \omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l,y}^{[\mu_3],t-3\delta_t} = & 3 + \frac{3}{4}\omega_3 \omega_4 \omega_1 \omega_2 - \frac{1}{2}\omega_4^2 u^2 \omega_2 - \frac{3}{4}\omega_3^2 \omega_2 + \frac{3}{4}\omega_4 \omega_1 - \frac{15}{4}\omega_3 + 2\omega_4 \omega_1 u^2 \omega_2 - \frac{15}{4}\omega_3 \omega_4 \omega_2 + \frac{1}{4}\omega_3^2 \omega_1 \omega_2 - \omega_3 \omega_4 \omega_1 \omega_2 - \\
& \frac{1}{2}\omega_1 \omega_2^2 - \omega_3 \omega_4 \omega_1 \omega_2^2 + 2\omega_3 \omega_1 \omega_2^2 - \omega_3^2 \omega_1 + \omega_3^2 \omega_4 u^2 \omega_2 - 6\omega_3 \omega_4 \omega_1 - \frac{1}{2}\omega_3^2 \omega_1 \omega_2 + \frac{1}{2}\omega_4 \omega_1^2 \omega_2 - v^2 \omega_4 \omega_1 \omega_2 - 2\omega_4 \omega_1 \omega_2^2 + \\
& \frac{13}{4}\omega_3 \omega_4 + \frac{1}{2}\omega_4^2 u^2 - 3\omega_4 \omega_1 \omega_2 + \frac{1}{2}\omega_3 \omega_1 \omega_2 \omega_2 + \frac{1}{2}v^2 \omega_3^2 - \frac{1}{2}\omega_3 \omega_1^2 \omega_2 - \frac{1}{2}v^2 \omega_3^2 \omega_2 - \omega_3 \omega_1^2 \omega_2^2 - \frac{3}{4}\omega_4 \omega_1 \omega_2 + \frac{7}{4}\omega_3 \omega_1 - \\
& \frac{1}{2}\omega_4^2 \omega_2 + \omega_3 \omega_4^2 u^2 \omega_2 + v^2 \omega_4 \omega_1 \omega_2^2 - \frac{1}{2}\omega_3 \omega_1^2 \omega_2 - \frac{1}{2}\omega_3 \omega_4^2 - \frac{11}{4}\omega_4 + \frac{7}{2}\omega_4 \omega_1 \omega_2 + \frac{1}{2}\omega_4 \omega_1 \omega_2^2 - \omega_4^2 + \frac{1}{2}v^2 \omega_3^2 \omega_1 \omega_2 + 3\omega_3 \omega_4 \omega_1 \omega_2 + \\
& 7\omega_3 \omega_4 \omega_1 \omega_2 + 2\omega_1 \omega_2 + \frac{1}{2}\omega_3 \omega_1 \omega_2 \omega_2 + \omega_3^2 \omega_2 + \frac{1}{2}\omega_3^2 \omega_2^2 - \frac{3}{2}\omega_1 + \frac{1}{2}\omega_3^2 \omega_1 \omega_2^2 + \omega_3 \omega_4 \omega_1 \omega_2^2 + \frac{1}{2}\omega_4 \omega_1 \omega_2 \omega_2 - 5\omega_1 \omega_2 - \omega_1^2 \omega_2 + \\
& \frac{1}{2}v^2 \omega_4^2 \omega_2 + \omega_3 \omega_4 \omega_1 \omega_2 + \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_3 \omega_4 \omega_2^2 - \frac{1}{2}\omega_3^2 \omega_1 \omega_2^2 - \frac{1}{4}v \omega_3 \omega_1 \omega_2 + v \omega_3 \omega_4 \omega_2 + \frac{17}{4}v \omega_3 \omega_4 \omega_1 \omega_2,
\end{aligned}$$

$$\begin{aligned} & \omega_1^2 u - \frac{1}{2} v^2 \omega_4^2 - \frac{1}{2} \omega_4^2 \omega_1 u^2 \omega_2 - \frac{1}{2} \omega_4^2 \omega_1 u + v^2 \omega_4 \omega_2 - \frac{1}{2} v^2 \omega_3^2 \omega_1 - \omega_3 \omega_2^2 - 3 \omega_3 \omega_4 \omega_1 u^2 \omega_2 - 2 \omega_1^2 u^2 \omega_2 + \frac{1}{2} \omega_4 \omega_1 u \omega_2^2 - \\ & 2 \omega_3 \omega_1 u^2 - \omega_3^2 \omega_4 u^2 - 3 \omega_3 u \omega_2 - \frac{3}{2} \omega_3 \omega_4^2 u \omega_2 - \frac{1}{4} \omega_3^2 \omega_1 + \frac{13}{4} \omega_4 \omega_2 + v^2 \omega_3 \omega_2^2 - \frac{3}{4} \omega_3 \omega_4 \omega_1 + v^2 \omega_3 \omega_1 \omega_2 + \frac{1}{2} \omega_3 \omega_1 \omega_2^2 + \\ & 6 \omega_1 u \omega_2 + \omega_2^2 - 4 \omega_2 + \frac{5}{2} \omega_4 u - \frac{1}{2} \omega_4 \omega_1^2 u + \frac{1}{2} \omega_3^2 \omega_4 \omega_2 - \frac{9}{4} \omega_3 \omega_1 \omega_2 - \omega_1 u \omega_2^2 + \omega_4 \omega_1^2 u^2 \omega_2 - \frac{1}{2} \omega_3^2 \omega_4 - \omega_4 \omega_1^2 u^2 + \\ & \frac{3}{2} \omega_3^2 \omega_4 u + \frac{7}{2} \omega_3 \omega_1 u + \omega_3 \omega_1^2 u^2 \omega_2 + \frac{1}{2} \omega_3 u \omega_2^2 - \frac{1}{2} \omega_4 \omega_2^2 + \frac{1}{2} v^2 \omega_4^2 \omega_1 - v^2 \omega_3 \omega_2 - v^2 \omega_3 \omega_1 \omega_2^2 + \frac{3}{4} \omega_3^2 + 2 \omega_1^2 u^2 + \omega_4^2 u \omega_2 + \\ & \frac{1}{2} \omega_4^2 \omega_1 u^2 - \frac{1}{2} v^2 \omega_4^2 \omega_1 \omega_2 + \frac{1}{2} \omega_3 \omega_4^2 \omega_2 - 4 \omega_4 \omega_1 u \omega_2 - v^2 \omega_4 \omega_2^2 + \frac{19}{4} \omega_3 \omega_2 + \frac{3}{2} \omega_3^2 \omega_4 u \omega_2 - 4 \omega_3 \omega_1 u \omega_2 + \frac{5}{2} \omega_3 u, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_1], t=3\delta_t} = & -v\omega_4 - 4v^3\omega_3\omega_4\omega_1\omega_2 + 4v^3\omega_3\omega_4\omega_2 + 4v^3\omega_2^2 + 2v\omega_4^2\omega_1u^2 - 2v\omega_3^2\omega_4c_s^2\omega_1 - 2v\omega_3\omega_2 - v\omega_2^2\omega_1 - \\ & v\omega_3^2\omega_4\omega_1u^2 + v\omega_4\omega_2^2 + 4v\omega_4\omega_1^2u^2\omega_2 - 4v\omega_3\omega_4c_s^2\omega_2 - v^3\omega_2^2\omega_1 - 2v^3\omega_4\omega_2 - 2v\omega_3^2c_s^2 + 2v\omega_3\omega_1\omega_2 - v\omega_3^2\omega_4 - \\ & 2v\omega_3\omega_4c_s^2 + 4v^3\omega_4\omega_1\omega_2 - v\omega_3\omega_4^2\omega_1u^2 - 4v\omega_3\omega_4\omega_1u^2\omega_2 - 2v\omega_3\omega_4^2c_s^2\omega_1 + 2v^3\omega_4\omega_1\omega_2 + v^3\omega_3\omega_4^2\omega_1 - \\ & v^3\omega_3^2\omega_4 + 4v\omega_3\omega_4c_s^2\omega_1\omega_2 - v\omega_3^2\omega_1 - 6v\omega_4\omega_2 - v\omega_3^2\omega_4u^2 - 2v\omega_3\omega_1u^2 - 4v^3\omega_4\omega_2^2 - 2v\omega_3\omega_4\omega_1 - v\omega_4\omega_1^2\omega_2 + \\ & v^3\omega_3^2\omega_4\omega_1 - 4v\omega_1^2u^2\omega_2 + v^3\omega_3^2 - 4v^3\omega_3\omega_2 - v\omega_4^2\omega_1\omega_2 + v\omega_4^2 - 2v\omega_3^2u^2\omega_2 + v\omega_1^2\omega_2 - v\omega_3\omega_4^2u^2 - \\ & 2v\omega_4^2\omega_1u^2\omega_2 - 2v^3\omega_4^2\omega_1\omega_2 + 2v\omega_3\omega_4c_s^2\omega_1 + 3v\omega_3\omega_4\omega_1u^2 + v\omega_3^2u^2 - 4v^3\omega_1\omega_2^2 + v\omega_3^2\omega_4\omega_1 + v\omega_3\omega_4u^2 + \\ & v\omega_3^2\omega_1u^2 + 2v\omega_3^2c_s^2\omega_1 - 6v\omega_1\omega_2 + 2v\omega_3\omega_4^2u^2\omega_2 - v\omega_3\omega_4^2 + 4v\omega_1u^2\omega_2 - v\omega_3 + v^3\omega_3\omega_4 - v^3\omega_3\omega_4\omega_1 - v\omega_2^2 + \\ & v\omega_3\omega_1 + v\omega_4^2\omega_2 - 2v\omega_3u^2\omega_2 + v\omega_3\omega_4^2\omega_1 + 7v\omega_4\omega_1\omega_2 + 4v^3\omega_3\omega_1\omega_2 + 5v\omega_2 + 2v^3\omega_4^2\omega_2 - v\omega_4\omega_1\omega_2^2 + \\ & 2v\omega_3\omega_4 + v\omega_3^2 - v^3\omega_3\omega_4^2 - 2v\omega_4\omega_1u^2 + 2v\omega_3\omega_4^2c_s^2 - 2v\omega_4\omega_1u^2\omega_2 + v\omega_1\omega_2^2 - 2v\omega_3\omega_4\omega_1\omega_2 + v\omega_4\omega_1 + \\ & 4v\omega_3c_s^2\omega_2 + 2v\omega_3^2\omega_4c_s^2 + 2v\omega_3^2\omega_4u^2\omega_2 + 4v\omega_3\omega_1u^2\omega_2 + 2v\omega_3\omega_4\omega_2 - 4v\omega_3c_s^2\omega_1\omega_2, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_3], t=3\delta_t} = & 3 + 5\omega_4\omega_1 - 2\omega_4\omega_1u^2\omega_2 - 2v^2\omega_3^2\omega_4\omega_1 - \omega_1\omega_2^2 - 6\omega_3\omega_1u^2\omega_2 - 2\omega_3^2\omega_4u^2\omega_2 + \omega_1^2 - 2v^2\omega_3\omega_4 + 4v^2\omega_1\omega_2^2 - \\ & 2v^2\omega_3\omega_4^2\omega_1 - 2v^2\omega_4\omega_1\omega_2 + 2\omega_4\omega_1u^2 - 2v^2\omega_3^2 + \omega_4\omega_1\omega_2^2 - 6\omega_4\omega_1\omega_2 - \omega_4^2\omega_2 - 2\omega_3\omega_4^2u^2\omega_2 - 4v^2\omega_2^2 - 4v^2\omega_4\omega_1\omega_2^2 - \\ & 4\omega_4 - 6v^2\omega_3\omega_4\omega_2 - 6\omega_3\omega_4\omega_1u^2 + 5\omega_1\omega_2 - 2\omega_3^2u^2 - 4\omega_1 - 2\omega_3\omega_4u^2 + 2v^2\omega_3\omega_4^2 - 2v^2\omega_4\omega_2 - \omega_4\omega_1^2 + \omega_4^2 - \\ & \omega_1^2\omega_2 + 2\omega_3\omega_4u^2\omega_2 + \omega_4^2\omega_1\omega_2 + 2\omega_3\omega_4^2u^2 + 2\omega_3^2u^2\omega_2 + 2\omega_4^2\omega_1u^2\omega_2 + 2v^2\omega_4\omega_2 + 2v^2\omega_3^2\omega_1 + 6\omega_3\omega_4\omega_1u^2\omega_2 + \\ & 4\omega_1^2u^2\omega_2 + 6\omega_3\omega_1u^2 + 2\omega_3^2\omega_4u^2 + 5\omega_4\omega_2 + \omega_4\omega_1^2\omega_2 - 6v^2\omega_3\omega_1\omega_2 + \omega_2^2 - 4\omega_2 + 2v^2\omega_3\omega_4\omega_1 - 4\omega_4\omega_1^2u^2\omega_2 + \\ & 4\omega_4\omega_1^2u^2 - \omega_4\omega_2^2 + 6v^2\omega_3\omega_2 + 6v^2\omega_3\omega_4\omega_1\omega_2 - 4\omega_1^2u^2 - 2\omega_4^2\omega_1u^2 + 2v^2\omega_4\omega_2^2 - \omega_4^2\omega_1 + 2v^2\omega_3^2\omega_4, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_l,y}^{[\mu_1], t=3\delta_t} = & -\frac{7}{2}v\omega_4\omega_1\omega_2 - v\omega_4 - \frac{1}{2}v^3\omega_3^2\omega_1\omega_2 - v\omega_3\omega_4^2u - \frac{7}{2}v\omega_3\omega_1\omega_2 - \frac{3}{4}v\omega_4^2\omega_1u^2 + \frac{1}{2}v\omega_3^2\omega_4c_s^2\omega_1 - \\ & \frac{3}{2}v\omega_3^2\omega_4u\omega_2 + v\omega_4^2\omega_2 - \frac{21}{4}v\omega_3\omega_2 - \frac{1}{4}v\omega_4^2\omega_1 + \frac{1}{2}v\omega_3^2\omega_4\omega_1u^2 - v^3\omega_3\omega_2^2 - \frac{1}{2}v\omega_3\omega_4^2\omega_2 + \frac{1}{2}v\omega_3u\omega_2^2 + \\ & \frac{1}{2}v\omega_4\omega_2^2 - \frac{1}{2}v\omega_3\omega_1u - v\omega_3^2\omega_4u - v\omega_4\omega_1^2u^2\omega_2 + v\omega_3\omega_4c_s^2\omega_2 + \frac{1}{4}v^3\omega_3^2\omega_1 - \frac{1}{2}v^3\omega_4\omega_2 - v\omega_1\omega_2^2 + \frac{1}{2}v\omega_3^2c_s^2 + \\ & \frac{1}{2}v\omega_3\omega_4^2\omega_1u + \frac{9}{4}v\omega_3\omega_1\omega_2 - \frac{1}{2}v\omega_3^2\omega_4\omega_2 - \frac{1}{2}v\omega_3^2\omega_4 + \frac{1}{2}v\omega_3\omega_4c_s^2 - v^3\omega_4\omega_1\omega_2^2 - v\omega_3\omega_2^2u^2\omega_2 + \frac{1}{2}v\omega_4u\omega_2^2 + \\ & \frac{1}{2}v\omega_3\omega_4^2\omega_1u^2 + 2v\omega_3\omega_4\omega_1u^2\omega_2 + 6v\omega_1\omega_2 + \frac{1}{2}v\omega_3\omega_4^2c_s^2\omega_1 - \frac{3}{2}v\omega_3\omega_4^2u\omega_2 - \frac{1}{2}v\omega_3\omega_1\omega_2^2 + \frac{1}{2}v^3\omega_4\omega_1\omega_2 - \\ & v\omega_3\omega_4c_s^2\omega_1\omega_2 - \frac{1}{4}v\omega_3^2\omega_1 - \frac{17}{4}v\omega_4\omega_2 - \frac{7}{2}v\omega_3\omega_2 + \frac{1}{2}v\omega_3^2\omega_4u^2 + v\omega_3\omega_1u^2 + v^3\omega_4\omega_2^2 - \frac{1}{2}v\omega_3\omega_4\omega_1 + \\ & \frac{1}{2}v\omega_3\omega_1\omega_2^2 + \frac{1}{2}v\omega_3^2\omega_4\omega_1u + v\omega_3\omega_2^2 + 2v\omega_1^2u^2\omega_2 - \frac{1}{4}v^3\omega_3^2 + \frac{1}{2}v^3\omega_3\omega_2 - \frac{1}{4}v^3\omega_4\omega_1 + \frac{1}{2}v\omega_3^2\omega_1u^2\omega_2 + \\ & \frac{1}{2}v\omega_4\omega_1\omega_2^2 + \frac{3}{4}v\omega_4^2 + \frac{1}{2}v\omega_3^2u^2\omega_2 + \frac{1}{2}v\omega_3\omega_4^2u^2 + \frac{1}{2}v\omega_4^2\omega_1u^2\omega_2 + \frac{1}{2}v^3\omega_3^2\omega_2 + \frac{1}{2}v\omega_3^2\omega_1\omega_2 - \\ & \frac{1}{2}v\omega_3\omega_4c_s^2\omega_1 + 8v\omega_3\omega_4\omega_2 - \frac{1}{2}v\omega_3\omega_4\omega_2^2 - \frac{3}{2}v\omega_3\omega_4\omega_1u^2 - v\omega_1\omega_2 - \frac{1}{4}v\omega_3^2u^2 - \frac{1}{2}v\omega_3\omega_4u^2 - \frac{3}{4}v\omega_3^2\omega_1u^2 + \\ & \frac{1}{2}v\omega_4\omega_1\omega_2 - \frac{1}{2}v\omega_3^2\omega_1 + \frac{1}{2}v\omega_3^2\omega_4\omega_1u + v\omega_3\omega_2^2 + 2v\omega_1^2u^2\omega_2 - \frac{1}{4}v^3\omega_3^2 + \frac{1}{2}v^3\omega_3\omega_2 - \frac{1}{4}v^3\omega_4\omega_1 + \frac{1}{2}v\omega_3^2\omega_1u^2\omega_2 + \\ & \frac{1}{2}v\omega_4\omega_1\omega_2^2 + \frac{3}{4}v\omega_4^2 + \frac{1}{2}v\omega_3^2u^2\omega_2 + \frac{1}{2}v\omega_3\omega_4^2u^2 + \frac{1}{2}v\omega_4^2\omega_1u^2\omega_2 + \frac{1}{2}v^3\omega_3^2\omega_2 + \frac{1}{2}v\omega_3^2\omega_1\omega_2 - \\ & \frac{1}{2}v\omega_3\omega_4c_s^2\omega_1 + \frac{1}{2}v\omega_3\omega_4\omega_2 - \frac{1}{2}v\omega_3\omega_4\omega_2^2 - \frac{3}{2}v\omega_3\omega_4\omega_1u^2 - v\omega_1\omega_2 - \frac{1}{4}v\omega_3^2u^2 - \frac{1}{2}v\omega_3\omega_4u^2 - \frac{3}{4}v\omega_3^2\omega_1u^2 + \\ & \frac{1}{2}v\omega_4\omega_1\omega_2 - \frac{1}{2}v\omega_3^2\omega_1 + v\omega_3^2\omega_2 - \frac{5}{2}v\omega_1\omega_2 - v\omega_3\omega_4^2u^2\omega_2 - \frac{1}{2}v\omega_3\omega_4^2 - 2v\omega_1\omega_2^2 + \frac{1}{2}v\omega_4^2u - v\omega_3 + \\ & \frac{1}{2}v\omega_4\omega_1\omega_2^2 - \frac{1}{2}v\omega_4\omega_1u + v^3\omega_3\omega_1\omega_2^2 - v\omega_2^2 + \frac{1}{2}v\omega_3\omega_1 + \frac{1}{2}v\omega_4\omega_1\omega_2^2 + \frac{5}{4}v\omega_4\omega_1\omega_2 - \frac{1}{2}v^3\omega_3\omega_1\omega_2 + \\ & 5v\omega_2 + \frac{1}{4}v^3\omega_4^2 - \frac{1}{2}v^3\omega_3^2\omega_2 + \frac{1}{2}v\omega_4\omega_1^2u\omega_2 + \frac{3}{2}v\omega_3\omega_4 + \frac{3}{4}v\omega_3^2 - \frac{1}{4}v\omega_4^2u^2 - \frac{7}{2}v\omega_4\omega_2 + \frac{1}{2}v\omega_3\omega_1^2u\omega_2 + v\omega_4\omega_1u^2 - \\ & \frac{1}{2}v\omega_3\omega_4c_s^2 + \frac{1}{2}v\omega_3^2u - \frac{1}{2}v\omega_4\omega_1u^2\omega_2 + v\omega_3\omega_4u + \frac{1}{2}v\omega_1\omega_2^2 - \frac{3}{4}v\omega_3\omega_4\omega_1\omega_2 + \frac{3}{4}v\omega_3^2\omega_2 + \frac{1}{2}v\omega_4\omega_1 + \frac{1}{2}v\omega_4^2u^2\omega_2 - \\ & v\omega_3c_s^2\omega_2 - \frac{1}{2}v\omega_3^2\omega_4c_s^2 - v\omega_3^2\omega_4u^2\omega_2 - \frac{1}{2}v\omega_3\omega_1\omega_2^2 - v\omega_3\omega_4\omega_2 + \frac{17}{4}v\omega_3\omega_4\omega_2 + v\omega_3c_s^2\omega_1\omega_2, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_l,y}^{[\mu_3], t=3\delta_t} = & 3 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{3}{4}\omega_2^2\omega_2 + \frac{3}{4}\omega_4\omega_1 - \frac{15}{4}\omega_3 + 2\omega_4\omega_1u^2\omega_2 - \frac{15}{4}\omega_3\omega_4\omega_2 + \frac{1}{4}\omega_3^2\omega_1\omega_2 + \omega_3\omega_4\omega_1u - \\ & \frac{1}{2}\omega_1\omega_2^2 + \omega_3\omega_4u\omega_2^2 + 2\omega_3\omega_1u^2\omega_2 + \omega_3^2u + \omega_3^2\omega_4u^2\omega_2 + 6\omega_3\omega_4u + \frac{1}{2}\omega_3^2\omega_1u - \frac{1}{2}\omega_4\omega_1^2u\omega_2 - v^2\omega_4\omega_1\omega_2 - 2\omega_4\omega_1u^2 + \\ & \frac{13}{4}\omega_3\omega_4 + \frac{1}{2}\omega_4^2u^2 + 3\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_1u\omega_2 + \frac{1}{2}\omega_3^2\omega_3 + \frac{1}{2}\omega_3\omega_1^2u - \frac{1}{2}\omega_3\omega_1^2u^2 - \frac{3}{4}\omega_4\omega_1\omega_2 + \frac{7}{4}\omega_3\omega_1 - \\ & \frac{1}{2}\omega_1\omega_2 + \omega_3\omega_4u^2\omega_2 + v^2\omega_4\omega_1\omega_2^2 - \frac{1}{2}\omega_3\omega_4^2 - \frac{11}{4}\omega_4 - \frac{7}{2}\omega_4\omega_1u - \frac{1}{2}\omega_4\omega_1\omega_2^2 + \omega_4^2u + \frac{1}{2}v^2\omega_3\omega_1\omega_2 + 3\omega_3\omega_4\omega_1u^2 - \\ & 7\omega_3\omega_4u\omega_2 + 2\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_1u\omega_2 - \omega_3^2\omega_2 + \frac{1}{2}\omega_3^2\omega_1u^2 + \omega_3\omega_4u^2\omega_2 - \frac{1}{2}\omega_4\omega_1\omega_2^2 + 5\omega_1u + \omega_1^2\omega_2 + \\ & \frac{1}{2}v^2\omega_4^2\omega_2 - \omega_3\omega_4\omega_1\omega_2^2 + \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_3\omega_4\omega_2^2 - \frac{1}{2}\omega_3\omega_1u^2\omega_2 - \omega_3\omega_4u^2\omega_2 - \omega_3\omega_2^2\omega_2^2 - \frac{1}{2}\omega_3^2\omega_2^2\omega_2 - \frac{1}{2}\omega_3\omega_1\omega_2^2 - \\ & \omega_1^2u - \frac{1}{2}v^2\omega_4^2 - \frac{1}{2}\omega_4\omega_1u^2\omega_2 + \frac{1}{2}\omega_4\omega_1u + v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3\omega_1 - \omega_3\omega_2^2 - \omega_3\omega_4\omega_1u^2\omega_2 - 2\omega_1^2u^2\omega_2 - \frac{1}{2}\omega_4\omega_1\omega_2^2 - \\ & 2\omega_3\omega_1u^2 - \omega_3^2\omega_4u^2 + 3\omega_3\omega_2 + \frac{3}{2}\omega_3\omega_4^2\omega_2 - \frac{1}{4}\omega_3^2\omega_1 + \frac{13}{4}\omega_4\omega_2 + v^2\omega_3\omega_2^2 - \frac{3}{4}\omega_3\omega_4\omega_1 + v^2\omega_3\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2^2 - \\ & 6\omega_1\omega_2 + \omega_2^2 - 4\omega_2 - \frac{5}{2}\omega_4u + \frac{1}{2}\omega_4\omega_1^2u + \frac{1}{2}\omega_3\omega_4\omega_2 - \frac{9}{4}\omega_3\omega_1\omega_2 + \omega_1\omega_2^2 + \omega_4\omega_1^2u\omega_2 - \frac{1}{2}\omega_3\omega_4 - \omega_4\omega_1^2u^2 - \\ & \frac{3}{2}\omega_3\omega_4u - \frac{7}{2}\omega_3\omega_1u + \omega_3\omega_1^2u\omega_2 - \frac{1}{2}\omega_3\omega_2^2 - \frac{1}{2}\omega_4\omega_2^2 + \frac{1}{2}v^2\omega_4^2\omega_1 - v^2\omega_3\omega_2 - v^2\omega_3\omega_1\omega_2^2 + \frac{3}{4}\omega_3^2 + 2\omega_1^2u^2 - \frac{1}{2}\omega_4\omega_1\omega_2^2 + \\ & \frac{1}{2}\omega_4\omega_1u^2 - \frac{1}{2}v^2\omega_4^2\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4^2\omega_2 + 4\omega_4\omega_1u\omega_2 - v^2\omega_4\omega_2^2 + \frac{19}{4}\omega_3\omega_2 - \frac{3}{2}\omega_3\omega_4u\omega_2 + 4\omega_3\omega_1\omega_2 - \frac{5}{2}\omega_3u, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y+\delta_l}^{[\mu_1],t-3\delta_t} = & 1 - \frac{1}{2}\omega_3^2\omega_4c_s^2 + \frac{1}{2}\omega_3c_s^2\omega_2 - \frac{1}{2}v\omega_4 + 2v^3\omega_3\omega_4\omega_1\omega_2 + \frac{1}{4}v^2\omega_3\omega_1^2 + \frac{3}{2}\omega_4\omega_1 - \frac{1}{4}\omega_3 - \frac{1}{4}\omega_4\omega_1u^2\omega_2 + \\ & \frac{1}{5}v^3\omega_3^2\omega_1\omega_2 - 2v^3\omega_3\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_4\omega_1 - 2v^3\omega_2^2 - \frac{1}{4}v\omega_4^2\omega_1u^2 + \frac{1}{2}v\omega_3^2\omega_4c_s^2\omega_1 - \frac{7}{4}v\omega_3\omega_2 - \frac{1}{4}v\omega_4^2\omega_1 - \\ & \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1^2 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 - \frac{5}{2}v^2\omega_3\omega_4 + v^3\omega_3\omega_2^2 - v^2\omega_1\omega_2^2 - \frac{1}{2}v^2\omega_3\omega_4^2\omega_1 - \frac{13}{4}v^2\omega_4\omega_1\omega_2 - \\ & 4v^2\omega_2 - v\omega_4\omega_1^2u^2\omega_2 + v\omega_3\omega_4c_s^2\omega_2 + \frac{1}{4}\omega_4\omega_1u^2 - \frac{1}{2}\omega_3\omega_4^2c_s^2 + \frac{1}{4}v^3\omega_3\omega_2^2 + \frac{3}{2}v^3\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_4 + \frac{3}{4}\omega_4^2u^2 - \\ & 2\omega_3c_s^2 + \frac{1}{2}\omega_3^2c_s^2 - \frac{1}{4}v^2\omega_3^2 + \frac{9}{4}v\omega_3\omega_1\omega_2 + \frac{1}{2}v\omega_3\omega_4c_s^2 - v^3\omega_4\omega_1\omega_2^2 + v\omega_3\omega_1^2u^2\omega_2 + \frac{1}{4}\omega_3\omega_1^2 - \frac{5}{4}v^2\omega_4\omega_1 - \\ & \frac{1}{5}v^2\omega_3^2\omega_2 - \frac{1}{2}v\omega_4u^2\omega_2 + v^2\omega_3 - \frac{1}{4}\omega_3u^2\omega_2 + \frac{1}{2}v\omega_3\omega_4^2c_s^2\omega_1 - \frac{3}{4}\omega_3\omega_1^2u^2 - \frac{3}{2}v^3\omega_4\omega_1\omega_2 - \frac{1}{2}v^3\omega_3\omega_4^2\omega_1 - \\ & \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{2}v^2\omega_3\omega_1^2\omega_2 + \frac{1}{2}v^3\omega_3^2\omega_4 - v\omega_3\omega_4c_s^2\omega_1\omega_2 + \frac{1}{4}v^2\omega_4\omega_1^2 - \frac{1}{4}v\omega_3^2\omega_1 - \frac{3}{4}v\omega_4\omega_2 + 5v^2\omega_1\omega_2 + v^2\omega_2^2 + \\ & \frac{1}{2}v^2\omega_4\omega_1\omega_2^2 - \frac{5}{4}\omega_4 + v^3\omega_4\omega_2^2 - \frac{1}{2}v\omega_3\omega_4\omega_1 - \frac{1}{2}v^2\omega_3\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_1\omega_2 - \frac{1}{2}v^3\omega_3^2\omega_4\omega_1 - 3v\omega_3\omega_4c_s^2\omega_1 + \frac{1}{2}\omega_1\omega_2 - \\ & \frac{1}{4}v^3\omega_3^2 - \frac{1}{2}\omega_3^2c_s^2\omega_1 - \frac{3}{4}\omega_3^2u^2 - \omega_1 + \frac{3}{4}\omega_3^2\omega_1u^2 + \frac{3}{2}v^3\omega_3\omega_2 + \frac{1}{4}v^3\omega_4\omega_1^2 + \frac{1}{2}v^2\omega_3\omega_4^2 - \frac{1}{2}v\omega_3^2\omega_1u^2\omega_2 + \frac{1}{4}v\omega_4^2 - \\ & \frac{1}{2}v^2\omega_4^2\omega_2 - \frac{5}{4}v^2\omega_3\omega_1 - \frac{1}{4}\omega_4\omega_1^2 + \frac{1}{2}v\omega_3^2u^2\omega_2 + \frac{1}{2}v\omega_3^2\omega_1\omega_2 + \frac{1}{4}\omega_4^2 + \frac{1}{2}v\omega_2^2\omega_1u^2\omega_2 + \frac{1}{2}v^3\omega_4\omega_1\omega_2 - \frac{1}{2}v^3\omega_3\omega_2 - \\ & \frac{1}{2}v\omega_3\omega_4c_s^2\omega_1 + \omega_3u^2 - \frac{1}{4}v\omega_3^2u^2 - \frac{1}{4}v^2\omega_4^2 + \frac{1}{2}v\omega_3\omega_4c_s^2\omega_1\omega_2 + \frac{1}{4}v\omega_2^2\omega_1u^2 + \frac{11}{4}v^2\omega_4\omega_2 + \frac{1}{4}v^2\omega_3^2\omega_1 - \\ & \frac{1}{2}v\omega_3^2c_s^2\omega_1 - \frac{5}{4}v\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u^2 + \frac{5}{2}\omega_3c_s^2\omega_1 - \frac{1}{2}v\omega_3 + \frac{1}{2}\omega_3\omega_4^2c_s^2\omega_1 - \frac{1}{2}v^3\omega_3\omega_4 + \frac{1}{4}\omega_4\omega_2 - \frac{1}{2}v^2\omega_3\omega_2^2 - \\ & \frac{1}{4}\omega_3\omega_4\omega_1 - \frac{13}{4}v^2\omega_3\omega_1\omega_2 + \frac{1}{2}v^3\omega_3\omega_4\omega_1 - \frac{1}{2}v^2\omega_3\omega_4\omega_1^2 - v^3\omega_3\omega_1\omega_2^2 + \frac{1}{2}v\omega_3\omega_1 - v^2\omega_1\omega_2 + \frac{1}{2}v\omega_3u^2\omega_2 - \frac{1}{2}\omega_2 + \\ & \frac{3}{4}v\omega_4\omega_1\omega_2 - \frac{3}{2}v^3\omega_3\omega_1\omega_2 + 2v\omega_2 + 3v^2\omega_3\omega_4\omega_1 + \frac{1}{2}v^2\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1\omega_2 - \frac{1}{2}v\omega_3\omega_4c_s^2\omega_2 - \omega_4u^2 + \frac{1}{2}\omega_3^2c_s^2 + \\ & \frac{1}{4}\omega_4u^2\omega_2 - \frac{1}{4}v^3\omega_4^2 - \frac{1}{2}v^3\omega_4\omega_2 + \frac{5}{2}\omega_3\omega_4c_s^2 + \frac{3}{2}\omega_4\omega_1^2u^2 + \frac{1}{2}v\omega_3\omega_4 - \frac{1}{2}v\omega_3\omega_2^2\omega_1 - \frac{1}{2}\omega_3c_s^2\omega_1^2 + \frac{1}{4}v\omega_3^2 + \frac{1}{4}v\omega_4^2u^2 + \\ & \frac{1}{4}v^2\omega_4^2\omega_1 + \frac{11}{4}v^2\omega_3\omega_2 + \frac{1}{2}v^3\omega_3\omega_4^2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}v^2\omega_3\omega_1\omega_2^2 - \frac{1}{2}v\omega_3\omega_4^2c_s^2 + v^2\omega_4 + \frac{3}{2}v\omega_4\omega_1u^2\omega_2 - \\ & \frac{3}{4}\omega_4^2\omega_1u^2 + \frac{1}{2}v^2\omega_4^2\omega_1\omega_2 - \frac{1}{2}v\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}v^2\omega_4\omega_2^2 + \frac{1}{4}\omega_3\omega_2 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}v\omega_3^2\omega_2 + \frac{1}{2}v\omega_4\omega_1 - \frac{1}{2}v\omega_4^2u^2\omega_2 - \\ & v\omega_3c_s^2\omega_2 - \frac{1}{2}v\omega_3^2\omega_4c_s^2 - \frac{3}{2}v\omega_3\omega_1u^2\omega_2 - \frac{1}{4}v\omega_3\omega_1\omega_2 + \frac{1}{4}v\omega_3\omega_4\omega_2 + v\omega_3c_s^2\omega_1\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_4 + \frac{1}{2}\omega_3^2\omega_4c_s^2\omega_1, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y+\delta_l}^{[\mu_3],t-3\delta_t} = & 3 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 - \frac{5}{2}v\omega_4 + \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{1}{4}\omega_3^2\omega_2 + \frac{13}{4}\omega_4\omega_1 - \frac{15}{4}\omega_3 - \omega_4\omega_1u^2\omega_2 + v^2\omega_3^2\omega_4\omega_1 - \frac{3}{4}\omega_3\omega_4\omega_2 + \\ & \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{7}{2}v\omega_3\omega_2 - v\omega_4^2\omega_1 + \omega_3\omega_1u^2\omega_2 + \omega_1^2 + v^2\omega_3\omega_4 - 2v^2\omega_1\omega_2^2 + \frac{1}{2}v\omega_4\omega_2^2 + v^2\omega_3\omega_4^2\omega_1 + 2v^2\omega_4\omega_1\omega_2 + \\ & \frac{1}{2}v\omega_3\omega_1^2\omega_2 + v\omega_3\omega_4\omega_1^2 + \omega_4\omega_1u^2 + \frac{13}{4}\omega_3\omega_4 - \frac{1}{2}\omega_4^2u^2 + \frac{1}{2}v^2\omega_3^2 + 4v\omega_3\omega_1\omega_2 - \frac{3}{2}v\omega_3^2\omega_4 - \omega_3\omega_1^2 + \frac{1}{2}v^2\omega_3^2\omega_2 + \\ & \omega_3\omega_1^2u^2 - \frac{1}{2}v\omega_3\omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_4^2\omega_1 - \frac{3}{4}\omega_4\omega_1\omega_2 + \frac{19}{4}\omega_3\omega_1 - v\omega_3\omega_1^2 - \frac{7}{2}v\omega_4\omega_2 + 2v^2\omega_2^2 + v^2\omega_4\omega_1\omega_2^2 - \frac{1}{2}\omega_3\omega_4^2 - \\ & \frac{11}{4}\omega_4 - 7v\omega_3\omega_4\omega_1 - \frac{1}{2}v\omega_4\omega_1\omega_2^2 + \frac{1}{2}\omega_3^2\omega_4\omega_1 + 3v^2\omega_3\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1\omega_2 + 2\omega_1\omega_2 + \frac{1}{2}v\omega_3\omega_2^2 + \frac{1}{2}\omega_3^2u^2 - 4\omega_1 - \\ & \frac{1}{2}\omega_3^2\omega_1u^2 - v^2\omega_3\omega_4^2 - \frac{1}{2}v\omega_4^2\omega_1\omega_2 + v\omega_4^2 + \frac{1}{2}v^2\omega_4^2\omega_2 - \frac{1}{2}\omega_4\omega_1^2 + v\omega_1^2\omega_2 + \frac{1}{2}\omega_4^2 - \frac{1}{2}\omega_1^2\omega_2 - \frac{1}{2}v\omega_4\omega_1^2 + \frac{1}{2}\omega_3^2\omega_1u^2\omega_2 - \\ & \frac{1}{2}\omega_3^2\omega_2^2 + \frac{1}{2}v^2\omega_4^2 - \frac{1}{2}\omega_4^2\omega_1u^2\omega_2 + \frac{3}{2}v\omega_3^2\omega_4\omega_1 - 2v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1 - 6v\omega_1\omega_2 - \omega_3\omega_1u^2 - \frac{3}{2}v\omega_3\omega_4^2 - \frac{5}{2}v\omega_3 - \\ & \frac{3}{4}\omega_3^2\omega_1 + \frac{3}{4}\omega_4\omega_2 - v^2\omega_3\omega_2^2 - \frac{15}{4}\omega_3\omega_4\omega_1 + 2v^2\omega_3\omega_1\omega_2 - v\omega_2^2 + 3v\omega_3\omega_1 + \frac{1}{2}v\omega_4^2\omega_2 - \frac{3}{2}\omega_2 + \frac{3}{2}v\omega_3\omega_4^2\omega_1 + 4v\omega_4\omega_1\omega_2 + \\ & 5v\omega_2 - v^2\omega_3\omega_4\omega_1 - \frac{9}{4}\omega_3\omega_1\omega_2 - \frac{1}{2}v\omega_3\omega_2^2 + \omega_4\omega_1^2u^2\omega_2 - \frac{1}{2}\omega_3^2\omega_4 - \frac{1}{2}v\omega_4\omega_1\omega_2^2 - \omega_4\omega_1^2u^2 + 6v\omega_3\omega_4 - \frac{1}{2}v\omega_3\omega_1\omega_2 - \\ & \omega_3\omega_1^2u^2\omega_2 + v\omega_3^2 - \frac{1}{2}v^2\omega_4^2\omega_1 - 2v^2\omega_3\omega_2 - 3v^2\omega_3\omega_4\omega_1\omega_2 + v^2\omega_3\omega_1\omega_2^2 + \frac{3}{2}\omega_3^2 + \frac{1}{2}v\omega_3\omega_4\omega_1^2 + \frac{1}{2}\omega_4^2\omega_1u^2 - \frac{1}{2}v^2\omega_4^2\omega_1\omega_2 + \\ & v\omega_1\omega_2^2 - v\omega_3\omega_4\omega_1\omega_2 - v^2\omega_4\omega_2^2 + \frac{7}{4}\omega_3\omega_2 - \frac{1}{2}\omega_4^2\omega_1 + \frac{1}{2}v\omega_3^2\omega_2 + 3v\omega_4\omega_1 - \frac{1}{2}v\omega_3^2\omega_1\omega_2 + v\omega_3\omega_4\omega_2 - v^2\omega_3\omega_4, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_1],t-4\delta_t} = & v\omega_4 - v\omega_3\omega_4\omega_1^2\omega_2 + 7v\omega_3\omega_2 + v\omega_4^2\omega_1 + v\omega_3\omega_4^2\omega_2 - v\omega_3\omega_4\omega_1\omega_2 - v\omega_4\omega_2^2 - 8v\omega_3\omega_1\omega_2 + v\omega_3^2\omega_4\omega_2 + \\ & v\omega_3^2\omega_4 + v\omega_3\omega_1\omega_2^2 + v\omega_3^2\omega_1 + 7v\omega_4\omega_2 + 2v\omega_3\omega_4\omega_1 + v\omega_4\omega_1\omega_2 - v\omega_3\omega_2^2 + v\omega_4^2\omega_1\omega_2 - v\omega_3^2\omega_4\omega_1\omega_2 - v\omega_4^2 - v\omega_1^2\omega_2 + \\ & v\omega_3\omega_4\omega_2^2 - v\omega_3^2\omega_4\omega_1 - v\omega_3\omega_4\omega_1\omega_2^2 + 7v\omega_1\omega_2 + v\omega_3\omega_4^2 + v\omega_3 + v\omega_2^2 - v\omega_3\omega_1 - v\omega_4^2\omega_2 - v\omega_3\omega_4\omega_1^2 - 8v\omega_4\omega_1\omega_2 - \\ & 6v\omega_2 + v\omega_4\omega_1\omega_2^2 - 2v\omega_3\omega_4 + v\omega_3\omega_1\omega_2 - v\omega_3^2 - v\omega_1\omega_2^2 + 9v\omega_3\omega_4\omega_1\omega_2 - v\omega_3^2\omega_2 - v\omega_4\omega_1 + v\omega_3^2\omega_1\omega_2 - 8v\omega_3\omega_4\omega_2, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_3],t-4\delta_t} = & -4 - 8\omega_3\omega_4\omega_1\omega_2 + \omega_3^2\omega_2 - 6\omega_4\omega_1 + 5\omega_3 + 7\omega_3\omega_4\omega_2 - \omega_3^2\omega_1\omega_2 + \omega_1\omega_2^2 - \omega_1^2 - \omega_3\omega_1^2\omega_2 - 6\omega_3\omega_4 - \omega_4\omega_1\omega_2^2 + \\ & \omega_3\omega_1^2 - \omega_3\omega_4\omega_1 + 7\omega_4\omega_1\omega_2 - 6\omega_3\omega_1 + \omega_4^2\omega_2 + \omega_3\omega_4^2 + 5\omega_4 - \omega_3^2\omega_4\omega_1 - 6\omega_1\omega_2 + 5\omega_1 + \omega_3\omega_4\omega_1\omega_2^2 + \omega_4\omega_1^2 - \\ & \omega_4^2 - \omega_3\omega_4\omega_2^2 + \omega_1^2\omega_2 - \omega_4^2\omega_1\omega_2 + \omega_3^2\omega_4\omega_1\omega_2 + \omega_3\omega_2^2 + \omega_3^2\omega_1 - 6\omega_4\omega_2 + 7\omega_3\omega_4\omega_1 - \omega_4\omega_1^2\omega_2 - \omega_3\omega_1\omega_2^2 - \omega_2^2 + \\ & 5\omega_2 - \omega_3^2\omega_4\omega_2 + 7\omega_3\omega_1\omega_2 + \omega_3^2\omega_4 + \omega_3\omega_4\omega_1\omega_2 + \omega_4\omega_2^2 - \omega_3^2 - \omega_3\omega_4\omega_1^2 + \omega_3\omega_4\omega_1\omega_2^2 - \omega_3\omega_4^2\omega_2 + \omega_4^2\omega_1, \end{aligned}$$

## 8.5 EFDE for $\mu_4$

$$\mu_{4,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_1],t-\ell\delta_t} \mu_{x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_l,y+j\delta_l}^{[\mu_4],t-\ell\delta_t} \mu_{4,x+i\delta_l,y+j\delta_l}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\alpha_{x-\delta_l, y}^{[\mu_1], t} = 1 + \omega_1 u^2 - \frac{1}{4} \omega_3 + \frac{1}{2} \omega_3 c_s^2 - \frac{1}{4} v^2 \omega_3 - \frac{1}{4} \omega_4 - \frac{1}{2} \omega_1 - \frac{1}{2} \omega_1 u - \frac{1}{4} \omega_3 u^2 + \frac{1}{2} \omega_4 u - \frac{1}{4} \omega_4 u^2 + \frac{1}{4} v^2 \omega_4 + \frac{1}{2} \omega_3 u.$$

$$\alpha_{x+\delta_l, y}^{[\mu_1], t} = 1 + \omega_1 u^2 - \frac{1}{4} \omega_3 + \frac{1}{2} \omega_3 c_s^2 - \frac{1}{4} v^2 \omega_3 - \frac{1}{4} \omega_4 - \frac{1}{2} \omega_1 + \frac{1}{2} \omega_1 u - \frac{1}{4} \omega_3 u^2 - \frac{1}{2} \omega_4 u - \frac{1}{4} \omega_4 u^2 + \frac{1}{4} v^2 \omega_4 - \frac{1}{2} \omega_3 u.$$

$$\begin{aligned} \alpha_{x-\delta_l, y-\delta_l}^{[\mu_1], t-\delta_t} = & -1 - \frac{1}{8} \omega_4 u^3 + \frac{1}{4} \omega_4 \omega_1 u^3 + \frac{1}{2} \omega_3 c_s^2 \omega_1 u - v \omega_4 - \frac{1}{8} \omega_4 \omega_1 + \frac{1}{4} \omega_3 - \frac{1}{4} v \omega_3 \omega_2 + \frac{1}{8} \omega_3^2 u - \frac{1}{8} v^2 \omega_3 \omega_4 + \frac{1}{4} \omega_3 w_4 u + \\ & \frac{1}{2} v \omega_3 \omega_1 u - v^2 \omega_2 + \frac{1}{8} \omega_4 \omega_1 u^2 - \frac{1}{2} v^3 \omega_4 \omega_2 - \frac{1}{8} \omega_3 \omega_4 + \frac{1}{8} \omega_4^2 u^2 + \frac{1}{8} v^2 \omega_3^2 u - \frac{1}{2} \omega_3 c_s^2 + \frac{1}{4} \omega_4 u \omega_2 + \frac{1}{4} v \omega_3^2 c_s^2 + \\ & \frac{1}{4} v^2 \omega_3^2 - \frac{1}{4} v^2 \omega_4 \omega_1 u - \frac{1}{4} v \omega_3 \omega_4 c_s^2 - \frac{1}{8} v^2 \omega_4 \omega_1 + \frac{1}{4} v^2 \omega_3 - \frac{1}{2} v^2 \omega_4 u \omega_2 - \frac{1}{2} v \omega_1 u \omega_2 + \frac{1}{8} \omega_3^2 u^3 - \frac{1}{8} \omega_3 \omega_1 + \frac{1}{2} v^2 \omega_1 \omega_2 + \\ & \frac{1}{4} v \omega_3 u \omega_2 + \frac{3}{4} \omega_4 - \frac{1}{4} \omega_4 \omega_1 u + \frac{1}{8} \omega_4^2 u - \frac{1}{4} \omega_1 \omega_2 - \frac{1}{8} v^3 \omega_3^2 + \frac{1}{8} v^2 \omega_4^2 u + \frac{1}{2} \omega_1 - \frac{1}{8} \omega_3 \omega_4 u^2 + \frac{1}{4} v^3 \omega_3 \omega_2 + \frac{1}{4} v^2 \omega_3 \omega_4 u + \\ & \omega_1 u + \frac{3}{8} v \omega_4^2 - \frac{1}{8} v^2 \omega_3 \omega_1 - \frac{1}{8} \omega_4^2 + \frac{1}{4} \omega_3 u^2 - \frac{1}{4} \omega_3 \omega_1 u^3 - \frac{1}{8} v \omega_3^2 u^2 - \frac{3}{8} v^2 \omega_4^2 + \frac{1}{4} v \omega_3 \omega_4 u^2 + \frac{3}{4} v^2 \omega_4 \omega_2 - \frac{1}{4} v \omega_1 \omega_2 - \\ & \frac{1}{8} \omega_3 \omega_1 u^2 + \frac{1}{4} \omega_3 \omega_1 \omega_2 + \frac{1}{4} \omega_3 c_s^2 \omega_1 - \frac{1}{4} v \omega_4^2 u - \frac{1}{4} \omega_4 \omega_2 + \frac{1}{2} v \omega_4 \omega_1 u - \frac{1}{2} \omega_1 u \omega_2 + \frac{1}{4} v \omega_3 \omega_1 + \frac{1}{2} \omega_2 - \frac{1}{2} \omega_4 u - \\ & \frac{1}{4} v^2 \omega_3 \omega_1 u + \frac{1}{2} v \omega_2 - \frac{1}{4} \omega_4 u^2 - \frac{1}{2} v^2 \omega_3 u \omega_2 + \frac{1}{8} v^3 \omega_4^2 + \frac{1}{4} \omega_3 \omega_4 c_s^2 + \frac{1}{4} v \omega_3 \omega_4 - \frac{1}{4} \omega_3 \omega_1 u - \frac{1}{8} v \omega_3^2 - \frac{1}{8} v \omega_4^2 u^2 - \\ & \frac{1}{4} \omega_3 \omega_4 c_s^2 u - \frac{1}{4} \omega_3^2 c_s^2 u + \frac{1}{4} v \omega_4 u \omega_2 - \frac{1}{4} v^2 \omega_3 \omega_2 + v^2 \omega_1 u \omega_2 - \frac{1}{4} v \omega_3^2 u + \frac{1}{4} v^2 \omega_4 - \frac{1}{2} v \omega_3 \omega_4 u + \frac{1}{4} v \omega_4 \omega_1 - \frac{1}{2} \omega_3 u, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_l, y-\delta_l}^{[\mu_4], t-\delta_t} = & 1 + v \omega_4 + \frac{1}{4} \omega_4 \omega_1 + \frac{1}{4} v \omega_3 \omega_2 - \frac{1}{2} v \omega_3 \omega_1 u - \frac{1}{2} \omega_4 \omega_1 u^2 + \frac{1}{4} \omega_4^2 u^2 - \frac{1}{4} \omega_4 u \omega_2 - \frac{1}{4} v^2 \omega_3^2 + v \omega_1 u \omega_2 + \\ & \frac{1}{4} v \omega_4 \omega_2 - \frac{1}{2} v \omega_3 u \omega_2 - \omega_4 + \frac{1}{4} \omega_4 \omega_1 u - \frac{1}{2} \omega_4^2 u + \frac{1}{4} \omega_1 \omega_2 - \frac{1}{4} \omega_3^2 u^2 - \frac{1}{2} \omega_1 - \omega_1 u - \frac{1}{2} v \omega_4^2 + \frac{1}{4} \omega_4^2 + \frac{1}{4} v^2 \omega_4^2 - \\ & \frac{1}{2} v^2 \omega_4 \omega_2 + \frac{1}{2} v \omega_1 \omega_2 + \frac{1}{2} \omega_3 \omega_1 u^2 - \frac{1}{4} \omega_3 u \omega_2 + \frac{1}{2} v \omega_4^2 u + \frac{1}{4} \omega_4 \omega_2 - \frac{1}{2} v \omega_4 \omega_1 u + \frac{1}{2} \omega_1 u \omega_2 - \frac{1}{4} v \omega_3 \omega_1 - \frac{1}{2} \omega_2 + \\ & \omega_4 u - v \omega_2 + \frac{1}{4} \omega_3 \omega_1 u - \frac{1}{2} v \omega_4 u \omega_2 + \frac{1}{2} v^2 \omega_3 \omega_2 - \frac{1}{4} v \omega_4 \omega_1, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_l, y-\delta_l}^{[\mu_4], t-\delta_t} = & -1 + \frac{1}{8} \omega_4^2 u^3 - \frac{1}{4} \omega_4 \omega_1 u^3 - \frac{1}{2} \omega_3 c_s^2 \omega_1 u - v \omega_4 - \frac{1}{8} \omega_4 \omega_1 + \frac{1}{4} \omega_3 - \frac{1}{4} v \omega_3 \omega_2 - \frac{1}{8} \omega_3^2 u - \frac{1}{8} v^2 \omega_3 \omega_4 - \frac{1}{4} \omega_3 \omega_4 u - \\ & \frac{1}{2} v \omega_3 \omega_1 u - v^2 \omega_2 + \frac{1}{8} \omega_4 \omega_1 u^2 - \frac{1}{2} v^3 \omega_4 \omega_2 - \frac{1}{8} \omega_3 \omega_4 + \frac{1}{8} \omega_4^2 u^2 - \frac{1}{8} v^2 \omega_3^2 u - \frac{1}{2} \omega_3 c_s^2 - \frac{1}{4} \omega_4 u \omega_2 + \frac{1}{4} v \omega_3^2 c_s^2 + \\ & \frac{1}{4} v^2 \omega_3^2 + \frac{1}{4} v^2 \omega_4 \omega_1 u - \frac{1}{4} v \omega_3 \omega_4 c_s^2 - \frac{1}{8} v^2 \omega_4 \omega_1 + \frac{1}{4} v^2 \omega_3 + \frac{1}{2} v^2 \omega_4 u \omega_2 + \frac{1}{2} v \omega_1 u \omega_2 - \frac{1}{8} \omega_3^2 u^3 - \frac{1}{8} \omega_3 \omega_1 + \frac{1}{2} v^2 \omega_1 \omega_2 - \\ & \frac{1}{4} v \omega_3 u \omega_2 + \frac{3}{4} \omega_4 + \frac{1}{4} \omega_4 \omega_1 u - \frac{1}{8} \omega_4^2 u - \frac{1}{4} \omega_1 \omega_2 - \frac{1}{8} v^3 \omega_3^2 - \frac{1}{8} v^2 \omega_4^2 u + \frac{1}{2} \omega_1 - \frac{1}{8} \omega_3 \omega_4 u^2 + \frac{1}{4} v^3 \omega_3 \omega_2 - \frac{1}{4} v^2 \omega_3 \omega_4 u - \\ & \omega_1 u + \frac{3}{8} v \omega_4^2 - \frac{1}{8} v^2 \omega_3 \omega_1 - \frac{1}{8} \omega_4^2 + \frac{1}{4} \omega_3 u^2 + \frac{1}{4} \omega_3 \omega_1 u^3 - \frac{1}{8} v \omega_3^2 u^2 - \frac{3}{8} v^2 \omega_4^2 + \frac{1}{4} v \omega_3 \omega_4 u^2 + \frac{3}{4} v^2 \omega_4 \omega_2 - \frac{1}{4} v \omega_1 \omega_2 - \\ & \frac{1}{8} \omega_3 \omega_1 u^2 - \frac{1}{4} \omega_3 u \omega_2 + \frac{1}{4} \omega_3 c_s^2 \omega_1 + \frac{1}{4} v \omega_4^2 u - \frac{1}{4} \omega_4 \omega_2 - \frac{1}{2} v \omega_4 \omega_1 u + \frac{1}{2} \omega_1 u \omega_2 + \frac{1}{4} v \omega_3 \omega_1 + \frac{1}{2} \omega_2 + \frac{1}{2} \omega_4 u + \\ & \frac{1}{4} v^2 \omega_3 \omega_1 u + \frac{1}{2} v \omega_2 - \frac{1}{4} \omega_4 u^2 + \frac{1}{2} v^2 \omega_3 u \omega_2 + \frac{1}{8} v^3 \omega_4^2 + \frac{1}{4} \omega_3 \omega_4 c_s^2 + \frac{1}{4} v \omega_3 \omega_4 + \frac{1}{4} \omega_3 \omega_1 u - \frac{1}{8} v \omega_3^2 - \frac{1}{8} v \omega_4^2 u^2 + \\ & \frac{1}{4} \omega_3 \omega_4 c_s^2 u + \frac{1}{4} \omega_3^2 c_s^2 u - \frac{1}{4} v \omega_4 u \omega_2 - \frac{1}{4} v^2 \omega_3 \omega_2 - v^2 \omega_1 u \omega_2 + \frac{1}{4} v \omega_3^2 u + \frac{1}{4} v^2 \omega_4 + \frac{1}{2} v \omega_3 \omega_4 u + \frac{1}{4} v \omega_4 \omega_1 + \frac{1}{2} \omega_3 u, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_l, y-\delta_l}^{[\mu_4], t-\delta_t} = & 1 + v \omega_4 + \frac{1}{4} \omega_4 \omega_1 + \frac{1}{4} v \omega_3 \omega_2 + \frac{1}{2} v \omega_3 \omega_1 u - \frac{1}{2} \omega_4 \omega_1 u^2 + \frac{1}{4} \omega_4^2 u^2 + \frac{1}{4} \omega_4 u \omega_2 - \frac{1}{4} v^2 \omega_3^2 - v \omega_1 u \omega_2 + \\ & \frac{1}{4} v \omega_4 \omega_2 + \frac{1}{2} v \omega_3 u \omega_2 - \omega_4 - \frac{1}{4} \omega_4 \omega_1 u + \frac{1}{2} \omega_4^2 u + \frac{1}{4} \omega_1 \omega_2 - \frac{1}{4} \omega_3^2 u^2 - \frac{1}{2} \omega_1 + \omega_1 u - \frac{1}{2} v \omega_4^2 + \frac{1}{4} \omega_4^2 + \frac{1}{4} v^2 \omega_4^2 - \\ & \frac{1}{2} v^2 \omega_4 \omega_2 + \frac{1}{2} v \omega_1 \omega_2 + \frac{1}{2} \omega_3 \omega_1 u^2 + \frac{1}{4} \omega_3 u \omega_2 - \frac{1}{2} v \omega_4^2 u + \frac{1}{4} \omega_4 \omega_2 + \frac{1}{2} v \omega_4 \omega_1 u - \frac{1}{2} \omega_1 u \omega_2 - \frac{1}{4} v \omega_3 \omega_1 - \frac{1}{2} \omega_2 - \\ & \omega_4 u - v \omega_2 - \frac{1}{4} \omega_3 \omega_1 u + \frac{1}{2} v \omega_4 u \omega_2 + \frac{1}{2} v^2 \omega_3 \omega_2 - \frac{1}{2} v \omega_3^2 u - \frac{1}{4} v \omega_4 \omega_1, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_l, y}^{[\mu_1], t} = & -1 + \omega_4 \omega_1 u^3 - 2 \omega_3 c_s^2 \omega_1 u + 2 \omega_1 u^2 + \frac{1}{4} \omega_3 + \frac{1}{4} v^2 \omega_3 \omega_4 + 2 v^2 \omega_2 - \frac{1}{2} \omega_4 \omega_1 u^2 - \frac{1}{2} v^2 \omega_3^2 u + 2 \omega_3 c_s^2 + \\ & \frac{1}{4} v^2 \omega_3^2 - \frac{1}{2} \omega_3 \omega_4 u^3 - v^2 \omega_3 + v^2 \omega_4 u \omega_2 - \frac{1}{2} \omega_3^2 u^3 - v^2 \omega_1 \omega_2 + \frac{1}{4} \omega_4 + \frac{1}{4} \omega_3^2 u^2 + \frac{1}{2} \omega_1 + \frac{1}{4} \omega_3 \omega_4 u^2 - \frac{1}{2} v^2 \omega_3 \omega_4 u + \\ & \omega_1 u + \frac{1}{2} v^2 \omega_3 \omega_1 - \omega_3 u^2 + 2 \omega_3 \omega_1 u^3 - \frac{1}{2} v^2 \omega_4 \omega_2 - \omega_3 c_s^2 \omega_1 - \frac{1}{2} \omega_4 u + v^2 \omega_3 \omega_1 u - \frac{1}{2} \omega_3 c_s^2 + v^2 \omega_3 u \omega_2 - \\ & 2 \omega_1^2 u^3 - \frac{1}{2} \omega_3 \omega_4 c_s^2 + \omega_3 \omega_4 c_s^2 u + \omega_3^2 c_s^2 u - \frac{1}{2} v^2 \omega_3 \omega_2 - 2 v^2 \omega_1 u \omega_2 - \omega_1^2 u^2 - \frac{1}{2} \omega_3 u, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_l, y}^{[\mu_4], t} = & 1 - \frac{5}{4} \omega_3 - \omega_3^2 u - \omega_3 \omega_4 u - \omega_4 \omega_1 u^2 + \frac{1}{4} \omega_3 \omega_4 + \frac{1}{2} \omega_3 \omega_1 - \frac{1}{4} \omega_4 + \frac{1}{2} \omega_4 \omega_1 u + \omega_3^2 u^2 - \frac{1}{2} \omega_1 + \omega_3 \omega_4 u^2 - \\ & 3 \omega_1 u + \omega_1^2 u - 3 \omega_3 \omega_1 u^2 + \frac{1}{2} \omega_4 u + \frac{1}{2} \omega_3 \omega_1 u + \frac{1}{4} \omega_3^2 + 2 \omega_1^2 u^2 + \frac{5}{2} \omega_3 u, \end{aligned}$$

$$\begin{aligned} \alpha_{x, y}^{[\mu_1], t-\delta_t} = & -2 - 2 \omega_1 u^2 - \frac{1}{2} \omega_4 \omega_1 + \frac{1}{2} \omega_3 - \omega_1^2 - \frac{7}{2} \omega_4 \omega_1 u^2 + \omega_4^2 u^2 - \omega_3 c_s^2 + \frac{1}{2} v^2 \omega_4 \omega_1 + \frac{1}{2} v^2 \omega_3 - \frac{1}{2} \omega_3 \omega_1 + \frac{1}{2} \omega_4 + \\ & \omega_3^2 u^2 + 3 \omega_1 + 2 \omega_3 \omega_4 u^2 - \frac{1}{2} v^2 \omega_3 \omega_1 + \frac{1}{2} \omega_3 u^2 - \frac{7}{2} \omega_3 \omega_1 u^2 + \omega_3 c_s^2 \omega_1 + \frac{1}{2} \omega_4 u^2 - \frac{1}{2} v^2 \omega_4 + 4 \omega_1^2 u^2, \end{aligned}$$

$$\begin{aligned} \alpha_{x, y}^{[\mu_4], t-\delta_t} = & 2 + \omega_1^2 - 2 v^2 \omega_3 \omega_4 + 4 \omega_4 \omega_1 u^2 - \omega_4^2 u^2 - v^2 \omega_3^2 - 4 v^2 \omega_2^2 - \omega_3^2 u^2 - 2 \omega_1 - 2 \omega_3 \omega_4 u^2 - v^2 \omega_4^2 + 4 v^2 \omega_4 \omega_2 + \\ & 4 \omega_3 \omega_1 u^2 + \omega_2^2 - 2 \omega_2 + 4 v^2 \omega_3 \omega_2 - 4 \omega_1^2 u^2, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_l, y}^{[\mu_1], t-\delta_t} = & -1 - \omega_4 \omega_1 u^3 + 2 \omega_3 c_s^2 \omega_1 u + 2 \omega_1 u^2 + \frac{1}{4} \omega_3 + \frac{1}{4} v^2 \omega_3 \omega_4 + 2 v^2 \omega_2 - \frac{1}{2} \omega_4 \omega_1 u^2 + \frac{1}{2} v^2 \omega_3^2 u + 2 \omega_3 c_s^2 + \end{aligned}$$



$$\begin{aligned}
& \frac{1}{2}v^2\omega_3^2\omega_4c_s^2 - \frac{11}{8}\omega_3\omega_4u^2 + \frac{3}{4}v^3\omega_3\omega_2 + \frac{1}{4}v^2\omega_3\omega_4u - \frac{1}{2}v^2\omega_3^2\omega_1u - \frac{3}{8}\omega_1u - \frac{3}{8}v\omega_4^2 - \frac{1}{4}v^2\omega_4^2\omega_2 - \frac{3}{8}v^2\omega_3\omega_1 + \\
& \frac{1}{4}v^4\omega_3^2\omega_2 + \frac{1}{4}v\omega_3^2u^2\omega_2 + \frac{1}{2}v\omega_3^2\omega_4u^3 - \frac{3}{4}v\omega_3\omega_4^2u^2 + \frac{1}{8}\omega_4^2 - \frac{1}{2}v\omega_3c_s^2\omega_2^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1u + \frac{3}{8}\omega_3\omega_4u^2\omega_2 - \\
& \frac{1}{2}v^3\omega_3^2\omega_2 + \frac{1}{2}v\omega_3\omega_4c_s^2\omega_1 - \frac{1}{4}v\omega_3\omega_4u\omega_2 - \frac{1}{2}v^2\omega_4^2\omega_1u^2 + \frac{1}{4}\omega_3\omega_4^2u^2 - v\omega_3c_s^2\omega_1u\omega_2 + v\omega_3\omega_4\omega_1u^2 + \frac{1}{4}\omega_3^2u^2\omega_2 + \\
& \omega_3u^2 - \frac{1}{4}\omega_3^2\omega_4u^3 - \frac{7}{4}\omega_3\omega_1u^3 + \frac{1}{4}v^2\omega_4^2\omega_2 + \frac{1}{8}v\omega_3^2u^2 + \frac{3}{8}v^2\omega_4^2 + \frac{9}{4}v\omega_3\omega_4u^2 + \frac{3}{4}v\omega_3^2\omega_1u^2 + v\omega_3\omega_1^2u^3 + \\
& \frac{7}{8}v^2\omega_4\omega_2 - \frac{1}{4}v\omega_3^2\omega_2 + \frac{1}{4}v\omega_1\omega_2 - \frac{1}{2}\omega_1^2u^2\omega_2 + \frac{11}{8}\omega_3\omega_1u^2 + \frac{1}{4}\omega_3^2\omega_4u^2 - \frac{1}{2}v\omega_3^2\omega_4c_s^2u - 2v\omega_3\omega_4\omega_1u^3 + \\
& 5v\omega_1u^2\omega_2 - \frac{1}{4}\omega_3\omega_4u^3 + \frac{1}{2}v^2\omega_3c_s^2\omega_2 - \frac{1}{4}\omega_3\omega_2u\omega_2 + \frac{3}{4}\omega_3c_s^2\omega_1 + \frac{1}{4}v\omega_2u^2 - v^2\omega_1u\omega_2^2 - \frac{1}{4}v\omega_4^2u^3\omega_2 + \frac{1}{2}v^4\omega_4\omega_2^2 + \\
& \frac{1}{4}\omega_4\omega_2 + \frac{1}{4}v^2\omega_3\omega_2^2 + \frac{3}{2}v\omega_3\omega_1u^3\omega_2 - \frac{3}{4}v\omega_4\omega_1u + \frac{1}{2}v\omega_3\omega_1^2u^2 + \frac{3}{4}\omega_1u\omega_2 - \frac{1}{2}v\omega_3^2\omega_1u^3 - \frac{1}{4}v\omega_3\omega_1 - \frac{5}{4}v\omega_3u^2\omega_2 + \\
& \frac{1}{4}v^2\omega_3\omega_4u\omega_2 - \frac{1}{2}\omega_2 + \frac{1}{2}\omega_4u - \frac{3}{4}v^2\omega_3\omega_1u - v^2\omega_3\omega_4\omega_1u^2 + \frac{3}{2}v\omega_4\omega_1u^3\omega_2 - \frac{1}{4}v^3\omega_3\omega_1\omega_2 - \frac{1}{2}v\omega_2 + 2v^2\omega_3\omega_1u^2\omega_2 - \\
& \omega_1^2u^3\omega_2 + \frac{1}{4}v\omega_3u^2\omega_2^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \frac{1}{2}\omega_4u^2 + \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{4}\omega_4^2\omega_1u^3 - \frac{1}{4}\omega_3^2c_s^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_1u\omega_2 - \frac{1}{8}\omega_4u^2\omega_2 - \\
& \frac{1}{8}v^3\omega_4^2 + \frac{1}{2}v^3\omega_4^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1u + 2\omega_1^2u^3 + \frac{1}{2}v^2\omega_3^2\omega_4u^2 + \frac{3}{2}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_4\omega_1u^2 - \frac{1}{4}v\omega_3\omega_4 + \frac{7}{8}\omega_3\omega_1u + \\
& \frac{1}{5}v^2\omega_4u^2\omega_2^2 + \frac{1}{8}v\omega_3^2 + \frac{1}{8}v\omega_4^2u^2 + 2v^2\omega_4\omega_1u^2\omega_2 - \frac{3}{2}\omega_3\omega_4c_s^2u - v\omega_1u^2\omega_2^2 - \frac{1}{4}\omega_3^2u^3\omega_2 - \frac{3}{4}\omega_3^2c_s^2u - \frac{1}{4}v\omega_4u\omega_2 + \\
& \frac{1}{8}v^2\omega_3\omega_2 - \frac{1}{4}\omega_3\omega_4u^3\omega_2 + v^2\omega_1u\omega_2 - \frac{5}{2}v\omega_4\omega_1u^2 + \frac{3}{4}v\omega_3\omega_4^2\omega_2^2 - \frac{1}{4}v^3\omega_2^2\omega_2 - \frac{1}{2}v\omega_4u^2\omega_3^2 + \frac{1}{4}v\omega_3^2u - \\
& \frac{1}{8}v^2\omega_4 + \omega_1^2u^2 - \frac{3}{4}v\omega_4\omega_1u^2\omega_2 - \frac{1}{4}\omega_4^2\omega_1u^2 + \frac{1}{2}v^2\omega_3\omega_4^2u^2 + \frac{1}{2}v\omega_2^2\omega_1u + \frac{1}{2}\omega_3^2c_s^2\omega_2 + \frac{1}{2}v\omega_3\omega_4u + \frac{1}{4}v^3\omega_4\omega_1u\omega_2 - \\
& \frac{1}{2}v^4\omega_3\omega_2^2 - \frac{1}{4}v^2\omega_4\omega_2^2 + \frac{1}{8}v\omega_3^2\omega_2 - \frac{1}{4}v\omega_4\omega_1 + \frac{1}{4}v\omega_4^2u^2\omega_2 + \frac{5}{2}v\omega_3c_s^2\omega_2 + \frac{3}{4}v\omega_3\omega_4c_s^2 - \frac{1}{2}v\omega_3\omega_4^2c_s^2u + \\
& \frac{1}{2}v\omega_3\omega_4c_s^2u\omega_2 - \frac{3}{4}v\omega_3\omega_1u^2\omega_2 + \frac{1}{8}v\omega_3\omega_4\omega_2 - \frac{1}{2}v\omega_3c_s^2\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u\omega_2 + \frac{1}{2}v\omega_3\omega_4\omega_1u + \frac{1}{2}\omega_3u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_4], t-2\delta_t} = & -2 + v\omega_4\omega_1u\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_2 - \frac{3}{2}v\omega_4 + \frac{1}{8}\omega_3^2\omega_2 - \frac{3}{8}\omega_4\omega_1 + \frac{5}{2}\omega_3 - \frac{1}{2}\omega_4\omega_1u^2\omega_2 + \frac{3}{8}\omega_3\omega_4\omega_2 + 2v\omega_3\omega_4^2u + v\omega_3\omega_1u\omega_2 + \\
& \frac{1}{2}\omega_3\omega_4\omega_1u + \frac{1}{2}v\omega_4\omega_1u^2 - \frac{3}{4}v\omega_4^2u\omega_2 - 2v\omega_3\omega_2 - \frac{3}{2}\omega_3\omega_1u^2\omega_2 + \omega_3^2u - v^2\omega_3\omega_4 + \frac{7}{2}\omega_3\omega_4u + \frac{1}{4}\omega_3^2\omega_1u + v^2\omega_1\omega_2^2 - \\
& 2v^2\omega_3\omega_1u\omega_2 - \frac{1}{2}v\omega_3\omega_2 + \frac{1}{4}v\omega_4\omega_2^2 + 3v\omega_3\omega_1u - \frac{1}{2}v^2\omega_4\omega_1\omega_2 + 2v\omega_3^2\omega_4u + \frac{3}{2}\omega_4\omega_1u^2 - \frac{7}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4^2u^2 + \frac{1}{2}\omega_4u\omega_2 - \\
& 2v^2\omega_4\omega_1u\omega_2 + v\omega_1u\omega_2^2 - v^2\omega_4u\omega_2^2 - \frac{3}{4}v^2\omega_3^2 + \frac{1}{2}v\omega_3\omega_1u\omega_2 + \frac{1}{4}\omega_3\omega_2u - \frac{3}{4}v\omega_3^2\omega_4 - v\omega_4\omega_1u^2 - \frac{1}{4}v^2\omega_3^2\omega_2 - 6v\omega_1u\omega_2 + \\
& \frac{1}{2}\omega_3\omega_1u^2 - \frac{1}{2}v\omega_4\omega_1u^2 - \frac{9}{8}\omega_3\omega_1 - \frac{1}{2}v\omega_3^2\omega_1 - 2v\omega_4\omega_2 + 3v\omega_3u\omega_2 - 2v^2\omega_2^2 - v\omega_3^2\omega_4u^2 + \frac{1}{4}\omega_3\omega_4^2 + \frac{3}{2}\omega_4 - 2\omega_4\omega_1u - \\
& v\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4^2u - \frac{3}{2}v^2\omega_3\omega_4\omega_2 - \frac{3}{4}v\omega_4^2\omega_1u - \frac{3}{2}\omega_3\omega_4\omega_1u^2 - \omega_3\omega_4u\omega_2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}v\omega_3\omega_2^2 + 2v\omega_3^2u^2\omega_2 - \frac{1}{2}\omega_3^2u\omega_2 - \\
& \frac{3}{4}\omega_3^2u^2 + \omega_1 + v\omega_3\omega_4u^2 - \frac{1}{4}\omega_3\omega_1u^2 - \omega_3\omega_4u^2 + \frac{1}{2}v^2\omega_3\omega_4^2 + \frac{1}{2}v^2\omega_3^2\omega_1u + 4\omega_1u + \frac{1}{2}v\omega_4^2 + \frac{1}{2}\omega_1^2u\omega_2 - \frac{1}{4}v^2\omega_4^2\omega_2 + \\
& \frac{1}{2}v\omega_3^2u^2\omega_2 - v\omega_3\omega_4^2u^2 - \frac{1}{4}\omega_4^2 + \frac{1}{2}\omega_3\omega_4u^2\omega_2 - \frac{3}{2}v\omega_3\omega_4u\omega_2 + \frac{1}{2}v\omega_3\omega_4u^2 + \frac{1}{2}\omega_3^2u^2\omega_2 + \frac{1}{2}v^2\omega_4^2u\omega_2 + \\
& v\omega_1^2u\omega_2 - \omega_1^2u - \frac{1}{4}v^2\omega_4^2 + \frac{1}{4}\omega_4^2\omega_1u - v^2\omega_3\omega_4^2u + \frac{1}{2}v\omega_3^2\omega_1u^2 + \frac{3}{2}v^2\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_1 - \frac{3}{4}v\omega_3^2\omega_2 - 2v\omega_1\omega_2 + \omega_1^2u^2\omega_2 + \\
& \frac{5}{2}\omega_3\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_4u^2 - \frac{3}{4}v\omega_3\omega_4^2 + \frac{3}{2}\omega_3\omega_2u - \frac{1}{2}v\omega_4^2u - \frac{5}{2}v\omega_3 + 2v^2\omega_1u\omega_2^2 + \frac{1}{8}\omega_3^2\omega_1 - \frac{3}{8}\omega_4\omega_2 - \frac{1}{2}v\omega_4u\omega_2^2 + \frac{1}{2}v^2\omega_3\omega_2^2 + \\
& \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{3}{2}v^2\omega_3\omega_1\omega_2 + 3v\omega_4\omega_1u - v\omega_3\omega_2u^2 - v\omega_2^2 - 2\omega_1u\omega_2 + \frac{3}{2}v\omega_3\omega_1 + \frac{1}{4}v\omega_4^2\omega_2 + 3v^2\omega_3\omega_4u\omega_2 + \omega_2 - \frac{3}{2}\omega_4u - \\
& v^2\omega_3u\omega_2^2 - v^2\omega_2^2\omega_4u + \frac{1}{4}\omega_4\omega_1u^2 + \frac{1}{2}v\omega_4\omega_1\omega_2 + 4v\omega_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1 - \frac{1}{2}v\omega_3\omega_2u + \frac{1}{2}\omega_3\omega_1\omega_2 + v^2\omega_3\omega_4\omega_1u + \frac{1}{4}\omega_3\omega_4 + \\
& \frac{1}{2}\omega_4\omega_1u^2 + \frac{7}{2}v\omega_3\omega_4 - \frac{3}{4}\omega_3\omega_4u - 2\omega_3\omega_1u + v\omega_3^2 + 3v\omega_4u\omega_2 + \frac{5}{2}v^2\omega_3\omega_2 - \frac{1}{2}\omega_3^2 - \frac{1}{2}v\omega_3^2u - 2\omega_1^2u^2 - 2v\omega_4\omega_1u^2\omega_2 - \\
& \frac{1}{4}\omega_4\omega_1u^2 - \frac{3}{4}v\omega_3\omega_1u - 5v\omega_3\omega_4u + \frac{1}{2}\omega_4\omega_1u\omega_2 + \frac{1}{2}v\omega_1\omega_2^2 + \frac{1}{2}v^2\omega_4\omega_2^2 - \frac{9}{8}\omega_3\omega_2 + \frac{1}{4}v\omega_3\omega_2 + \frac{1}{2}v\omega_4\omega_1 + \\
& \frac{1}{2}v\omega_4^2u^2\omega_2 - 2v\omega_3\omega_1u^2\omega_2 + \frac{1}{2}v^2\omega_4^2\omega_1u - \frac{3}{4}\omega_3\omega_4u^2 + \frac{1}{2}v\omega_3\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_4 + \frac{1}{2}\omega_3\omega_1u\omega_2 - \frac{3}{2}v\omega_3\omega_4\omega_1u - \frac{5}{2}\omega_3u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_1], t-2\delta_t} = & 2 - \frac{1}{2}v^2\omega_3^2\omega_1u^2 + 2v\omega_4 + \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{1}{4}v^2\omega_3\omega_2^2 + \frac{7}{4}\omega_4\omega_1 - \frac{1}{2}\omega_3 - 2\omega_4\omega_1u^2\omega_2 + \frac{5}{4}v\omega_4^2\omega_1u^2 + \frac{1}{2}v\omega_3\omega_2 + \\
& \frac{3}{4}v\omega_4^2\omega_1 - 2\omega_3\omega_1u^2\omega_2 + \omega_1^2 + \frac{1}{4}v^2\omega_3\omega_4 + \omega_4\omega_1^2u^4 + \frac{3}{2}v^2\omega_4\omega_1\omega_2 + 2v^2\omega_2 + v^2\omega_3\omega_1^2u^2 + \frac{17}{4}\omega_4\omega_1u^2 - \frac{1}{4}v^3\omega_3\omega_1 + \\
& v^3\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_4 - \frac{5}{4}\omega_4^2u^2 + \omega_3c_s^2 - \frac{1}{2}v\omega_3^2c_s^2 - \frac{1}{2}v^2\omega_3^2 - \frac{1}{2}\omega_4^2\omega_1u^4 - \frac{1}{2}v\omega_3\omega_1\omega_2 + \frac{1}{2}v\omega_3\omega_4c_s^2 - 2v\omega_4\omega_1^2u^2 - \\
& \omega_3^2\omega_4c_s^2u^2 - \frac{1}{4}\omega_3\omega_2^2 + \frac{3}{4}v^2\omega_4\omega_1 - \frac{1}{2}v^2\omega_3 + \frac{5}{4}\omega_3\omega_2u^2 - v^3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_1\omega_2 + \frac{3}{4}\omega_3\omega_1 - \frac{1}{4}v^2\omega_4\omega_1^2 - \\
& \frac{1}{4}v\omega_3^2\omega_1 - 3v^2\omega_1\omega_2 - 2v\omega_3\omega_4u^2 - \frac{3}{2}\omega_4 + \frac{1}{2}v\omega_3\omega_4\omega_1 - 2v^2\omega_3\omega_4u^2\omega_2 - \frac{11}{4}\omega_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 + \frac{3}{2}\omega_1\omega_2 + \\
& 2v\omega_1^2u^2\omega_2 + \frac{1}{4}v^3\omega_3^2 - \omega_3\omega_2c_s^2u^2 - \omega_3^2u^2 - v^2\omega_4^2u^2\omega_2 - 3\omega_1 + v\omega_3\omega_4u^2\omega_2 - \frac{1}{2}\omega_3\omega_1u^2 - \frac{7}{4}\omega_3\omega_4u^2 - v^3\omega_3\omega_2 + \\
& \frac{1}{4}v^3\omega_4\omega_1 - \frac{3}{4}v\omega_4^2 + \frac{3}{4}v^2\omega_3\omega_1 - \frac{1}{4}\omega_4\omega_1^2 + \frac{1}{2}v\omega_3\omega_2u^2 - \frac{1}{2}v\omega_3\omega_4u^2 + \frac{1}{4}\omega_4^2 - \frac{1}{2}\omega_1^2\omega_2 + \frac{1}{2}v\omega_4\omega_1^2 + \\
& \omega_3\omega_4u^2\omega_2 - \frac{1}{2}v\omega_3\omega_4c_s^2\omega_1 - \frac{1}{2}v^2\omega_4^2\omega_1u^2 + \omega_3\omega_4^2u^2 + \frac{1}{2}v\omega_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3\omega_2u^2 - \frac{1}{2}\omega_3\omega_1\omega_2 + \frac{1}{4}v\omega_3^2u^2 - \\
& 2\omega_3c_s^2\omega_1u^2 + \frac{3}{4}v^2\omega_4^2 - \omega_3\omega_1u^4 - \frac{1}{2}v\omega_3\omega_4u^2 + \frac{5}{2}v\omega_3\omega_1u^2 - \frac{3}{2}v^2\omega_4\omega_2 + \frac{1}{2}v^2\omega_3\omega_2\omega_1 + \frac{1}{2}v\omega_3^2c_s^2\omega_1 + \frac{3}{2}v\omega_1\omega_2 + \\
& 2\omega_1^2u^2\omega_2 + \frac{15}{4}\omega_3\omega_1u^2 + \omega_3\omega_4u^2 + v^2\omega_4\omega_1^2u^2 - \frac{3}{2}\omega_3c_s^2\omega_1 + \frac{1}{2}\omega_4\omega_2 - \frac{1}{4}v\omega_3\omega_1\omega_2 - 2v\omega_3\omega_1\omega_2 - \frac{1}{2}v\omega_3\omega_1\omega_2^2 - \\
& \frac{1}{2}v\omega_3\omega_1 + v^2\omega_1^2\omega_2 - \omega_2 + \frac{1}{2}\omega_3\omega_1u^4 - 3v^2\omega_3\omega_4\omega_1u^2 + v^3\omega_3\omega_1\omega_2 - v\omega_2 - \frac{1}{4}v^2\omega_3\omega_4\omega_1 + 4v^2\omega_3\omega_1u^2\omega_2 + \\
& \frac{1}{2}v\omega_3\omega_1^2 + \frac{1}{2}\omega_4\omega_2^2 - \frac{1}{4}v^3\omega_4^2 + v^2\omega_3\omega_4u^2 - \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{3}{4}\omega_4\omega_1^2u^2 - \frac{1}{2}v\omega_3\omega_4 + \frac{1}{2}\omega_3c_s^2\omega_1^2 + \frac{1}{4}v\omega_3^2 + \frac{1}{4}v\omega_4^2u^2 + \\
& 4v^2\omega_4\omega_1u^2\omega_2 - \frac{3}{4}v^2\omega_4^2\omega_1 + \frac{1}{2}v^2\omega_3\omega_2 - v^2\omega_3^2u^2\omega_2 - \frac{1}{2}v^2\omega_4 - 4\omega_1^2u^2 - 2v\omega_4\omega_1u^2\omega_2 - \frac{3}{4}\omega_4^2\omega_1u^2 + \\
& v^2\omega_3\omega_4u^2 + \omega_3^2c_s^2\omega_1u^2 - \frac{1}{4}\omega_4^2\omega_1 - 4v^2\omega_1^2u^2\omega_2 - \frac{5}{2}v\omega_4\omega_1 + \frac{1}{2}v\omega_4^2u^2\omega_2 + 3\omega_3\omega_4c_s^2\omega_1u^2 - 2v\omega_3\omega_1u^2\omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_4], t-2\delta_t} = & -2 - 2v\omega_4 - \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{5}{2}\omega_4\omega_1 + 2\omega_4\omega_1u^2\omega_2 - v\omega_4^2\omega_1u^2 - \frac{1}{2}v\omega_3\omega_2 - v\omega_4^2\omega_1 + 2\omega_3\omega_1u^2\omega_2 - \omega_1^2 - \\
& v^2\omega_4\omega_1\omega_2 - 3\omega_4\omega_1u^2 + \frac{1}{2}\omega_4^2u^2 + \frac{1}{2}v^2\omega_3^2 + \frac{1}{2}v\omega_3\omega_1\omega_2 + 2v\omega_4\omega_1^2u^2 + \frac{1}{2}\omega_4\omega_1\omega_2 - \frac{1}{2}v\omega_4\omega_2 + 2v\omega_3\omega_4u^2 +
\end{aligned}$$

$$\begin{aligned}
& 2w_4 + 3\omega_3\omega_4\omega_1u^2 - \frac{3}{2}\omega_1\omega_2 - 4vw_1^2u^2\omega_2 + \frac{3}{2}\omega_3^2u^2 + 3\omega_1 - 2v\omega_3\omega_4u^2\omega_2 + 2\omega_3\omega_4u^2 + vw_4^2 + \frac{1}{2}\omega_4\omega_1^2 - \\
& v\omega_3^2u^2\omega_2 + vw_1^2\omega_2 + 2v\omega_3\omega_4^2u^2 - \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_1\omega_2 - \frac{1}{2}v\omega_4\omega_1^2 - \omega_3\omega_4u^2\omega_2 - \omega_3\omega_4^2u^2 - 6vw_3\omega_4\omega_1u^2 - \\
& \frac{1}{2}\omega_3^2u^2\omega_2 - \frac{1}{2}v^2\omega_4^2 - v\omega_3^2\omega_1u^2 + v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1 - 3vw_1\omega_2 - 2w_1^2u^2\omega_2 - 5\omega_3\omega_1u^2 - \omega_3^2\omega_4u^2 - \frac{1}{2}\omega_4\omega_2 + \\
& v^2\omega_3\omega_1\omega_2 + 2vw_3\omega_1^2u^2 + \frac{1}{2}vw_3\omega_1 + \omega_2 + \frac{1}{2}vw_4\omega_1\omega_2 + 2vw_2 - \frac{1}{2}vw_3\omega_1^2 - 2w_4\omega_1^2u^2 + \frac{1}{2}v^2\omega_4^2\omega_1 - v^2\omega_3\omega_2 + \\
& 4\omega_1^2u^2 + 4vw_4\omega_1u^2\omega_2 + \omega_4^2\omega_1u^2 + \frac{5}{2}vw_4\omega_1 - vw_4^2u^2\omega_2 + 4vw_3\omega_1u^2\omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_i, y-\delta_i}^{[\mu_1], t-2\delta_t} = & 1 - \frac{1}{2}v^2\omega_3^2\omega_1u^2 + \frac{1}{4}vw_4\omega_1u\omega_2 - \frac{1}{4}\omega_3^2\omega_4c_s^2 - \frac{1}{8}\omega_4^2u^3 + \frac{5}{4}\omega_4\omega_1u^3 + \frac{5}{4}\omega_3c_s^2\omega_2 - \frac{3}{2}\omega_3c_s^2\omega_1u + vw_4 - \\
& 3\omega_1u^2 - \frac{1}{2}v\omega_3^2c_s^2\omega_2 + \frac{1}{8}\omega_4\omega_1 - \frac{1}{4}\omega_3 - \frac{1}{2}\omega_4\omega_1u^2\omega_2 - \frac{1}{4}vw_3\omega_1u\omega_2 + \frac{1}{8}\omega_3\omega_4\omega_1u + \frac{3}{4}vw_4^2\omega_1u^2 - \frac{3}{8}vw_3\omega_2 - \\
& \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - v\omega_4\omega_1^2u^3 - \frac{1}{4}\omega_3\omega_1u^2\omega_2 - v^2\omega_3c_s^2\omega_2 + \frac{1}{8}\omega_3^2u - \frac{1}{4}\omega_3\omega_4^2c_s^2\omega_2 - \frac{1}{8}v^2\omega_3\omega_4 + \\
& \frac{1}{4}v^3\omega_3\omega_2^2 + \frac{1}{4}\omega_3\omega_4u + \frac{1}{8}\omega_3^2\omega_1u + \frac{1}{4}vw_3^2u^3\omega_2 - \frac{3}{2}v^2\omega_3\omega_1u\omega_2 + \frac{7}{4}vw_3\omega_1u - \frac{1}{4}v^5\omega_4\omega_1\omega_2 - v^2\omega_2 - \\
& \frac{1}{2}vw_3\omega_4c_s^2\omega_2 - \frac{1}{2}vw_3\omega_4c_s^2\omega_2 + \frac{13}{8}\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_4^2c_s^2 - \frac{3}{2}v^3\omega_4\omega_2 + \frac{1}{8}\omega_3\omega_4 - \frac{1}{8}\omega_4^2u^2 - \frac{3}{2}v^2\omega_3^2u - 2\omega_3c_s^2 + \\
& \frac{1}{4}\omega_4u\omega_2 + \frac{1}{2}vw_1\omega_2 - \frac{1}{4}v\omega_3^2c_s^2 - \frac{1}{2}v^2\omega_3^2 + 2vw_1^2u^3\omega_2 - \frac{1}{4}v^2\omega_4\omega_1u + \frac{1}{4}vw_3\omega_1\omega_2 + \frac{5}{2}vw_3\omega_4u^3\omega_2 - \frac{9}{4}vw_3\omega_4c_s^2 + \\
& \frac{1}{4}vw_4\omega_1^2u^2 + \frac{1}{8}v^2\omega_4\omega_1 + \frac{1}{8}v^2\omega_3^2\omega_2 - \frac{5}{4}vw_4u^2\omega_2 + \frac{1}{2}vw_4^2\omega_1u^3 - \frac{1}{4}v^4\omega_4^2\omega_2 - \frac{1}{2}v\omega_3^2c_s^2\omega_2 - \frac{1}{2}\omega_3\omega_4u^3 + v^2\omega_3 - \\
& \frac{5}{8}\omega_3u^2\omega_2 - \frac{1}{4}\omega_3^2\omega_1u^3 + \frac{1}{2}v^2\omega_4u\omega_2 - 2vw_1\omega_2 - \omega_3\omega_1u^3\omega_2 - \frac{1}{4}\omega_3^2u^2 - \frac{3}{2}\omega_3^2u^3 - \frac{1}{2}v^2\omega_3\omega_4c_s^2 + \frac{1}{4}v^3\omega_4\omega_1u^2 + \\
& \frac{1}{8}\omega_3\omega_1 + \frac{1}{4}vw_4u^2\omega_2 - 2v^2\omega_1u^2\omega_2 - \omega_3\omega_4\omega_1u^3 - \frac{1}{4}\omega_3^2\omega_4c_s^2u + \frac{1}{8}vw_4\omega_2 + \omega_3c_s^2\omega_1u\omega_2 + \frac{1}{2}v^2\omega_1\omega_2 - \frac{1}{2}vw_3\omega_4u^3 + \\
& \frac{1}{4}vw_3\omega_2\omega_2 - \frac{1}{2}\omega_4\omega_1u^3\omega_2 + \frac{3}{2}\omega_1u^2\omega_2 - \frac{3}{4}v\omega_3^2\omega_4u^2 - \frac{5}{2}vw_3\omega_1u^2 - \frac{3}{4}\omega_4 - \frac{1}{4}v^3\omega_4\omega_2 - \frac{3}{2}\omega_4\omega_1u - vw_3\omega_4c_s^2\omega_1u + \\
& \frac{1}{8}\omega_4^2u + \frac{1}{2}v^2\omega_3u^2\omega_2^2 - \frac{3}{2}v^2\omega_3\omega_4u^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_2 - \frac{1}{4}\omega_3\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_1\omega_2 - vw_1^2u^2\omega_2 + \\
& \frac{1}{8}v^3\omega_3^2 - \frac{1}{4}v^3\omega_3^2\omega_2\omega_2 + \frac{1}{8}v^2\omega_4^2u - \frac{1}{4}\omega_3^2u^2 - \frac{1}{4}v^2\omega_4^2u^2\omega_2 + \frac{1}{2}\omega_3\omega_1u^3 - \frac{1}{2}\omega_1 + \frac{1}{2}vw_3\omega_4u^2\omega_2 - \frac{1}{4}\omega_3^2\omega_1u^2 - \\
& \frac{1}{2}v^2\omega_3^2\omega_4c_s^2 - \frac{11}{8}\omega_3\omega_4u^2 + \frac{3}{4}v^3\omega_3\omega_2 - \frac{1}{4}v^2\omega_3\omega_4u + \frac{1}{2}v^2\omega_3\omega_2\omega_1 + \frac{3}{2}\omega_1u - \frac{3}{8}v\omega_4^2 - \frac{1}{4}v^2\omega_4^2\omega_2 - \frac{3}{8}\omega_4\omega_1u - vw_3\omega_4c_s^2\omega_1u + \\
& \frac{1}{4}v^4\omega_3^2\omega_2 + \frac{1}{4}vw_3^2\omega_2\omega_2 - \frac{1}{2}vw_3^2\omega_4u^3 - \frac{3}{4}vw_3\omega_2^2\omega_2^2 + \frac{1}{4}\omega_4^2 - \frac{1}{2}vw_3c_s^2\omega_2^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1u + \frac{3}{8}\omega_3\omega_4u^2\omega_2 - \\
& \frac{1}{2}v^3\omega_3^2\omega_2 + \frac{1}{2}vw_3\omega_4c_s^2\omega_1 + \frac{1}{4}vw_3\omega_4u\omega_2 - \frac{1}{2}v^2\omega_2\omega_1u^2 + \frac{1}{4}\omega_3\omega_2^2u^2 + \frac{1}{2}vw_3\omega_4c_s^2\omega_2 + \frac{1}{2}vw_3\omega_4u^2 + \frac{1}{8}\omega_3^2u^2 + \\
& \omega_3u^2 + \frac{1}{4}\omega_3^2\omega_4u^3 + \frac{7}{4}\omega_3\omega_1u^3 - \frac{1}{4}v^2\omega_2\omega_4^2\omega_2 + \frac{1}{8}vw_3^2u^2 + \frac{3}{8}v^2\omega_4^2 + \frac{9}{4}vw_3\omega_4u^2 + \frac{3}{4}vw_3^2\omega_1u^2 - vw_3\omega_1^2u^3 + \\
& \frac{7}{8}v^2\omega_4\omega_2 + \frac{1}{4}vw_3^2\omega_2u + \frac{1}{4}vw_1\omega_2 - \frac{1}{2}\omega_1^2u^2\omega_2 + \frac{11}{8}\omega_3\omega_1u^2 + \frac{1}{4}\omega_3^2\omega_4u^2 + \frac{1}{2}vw_3\omega_4c_s^2u + 2vw_3\omega_4\omega_1u^3 + \\
& 5vw_1u^2\omega_2 + \frac{1}{4}\omega_3\omega_4u^3 + \frac{1}{2}v^2\omega_3^2c_s^2\omega_2 + \frac{1}{4}\omega_3\omega_2 + \frac{3}{4}\omega_3c_s^2\omega_1 - \frac{1}{4}vw_4^2u + v^2\omega_1\omega_2 + \frac{1}{4}vw_4^2u^3\omega_2 + \frac{1}{2}v^4\omega_4\omega_2 + \\
& \frac{1}{4}\omega_4\omega_2 + \frac{1}{4}v^2\omega_3\omega_2^2 - \frac{3}{2}v\omega_3\omega_1u^3\omega_2 + \frac{3}{4}vw_4\omega_1u + \frac{1}{2}vw_3\omega_1u^2 - \frac{3}{4}\omega_1\omega_2 + \frac{1}{2}vw_3\omega_1u^3 - \frac{1}{4}vw_3\omega_1u^2 - \frac{5}{4}vw_3\omega_1u^2 + \\
& \frac{1}{4}v^2\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_4u + \frac{3}{4}v^2\omega_3\omega_1u - v^2\omega_3\omega_4\omega_1u^2 - \frac{3}{2}vw_4\omega_1u^3\omega_2 - \frac{1}{4}v^3\omega_3\omega_1\omega_2 - \frac{1}{2}vw_2 + 2v^2\omega_3\omega_1u^2\omega_2 + \\
& \omega_1^2u^3\omega_2 + \frac{1}{4}vw_3u^2\omega_2^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \frac{1}{2}\omega_4u^2 + \frac{1}{2}\omega_3^2c_s^2 - \frac{1}{4}\omega_2^2\omega_1u^3 - \frac{1}{4}\omega_3^2c_s^2\omega_2 + \frac{1}{2}v^2\omega_3\omega_2\omega_2 - \frac{1}{8}\omega_4u^2\omega_2 - \\
& \frac{1}{8}v^3\omega_4^2 + \frac{1}{2}v^3\omega_3^2\omega_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1u - 2\omega_2^2u^3 + \frac{1}{2}v^2\omega_3^2\omega_4u^2 + \frac{3}{2}\omega_3\omega_4c_s^2\omega_2^2 - \frac{1}{4}\omega_4\omega_2^2u^2 - \frac{1}{4}vw_3\omega_4 - \frac{7}{8}\omega_3\omega_1u + \\
& \frac{1}{2}v^2\omega_4u^2\omega_2^2 + \frac{1}{8}\omega_3\omega_2 + \frac{1}{8}v\omega_4^2u^2 + 2v^2\omega_4\omega_1u^2\omega_2 + \frac{3}{2}\omega_3\omega_4c_s^2\omega_2 - vw_1\omega_2 + \frac{1}{4}\omega_3^2u^3\omega_2 + \frac{3}{4}\omega_3^2c_s^2\omega_2 + \frac{1}{4}vw_4\omega_1u^2 + \\
& \frac{1}{8}v^2\omega_3\omega_2 + \frac{1}{4}\omega_3\omega_4u^3\omega_2 - v^2\omega_1\omega_2 - \frac{5}{2}vw_4\omega_1u^2 + \frac{3}{4}vw_3\omega_2^2\omega_2^2 + \frac{1}{4}v^3\omega_4\omega_2 - \frac{1}{2}vw_2 + \frac{1}{2}v^2\omega_3\omega_1u^2\omega_2 + \\
& \frac{5}{8}v^2\omega_4\omega_2 - \frac{3}{4}vw_4\omega_1u^2\omega_2 - \frac{1}{4}\omega_4\omega_1u^2 + \frac{1}{2}v^2\omega_3\omega_4u^2 - \frac{1}{2}vw_3\omega_1u - \frac{1}{2}\omega_3^2c_s^2\omega_2\omega_2 - \frac{1}{2}vw_3\omega_4u - \frac{1}{2}v^3\omega_4\omega_1u\omega_2 - \\
& \frac{1}{2}v^4\omega_3\omega_2^2 - \frac{1}{4}v^2\omega_4\omega_2^2 + \frac{1}{8}vw_3^2\omega_2 - \frac{1}{4}vw_4\omega_1 + \frac{1}{4}vw_4^2u^2\omega_2 + \frac{5}{2}vw_3c_s^2\omega_2 + \frac{3}{4}vw_3^2\omega_4c_s^2 + \frac{1}{2}vw_3\omega_4c_s^2\omega_2 - \\
& \frac{1}{2}\omega_3\omega_4c_s^2\omega_2\omega_2 - \frac{3}{4}vw_3\omega_1u^2\omega_2 + \frac{1}{8}vw_3\omega_4\omega_2 + \frac{1}{2}v^3\omega_3\omega_1u\omega_2 - \frac{1}{2}vw_3c_s^2\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1u\omega_2 - \frac{1}{2}vw_3\omega_4\omega_1u - \frac{1}{2}\omega_3u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_i, y-\delta_i}^{[\mu_1], t-2\delta_t} = & -2 - vw_4\omega_1\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_2 - \frac{3}{2}vw_4 + \frac{1}{8}\omega_3^2\omega_2 - \frac{3}{2}\omega_4\omega_1 + \frac{5}{2}\omega_3 - \frac{1}{2}\omega_4\omega_1u^2\omega_2 + \frac{3}{8}\omega_3\omega_4\omega_2 - 2vw_3\omega_4^2u - vw_3\omega_1\omega_2 - \\
& \frac{1}{2}\omega_3\omega_4\omega_1u + \frac{1}{2}vw_2^2\omega_1u^2 + \frac{3}{4}vw_4^2\omega_2 - 2vw_3\omega_2 - \frac{3}{2}\omega_3\omega_1u^2\omega_2 - \omega_3^2u - v^2\omega_3\omega_4 - \frac{7}{2}\omega_3\omega_4u - \frac{1}{4}\omega_3^2\omega_1u + v^2\omega_1\omega_2^2 + \\
& 2v^2\omega_3\omega_1\omega_2 + \frac{1}{2}vw_3\omega_2^2 + \frac{1}{4}vw_4\omega_2^2 - 3vw_3\omega_1u - \frac{1}{2}v^2\omega_4\omega_1\omega_2 - 2vw_3^2\omega_4u + \frac{3}{2}\omega_4\omega_1u^2 - \frac{7}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4^2u^2 - \frac{1}{2}\omega_4\omega_1\omega_2 + \\
& 2v^2\omega_4\omega_1\omega_2 - vw_1\omega_2 + v^2\omega_4\omega_2^2 - \frac{3}{4}v^2\omega_3^2\omega_2 + \frac{1}{2}vw_3\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_2^2u - \frac{3}{4}vw_3\omega_1\omega_2 - v\omega_4\omega_1u^2 - \frac{1}{4}v^2\omega_3^2\omega_2 + 6vw_1\omega_2 + \\
& \frac{1}{2}\omega_3\omega_1u^2 + \frac{1}{2}vw_4\omega_1u - \frac{9}{8}\omega_3\omega_1 - \frac{1}{2}vw_3\omega_1 - 2vw_4\omega_2 - 3vw_3\omega_2 - 2v^2\omega_2^2 - vw_3^2\omega_4u^2 + \frac{1}{2}\omega_3\omega_4 + \frac{3}{2}\omega_4 + 2\omega_4\omega_1u - \\
& vw_3\omega_4\omega_1 - \frac{1}{2}\omega_4^2u - \frac{3}{2}v^2\omega_3\omega_4\omega_2 + \frac{4}{3}vw_4^2\omega_1u - \frac{3}{2}\omega_3\omega_4\omega_1u^2 + \omega_3\omega_4\omega_2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}vw_3\omega_2^2 + 2vw_3^2\omega_2^2 + \frac{1}{2}\omega_3^2\omega_2 - \\
& \frac{3}{4}\omega_3^2u^2 + w_1 + vw_3\omega_4\omega_2 - \frac{1}{4}\omega_3^2\omega_1u^2 - \omega_3\omega_4u^2 + \frac{1}{2}v^2\omega_3\omega_4 - \frac{1}{2}v^2\omega_3^2\omega_1u - 4\omega_1u + \frac{1}{2}v\omega_4^2 - \frac{1}{2}\omega_1^2\omega_2 - \frac{1}{4}\omega_4^2\omega_2 + \\
& \frac{1}{2}vw_3^2\omega_2^2 - vw_3\omega_4^2u^2 - \frac{1}{4}\omega_4^2 + \frac{1}{2}vw_3\omega_4\omega_2^2 + \frac{3}{2}vw_3\omega_4\omega_2u + \frac{1}{2}\omega_3\omega_4^2u^2 + 3vw_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_2^2u - \frac{1}{2}v^2\omega_4\omega_2u - \\
& vw_1^2\omega_2 + \omega_1^2u - \frac{1}{4}v^2\omega_4^2 - \frac{1}{4}\omega_4^2\omega_1u + v^2\omega_3\omega_4^2u + \frac{1}{2}vw_3\omega_1u^2 + \frac{3}{2}v^2\omega_4\omega_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1u^2 + \frac{3}{4}vw_3\omega_2\omega_2 - 2vw_1\omega_2 + \omega_1^2\omega_2 + \\
& \frac{5}{4}\omega_3\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_4\omega_2^2 - \frac{3}{2}vw_3\omega_2^2 - \frac{3}{2}\omega_3\omega_2\omega_2 + \frac{1}{2}vw_4^2u - \frac{5}{2}vw_3 - 2v^2\omega_1\omega_2 + \frac{1}{2}vw_3\omega_2 + \frac{1}{2}\omega_3\omega_4\omega_2 + \frac{1}{2}vw_4\omega_2 + \frac{1}{2}v^2\omega_3\omega_2^2 + \\
& \frac{3}{2}\omega_3\omega_4\omega_1 - \frac{3}{2}v^2\omega_3\omega_1\omega_2 - 3vw_4\omega_1u - vw_3\omega_2^2 - v\omega_2^2 + 2\omega_1\omega_2 + \frac{3}{2}vw_3\omega_1 + \frac{1}{4}vw_4\omega_2 - 3v^2\omega_3\omega_4\omega_2 + \omega_2 + \frac{3}{2}\omega_4u + \\
& v^2\omega_3\omega_2^2 + v^2\omega_3\omega_4\omega_2 - \frac{1}{4}\omega_4^2\omega_1u + \frac{1}{2}vw_4\omega_1\omega_2 + 4vw_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1 + \frac{1}{2}vw_3\omega_1u + \frac{1}{2}\omega_3\omega_1\omega_2 - v^2\omega_3\omega_4\omega_1u + \frac{1}{4}\omega_3^2\omega_4 + \\
& \frac{1}{4}\omega_4\omega_1u^2 + \frac{7}{2}vw_3\omega_4 + \frac{3}{4}\omega_3^2\omega_4u + 2\omega_3\omega_1u + v\omega_3^2 - 3vw_4\omega_1\omega_2 + \frac{5}{2}v^2\omega_3\omega_2 - \frac{1}{2}\omega_3^2u + \frac{1}{2}vw_3^2u - 2\omega_1^2u^2 - 2vw_4\omega_1\omega_2 - \\
& \frac{1}{4}\omega_4^2\omega_1u^2 + \frac{3}{4}vw_3\omega_1u + 5vw_3\omega_4u - \frac{1}{2}\omega_4\omega_1\omega_2 + \frac{1}{2}vw_1\omega_2^2 + \frac{1}{2}v^2\omega_4\omega_2^2 - \frac{9}{8}\omega_3\omega_2 + \frac{1}{4}vw_4\omega_1u + 
\end{aligned}$$

$$\begin{aligned}
& \frac{1}{2}v\omega_4^2u^2\omega_2 - 2v\omega_3\omega_1u^2\omega_2 - \frac{1}{2}v^2\omega_4^2\omega_1u + \frac{3}{4}\omega_3\omega_4^2u + \frac{1}{2}v\omega_3\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_4 - \frac{1}{2}\omega_3\omega_1u\omega_2 + \frac{3}{2}v\omega_3\omega_4\omega_1u + \frac{5}{2}\omega_3u, \\
\alpha_{x-\delta_l,y}^{[\mu_1],t-2\delta_t} &= 1 + v^2\omega_3^2\omega_1u^2 + \frac{1}{4}\omega_4^2u^3 - \frac{1}{2}\omega_4\omega_1u^3 - \frac{1}{4}v^2\omega_3^2u\omega_2 - \omega_3c_s^2\omega_1u - \omega_1u^2 + \frac{1}{4}\omega_4^2u^2\omega_2 + \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_3 + \\
&\quad \frac{1}{4}\omega_4\omega_1u^2\omega_2 - \frac{1}{4}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u^2\omega_2 + 2v^2\omega_3c_s^2\omega_2^2 - \frac{1}{4}\omega_3^2u - 3v^2\omega_3\omega_4c_s^2\omega_2 + \frac{1}{4}v^2\omega_3\omega_4 - \\
&\quad \frac{1}{5}\omega_3\omega_4u - \omega_1u^2\omega_2^2 - \frac{3}{2}v^2\omega_3\omega_1u\omega_2 + \frac{1}{4}v^2\omega_4\omega_1\omega_2 + 2v^2\omega_2 - \frac{1}{4}\omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4^2u^2 - \frac{1}{4}v^2\omega_3^2u + \frac{1}{2}\omega_3c_s^2 + \\
&\quad \frac{1}{2}\omega_4u\omega_2 - \frac{3}{2}v^2\omega_4\omega_1u\omega_2 - \frac{1}{2}v^2\omega_3^2 + \frac{1}{4}\omega_3u^2\omega_2^2 + \frac{1}{2}v^2\omega_4\omega_1u + \frac{1}{4}v^2\omega_4\omega_1 + \frac{1}{2}v^2\omega_3^2\omega_2 + \frac{1}{2}v^4\omega_4^2\omega_2 - \frac{1}{4}v^2\omega_3 + \\
&\quad v^2\omega_4u\omega_2 - \frac{1}{2}\omega_3\omega_1u^3\omega_2 - \frac{1}{4}\omega_3^2u^3 + v^2\omega_3\omega_4^2c_s^2 - \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1 - \frac{1}{4}\omega_4^2\omega_2 + 4v^2\omega_1u^2\omega_2^2 + \omega_3c_s^2\omega_1u\omega_2 - \\
&\quad v^2\omega_1\omega_2 + \frac{1}{2}\omega_4\omega_1u^3\omega_2 + 2\omega_1u^2\omega_2 - \frac{5}{4}\omega_4 + \frac{1}{2}\omega_4\omega_1u - \frac{1}{4}\omega_4^2u - v^2\omega_3u^2\omega_2^2 - \frac{1}{4}\omega_4^2u^3\omega_2 + 3v^2\omega_3\omega_4\omega_2u^2\omega_2 + \\
&\quad \frac{1}{4}v^2\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_4u\omega_2 + \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}\omega_3^2u\omega_2 - \frac{1}{4}v^2\omega_4^2u^2\omega_2 - \frac{1}{2}\omega_1 + v^2\omega_3^2\omega_4c_s^2 + \frac{1}{4}\omega_3\omega_4u^2\omega_2 - \\
&\quad \frac{1}{2}v^2\omega_3\omega_4u + \frac{1}{2}v^2\omega_3^2\omega_1u - \frac{3}{2}\omega_1u - \frac{1}{2}\omega_3c_s^2\omega_2^2 - \frac{1}{4}v^2\omega_4^2\omega_2 + \frac{1}{4}v^2\omega_3\omega_1 - \frac{1}{2}v^4\omega_3^2\omega_2 + \frac{1}{4}\omega_4^2 - \frac{1}{4}\omega_3\omega_4u^2\omega_2 + \\
&\quad v^2\omega_4^2\omega_1u^2 - \frac{1}{4}\omega_3u^2 + \frac{1}{2}\omega_3\omega_1u^3 - \frac{1}{4}v^2\omega_4^2u^2\omega_2 + \frac{3}{4}\omega_4\omega_2 + \frac{1}{2}v^2\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_2^2 + \frac{1}{4}\omega_3\omega_1u^2 - v^2\omega_3^2c_s^2\omega_2 - \\
&\quad \frac{1}{2}\omega_3\omega_2\omega_2 - \frac{1}{2}\omega_3c_s^2\omega_1u\omega_2 - \frac{1}{2}v^4\omega_4\omega_2^2 - \frac{5}{4}v^2\omega_3\omega_2^2 + \frac{1}{2}v^2\omega_3\omega_2^2 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 + 2\omega_1u\omega_2 - \frac{1}{2}v^2\omega_3\omega_4u\omega_2 - \\
&\quad \omega_2 + \frac{1}{2}v^2\omega_4\omega_2^2 + \frac{1}{2}\omega_4u + \frac{1}{2}v^2\omega_3\omega_1u + 2v^2\omega_3\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_1\omega_2 - 4v^2\omega_3\omega_1u^2\omega_2 - \frac{1}{2}\omega_1u\omega_2^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \\
&\quad \frac{3}{4}\omega_4u^2 + v^2\omega_3u\omega_2 - \omega_4u^2\omega_2 + v^2\omega_3\omega_4\omega_1u - v^2\omega_3^2\omega_4u^2 - \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_3\omega_1u - v^2\omega_4u^2\omega_2^2 - 4v^2\omega_4\omega_1u^2\omega_2 + \\
&\quad \frac{1}{2}\omega_3\omega_4c_s^2u + \frac{1}{4}\omega_3^2u^3\omega_2 - \frac{1}{4}\omega_4\omega_2^2 + \frac{1}{2}\omega_3c_s^2u + \frac{1}{2}v^2\omega_3\omega_2 - 2v^2\omega_1u\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_2^2\omega_2 - \frac{3}{4}v^2\omega_4 + \frac{1}{4}\omega_4^2u\omega_2 - \\
&\quad v^2\omega_3\omega_4u^2 - \frac{1}{2}\omega_3c_s^2u\omega_2 - \frac{1}{2}v^4\omega_4\omega_1u\omega_2 + v^4\omega_3\omega_2^2 - \frac{1}{2}\omega_3\omega_4c_s^2u\omega_2 + \frac{1}{2}v^2\omega_4^2\omega_1u - \frac{1}{2}\omega_3\omega_1u\omega_2 + \frac{1}{2}\omega_3u, \\
\alpha_{x-\delta_l,y}^{[\mu_4],t-2\delta_t} &= -2 - v^2\omega_3^2u\omega_2 + \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{1}{2}\omega_4\omega_1 - \omega_4\omega_1u^2\omega_2 + \frac{1}{2}\omega_1\omega_2^2 + \omega_3\omega_1u^2\omega_2 + 2v^2\omega_3\omega_4 - 2v^2\omega_1\omega_2 + \\
&\quad 4v^2\omega_3\omega_1u\omega_2 + 2v^2\omega_4\omega_1\omega_2 + \omega_4\omega_1u^2 - \frac{1}{2}\omega_4^2u^2 + \frac{5}{2}\omega_4u\omega_2 + 4v^2\omega_4\omega_1u\omega_2 + 2v^2\omega_4u\omega_2^2 + \frac{3}{2}v^2\omega_3^2 + \frac{1}{2}\omega_4\omega_1\omega_2 + \\
&\quad \frac{1}{2}\omega_4^2\omega_2 + 4v^2\omega_2^2 + 2\omega_4 - \frac{1}{2}\omega_4\omega_1u - \frac{1}{2}\omega_4u\omega_2^2 + \omega_4^2u + 3v^2\omega_3\omega_4\omega_2 - \frac{3}{2}\omega_1\omega_2 + \frac{1}{2}\omega_3^2u^2 + \omega_1 - v^2\omega_3\omega_4^2 - \\
&\quad v^2\omega_3^2\omega_1u + 2\omega_1u + v^2\omega_4^2\omega_2 - \frac{1}{2}\omega_4^2 - \frac{1}{2}\omega_3^2u^2\omega_2 - v^2\omega_4^2u\omega_2 + \frac{1}{2}v^2\omega_4^2 + 2v^2\omega_3\omega_4^2u - 3v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1 - \\
&\quad \omega_3\omega_1u^2 + \frac{1}{2}\omega_3u\omega_2 - 4v^2\omega_1u\omega_2^2 - \frac{5}{2}\omega_4\omega_2 + 2v^2\omega_3\omega_1\omega_2 - 3\omega_1u\omega_2 - 6v^2\omega_3\omega_4u\omega_2 - \omega_2^2 + 3\omega_2 - 2\omega_4u + \\
&\quad 2v^2\omega_3u\omega_2^2 + 2v^2\omega_3^2\omega_4u - v^2\omega_3\omega_4\omega_1 + \omega_1u\omega_2^2 - 2v^2\omega_3\omega_4\omega_1u - \frac{1}{2}\omega_3\omega_1u - \frac{1}{2}\omega_3u\omega_2^2 + \frac{1}{2}\omega_4\omega_2^2 - \frac{1}{2}v^2\omega_4^2\omega_1 - \\
&\quad 5v^2\omega_3\omega_2 - \omega_4^2u\omega_2 + \frac{1}{2}\omega_4\omega_1u\omega_2 - 2v^2\omega_4\omega_2^2 - v^2\omega_4^2\omega_1u - v^2\omega_3^2\omega_4 + \frac{1}{2}\omega_3\omega_1u\omega_2, \\
\alpha_{x,y}^{[\mu_1],t-2\delta_t} &= 2 + v^2\omega_3^2\omega_1u^2 - 4\omega_1u^2 + v^2\omega_3\omega_2^2 + \frac{1}{2}\omega_4\omega_1 - \frac{1}{2}\omega_3 + \omega_1^2 - \frac{1}{2}v^2\omega_3\omega_4 - 2\omega_4\omega_1^2u^4 - v^2\omega_4\omega_1\omega_2 - 4v^2\omega_2 - \\
&\quad 2v^2\omega_3\omega_1u^2 + 5\omega_4\omega_1u^2 - \omega_4^2u^2 - 4\omega_3c_s^2 - \frac{1}{2}v^2\omega_3^2 + \omega_4^2\omega_1u^4 + 2\omega_3^2\omega_4c_s^2\omega_2^2 + 2v^2\omega_3 - \omega_3\omega_1u^2 + \frac{1}{2}\omega_3\omega_1 + \\
&\quad 6v^2\omega_1\omega_2 - \frac{1}{2}\omega_4 + 4v^2\omega_3\omega_4u^2\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1u^2 - \omega_3\omega_4c_s^2\omega_1 + 2\omega_3\omega_4^2c_s^2\omega_2^2 - \omega_3^2c_s^2\omega_1 - \frac{3}{2}\omega_3^2u^2 + \\
&\quad 2v^2\omega_4^2u^2\omega_2 - 3\omega_1 - \frac{1}{2}\omega_3^2\omega_1u^2 - \frac{5}{2}\omega_3\omega_4u^2 - 3v^2\omega_3\omega_1 + v^2\omega_4^2\omega_1u^2 + 2\omega_3u^2 + 4\omega_3c_s^2\omega_2^2u^2 + 2\omega_3\omega_1u^4 + \\
&\quad v^2\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_1 + 6\omega_3\omega_1u^2 - 2v^2\omega_4\omega_1u^2 + 6\omega_3c_s^2\omega_1 - v^2\omega_3\omega_1\omega_2 - 2v^2\omega_1\omega_2 - \omega_3^2\omega_1u^4 + \\
&\quad 6v^2\omega_3\omega_4\omega_1u^2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1 - 8v^2\omega_3\omega_1u^2\omega_2 + \omega_3^2c_s^2 - 2v^2\omega_3^2\omega_4u^2 + \omega_3\omega_4c_s^2 - 2\omega_3c_s^2\omega_1u^2 - 8v^2\omega_4\omega_1u^2\omega_2 + \\
&\quad v^2\omega_3\omega_2 + 2v^2\omega_3^2u^2\omega_2 - 2\omega_1^2u^2 - 2v^2\omega_3\omega_4u^2 - 2\omega_3^2c_s^2\omega_1u^2 + 8v^2\omega_1^2u^2\omega_2 - 6\omega_3\omega_4c_s^2\omega_1u^2, \\
\alpha_{x,y}^{[\mu_4],t-2\delta_t} &= -4 + \frac{1}{2}\omega_3^2\omega_2 - \frac{1}{2}\omega_4\omega_1 + 5\omega_3 + \frac{1}{2}\omega_3\omega_4\omega_2 - \omega_1^2 - 2\omega_4\omega_1u^2 - \omega_3\omega_4 + \omega_4^2u^2 - v^2\omega_3^2 + \omega_3\omega_1^2 + v^2\omega_3^2\omega_2 - \\
&\quad 2\omega_3\omega_1u^2 - \frac{7}{2}\omega_3\omega_1 + \omega_4 - \omega_3^2u^2 + 3\omega_1 + \omega_3^2\omega_1u^2 - v^2\omega_4^2\omega_2 + v^2\omega_4^2 - 2v^2\omega_4\omega_2 + \omega_3\omega_2^2 + 2\omega_3\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_1 - \\
&\quad \frac{1}{2}\omega_4\omega_2 - 2v^2\omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_1 - \omega_2^2 + 3\omega_2 + 2\omega_4\omega_1u^2 + 2v^2\omega_3\omega_2 - \omega_3^2 - \omega_4^2\omega_1u^2 + 2v^2\omega_4\omega_2^2 - \frac{7}{2}\omega_3\omega_2, \\
\alpha_{x+\delta_l,y}^{[\mu_1],t-2\delta_t} &= 1 + v^2\omega_3^2\omega_1u^2 - \frac{1}{4}\omega_4^2u^3 + \frac{1}{2}\omega_4\omega_1u^3 + \frac{1}{4}v^2\omega_3^2u\omega_2 + \omega_3c_s^2\omega_1u - \omega_1u^2 + \frac{1}{4}\omega_4^2u^2\omega_2 + \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_3 + \\
&\quad \frac{1}{4}\omega_4\omega_1u^2\omega_2 - \frac{1}{4}\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u^2\omega_2 + 2v^2\omega_3c_s^2\omega_2^2 + \frac{1}{4}\omega_3^2u - 3v^2\omega_3\omega_4c_s^2\omega_2 + \frac{1}{4}v^2\omega_3\omega_4 + \\
&\quad \frac{1}{5}\omega_3\omega_4u - \omega_1u^2\omega_2^2 + \frac{3}{2}v^2\omega_3\omega_1u\omega_2 + \frac{1}{4}v^2\omega_4\omega_1\omega_2 + 2v^2\omega_2 - \frac{1}{4}\omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4^2u^2 + \frac{1}{4}v^2\omega_3^2u + \frac{1}{2}\omega_3c_s^2 + \\
&\quad \frac{1}{2}\omega_4u\omega_2 + \frac{3}{2}v^2\omega_4\omega_1u\omega_2 - \frac{1}{2}\omega_3^2\omega_2 + \frac{1}{4}\omega_3u^2\omega_2^2 - \frac{1}{2}v^2\omega_4\omega_1u + \frac{1}{4}v^2\omega_4\omega_1 + \frac{1}{2}v^2\omega_3^2\omega_2 + \frac{1}{2}v^4\omega_4^2\omega_2 - \frac{1}{4}v^2\omega_3 - \\
&\quad v^2\omega_4\omega_1u\omega_2 + \frac{1}{2}\omega_3\omega_1u^3\omega_2 + \frac{1}{4}\omega_3^2u^3 + v^2\omega_3\omega_4^2c_s^2 - \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1 - \frac{1}{4}\omega_4^2\omega_2 + 4v^2\omega_1u^2\omega_2^2 - \omega_3c_s^2\omega_1u\omega_2 - \\
&\quad v^2\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_1u^3\omega_2 + 2\omega_1u^2\omega_2 - \frac{5}{4}\omega_4 - \frac{1}{2}\omega_4\omega_1u + \frac{1}{4}\omega_4^2u - v^2\omega_3u^2\omega_2^2 + \frac{1}{4}\omega_4^2u^3\omega_2 + 3v^2\omega_3\omega_4u\omega_2 + \\
&\quad \frac{1}{4}v^2\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_4u\omega_2 + \frac{1}{2}\omega_1\omega_2 - \frac{1}{4}\omega_3^2u\omega_2 + \frac{1}{4}v^2\omega_4^2u^2\omega_2 - \frac{1}{2}\omega_1 + v^2\omega_3^2\omega_4c_s^2 + \frac{1}{4}\omega_3\omega_4u^2\omega_2 + \\
&\quad \frac{1}{2}v^2\omega_3\omega_4u - \frac{1}{2}\omega_3^2\omega_2\omega_1 + \frac{3}{2}\omega_1u - \frac{1}{2}\omega_3c_s^2\omega_2^2 - \frac{1}{4}v^2\omega_3^2\omega_2 + \frac{1}{4}v^2\omega_3\omega_1 - \frac{1}{2}v^4\omega_3^2\omega_2 + \frac{1}{4}\omega_4^2 - \frac{1}{4}\omega_3\omega_4u^2\omega_2 + \\
&\quad v^2\omega_4^2\omega_1u^2 - \frac{1}{4}\omega_3u^2 - \frac{1}{2}\omega_3\omega_1u^3 + \frac{1}{4}v^2\omega_4^2\omega_1u\omega_2 + \frac{3}{4}\omega_4\omega_2 + \frac{1}{2}v^2\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_2^2 + \frac{1}{4}\omega_3\omega_1u^2 - v^2\omega_3^2c_s^2\omega_2 + \\
&\quad \frac{1}{2}v^2\omega_3\omega_4\omega_1 - 2v^2\omega_1u\omega_2^2 - \frac{5}{4}\omega_4 - \frac{1}{2}\omega_4\omega_1u + \frac{1}{4}\omega_4^2u - v^2\omega_3u\omega_2^2 + \frac{3}{4}\omega_4\omega_2 + \frac{1}{2}v^2\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_2^2 + \frac{1}{4}\omega_3\omega_1u^2 - v^2\omega_3^2c_s^2\omega_2 + \\
&\quad \frac{1}{2}v^2\omega_3\omega_4u - \frac{1}{2}\omega_3^2\omega_2\omega_1 - \frac{1}{2}\omega_4u - \frac{1}{2}v^2\omega_3\omega_1u + 2v^2\omega_3\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_1\omega_2 - 4v^2\omega_3\omega_1u^2\omega_2 + \frac{1}{2}\omega_1u\omega_2^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \\
&\quad \frac{3}{4}\omega_4u^2 - v^2\omega_3\omega_4u\omega_2 - \omega_4u^2\omega_2 - v^2\omega_3\omega_4\omega_1u - v^2\omega_3\omega_4u^2 - \frac{1}{2}\omega_3\omega_4c_s^2 - \frac{1}{2}\omega_3\omega_1u - v^2\omega_4u^2\omega_2^2 - 4v^2\omega_4\omega_1u^2\omega_2 - \\
&\quad \frac{1}{2}\omega_3\omega_4c_s^2u - \frac{1}{4}\omega_3^2u^3\omega_2 - \frac{1}{4}\omega_4\omega_2^2 - \frac{1}{2}\omega_3c_s^2\omega_2 + \frac{1}{2}v^2\omega_3\omega_2 + 2v^2\omega_1u\omega_2 + \frac{1}{2}v^2\omega_3^2u\omega_2 - \frac{3}{4}v^2\omega_4 - \frac{1}{4}\omega_4^2u\omega_2 -
\end{aligned}$$

$$\begin{aligned}
& v^2 w_3 \omega_4^2 u^2 + \frac{1}{2} \omega_3^2 c_s^2 u w_2 + \frac{1}{2} \omega_4 \omega_1 u w_2 + v^4 \omega_3 \omega_2^2 + \frac{5}{4} v^2 \omega_4 \omega_2^2 + \frac{1}{2} \omega_3 \omega_4 c_s^2 u w_2 - \frac{1}{2} v^2 \omega_4^2 \omega_1 u + \frac{1}{2} \omega_3 \omega_1 u w_2 - \frac{1}{2} \omega_3 u, \\
\alpha_{x+\delta_1,y}^{[\mu_4],t-2\delta_t} &= -2 + v^2 w_3^2 u w_2 + \frac{1}{2} \omega_4^2 u^2 w_2 - \frac{1}{2} \omega_4 \omega_1 - \omega_4 \omega_1 u^2 w_2 + \frac{1}{2} \omega_1 \omega_2^2 + \omega_3 \omega_1 u^2 w_2 + 2 v^2 \omega_3 \omega_4 - 2 v^2 \omega_1 \omega_2^2 - \\
& 4 v^2 \omega_3 \omega_1 u w_2 + 2 v^2 \omega_4 \omega_1 w_2 + \omega_4 \omega_1 u^2 - \frac{1}{2} \omega_4^2 u^2 - \frac{5}{2} \omega_4 u w_2 - 4 v^2 \omega_4 \omega_1 u w_2 - 2 v^2 \omega_4 u w_2^2 + \frac{3}{2} v^2 \omega_3^2 + \frac{1}{2} \omega_4 \omega_1 w_2 + \\
& \frac{1}{2} \omega_4^2 \omega_2 + 4 v^2 \omega_2^2 + 2 w_4 + \frac{1}{2} \omega_4 \omega_1 u + \frac{1}{2} \omega_4 u w_2^2 - \omega_4^2 u + 3 v^2 \omega_3 \omega_4 \omega_2 - \frac{3}{2} \omega_1 \omega_2 + \frac{1}{2} \omega_3^2 u^2 + \omega_1 - v^2 \omega_3 \omega_4^2 + \\
& v^2 \omega_3^2 \omega_1 u - 2 \omega_1 u + v^2 \omega_4^2 \omega_2 - \frac{1}{2} \omega_4^2 - \frac{1}{2} \omega_3^2 u^2 w_2 + v^2 \omega_4^2 u w_2 + \frac{1}{2} v^2 \omega_4^2 - 2 v^2 \omega_3 \omega_4^2 u - 3 v^2 \omega_4 \omega_2 - \frac{1}{2} v^2 \omega_3^2 \omega_1 - \\
& \omega_3 \omega_1 u^2 - \frac{1}{2} \omega_3 u w_2 + 4 v^2 \omega_1 u w_2^2 - \frac{5}{2} \omega_4 \omega_2 + 2 v^2 \omega_3 \omega_1 w_2 + 3 \omega_1 u w_2 + 6 v^2 \omega_3 \omega_4 u w_2 - \omega_2^2 + 3 \omega_2 + 2 \omega_4 u - \\
& 2 v^2 \omega_3 u w_2^2 - 2 v^2 \omega_3^2 \omega_4 u - v^2 \omega_3 \omega_4 \omega_1 - \omega_1 u w_2^2 + 2 v^2 \omega_3 \omega_4 \omega_1 u + \frac{1}{2} \omega_3 \omega_1 u + \frac{1}{2} \omega_3 u w_2^2 + \frac{1}{2} \omega_4 \omega_2^2 - \frac{1}{2} v^2 \omega_4^2 \omega_1 - \\
& 5 v^2 \omega_3 \omega_2 + \omega_4^2 u w_2 - \frac{1}{2} \omega_4 \omega_1 u w_2 - 2 v^2 \omega_4 \omega_2^2 + v^2 \omega_4^2 \omega_1 u - v^2 \omega_3^2 \omega_4 - \frac{1}{2} \omega_3 \omega_1 u w_2, \\
\alpha_{x-\delta_1,y+\delta_t}^{[\mu_1],t-2\delta_t} &= 1 - \frac{1}{2} v^2 \omega_3^2 \omega_1 u^2 + \frac{1}{4} v \omega_4 \omega_1 u w_2 - \frac{1}{4} \omega_3^2 \omega_4 c_s^2 + \frac{1}{8} \omega_4^2 u^3 - \frac{5}{4} \omega_4 \omega_1 u^3 + \frac{5}{4} \omega_3 c_s^2 \omega_2 + \frac{3}{2} \omega_3 c_s^2 \omega_1 u - v w_4 - \\
& 3 \omega_1 u^2 - \frac{1}{2} v \omega_3^2 c_s^2 u w_2 + \frac{1}{8} \omega_4 \omega_1 - \frac{1}{4} \omega_3 - \frac{1}{2} \omega_4 \omega_1 u^2 w_2 - \frac{1}{4} v \omega_3 \omega_1 u w_2 - \frac{1}{8} \omega_3 \omega_4 \omega_1 u - \frac{3}{4} v \omega_4^2 \omega_1 u^2 + \frac{3}{8} v \omega_3 \omega_2 - \\
& \frac{1}{2} \omega_3 c_s^2 \omega_1 \omega_2 - v w_4 \omega_1^2 u^3 - \frac{1}{4} \omega_3 \omega_1 u^2 w_2 - v^2 \omega_3 c_s^2 w_2^2 - \frac{1}{8} \omega_3^2 u + \frac{1}{4} \omega_3 \omega_4^2 c_s^2 u + \frac{3}{8} v^2 \omega_3 \omega_4 c_s^2 w_2 - \frac{1}{8} v^2 \omega_3 \omega_4 - \\
& \frac{1}{4} v^3 \omega_3 \omega_2^2 - \frac{1}{4} \omega_3 \omega_4 u - \frac{1}{8} \omega_3^2 \omega_1 u + \frac{1}{4} v \omega_3^2 u^3 w_2 + \frac{3}{2} v^2 \omega_3 \omega_1 u w_2 + \frac{1}{4} v \omega_3 \omega_1 u - \frac{1}{4} v^2 \omega_4 \omega_1 \omega_2 - v^2 \omega_2 - \\
& \frac{1}{2} v \omega_3 \omega_4 c_s^2 u w_2 + \frac{1}{2} v \omega_3 \omega_4 c_s^2 w_2 + \frac{13}{8} \omega_4 \omega_1 u^2 - \frac{1}{4} \omega_3 \omega_4^2 c_s^2 + \frac{3}{4} v^3 \omega_4 \omega_2 + \frac{1}{8} \omega_3 \omega_4 - \frac{1}{8} \omega_4^2 u^2 + \frac{3}{8} v^2 \omega_3^2 u - 2 \omega_3 c_s^2 - \\
& \frac{1}{4} \omega_4 \omega_2 + \frac{1}{2} v \omega_1 u w_2^2 + \frac{1}{4} v \omega_3^2 c_s^2 - \frac{1}{2} v^2 \omega_3^2 + 2 v \omega_1^2 u^3 w_2 + \frac{1}{4} v^2 \omega_4 \omega_1 u - \frac{1}{4} v \omega_3 \omega_1 \omega_2 + \frac{1}{2} v \omega_3 \omega_4 u^3 w_2 + \frac{9}{4} v \omega_3 \omega_4 c_s^2 - \\
& \frac{5}{2} v \omega_4 \omega_1^2 u^2 + \frac{1}{8} v^2 \omega_4 \omega_1 + \frac{1}{8} v^2 \omega_3^2 \omega_2 + \frac{5}{4} v \omega_4 u^2 w_2 + \frac{1}{2} v \omega_4^2 \omega_1 u^3 - \frac{1}{4} v^4 \omega_4^2 \omega_2 + \frac{1}{2} v \omega_3^2 c_s^2 w_2 + \frac{1}{2} \omega_3 \omega_4 u^3 + v^2 \omega_3 - \\
& \frac{5}{8} \omega_3 u^2 w_2 + \frac{1}{4} \omega_3^2 \omega_1 u^3 - \frac{1}{2} v^2 \omega_4 u w_2 - 2 v \omega_1 u w_2 + \omega_3 \omega_1 u^3 w_2 - \frac{1}{4} \omega_3 \omega_2^2 u^2 + \frac{3}{8} \omega_3^2 u^3 - \frac{1}{2} v^2 \omega_3 \omega_4^2 c_s^2 - \frac{1}{4} v^3 \omega_4 \omega_1 \omega_2 + \\
& \frac{1}{8} \omega_3 \omega_1 - \frac{1}{4} v \omega_4 u^2 w_2 - 2 v^2 \omega_1 u^2 w_2^2 + \omega_3 \omega_4 \omega_1 u^3 + \frac{1}{4} \omega_3^2 \omega_4 c_s^2 u - \frac{1}{8} v \omega_4 \omega_2 - \omega_3 c_s^2 \omega_1 u w_2 + \frac{1}{2} v^2 \omega_1 \omega_2 - \frac{1}{2} v \omega_3 \omega_4^2 u^3 + \\
& \frac{1}{4} v \omega_3 u w_2 + \frac{1}{2} \omega_4 \omega_1 u^3 w_2 + \frac{3}{2} \omega_1 u^2 w_2 + \frac{3}{4} v \omega_3^2 \omega_4 u^2 + \frac{5}{2} v \omega_3 \omega_1 u^2 - \frac{3}{4} \omega_4 + \frac{1}{4} v^3 \omega_4 \omega_2 + \frac{3}{8} \omega_4 \omega_1 u - v \omega_3 \omega_4 c_s^2 \omega_1 u - \\
& \frac{1}{8} \omega_4^2 u + \frac{1}{2} v^2 \omega_3 u^2 w_2 - \frac{3}{2} v^2 \omega_3 \omega_4 u^2 w_2 - \frac{1}{8} v^2 \omega_3 \omega_4 \omega_2 - \frac{1}{4} \omega_3 \omega_4 \omega_1 u^2 - \frac{1}{4} \omega_3 \omega_4 c_s^2 \omega_1 + \frac{1}{4} \omega_1 \omega_2 + v \omega_1^2 u^2 w_2 - \\
& \frac{8}{3} v^3 \omega_3^2 - \frac{1}{4} v^3 \omega_3^2 u w_2 - \frac{1}{8} v^2 \omega_4^2 u - \frac{1}{4} \omega_3^2 u^2 - \frac{1}{4} v^2 \omega_4^2 u^2 w_2 - \frac{1}{2} \omega_3 \omega_1 u^3 - \frac{1}{2} \omega_1 - \frac{1}{2} v \omega_3 \omega_4 u^2 w_2 - \frac{1}{4} \omega_3^2 \omega_1 u^2 - \\
& \frac{1}{2} v^2 \omega_3^2 \omega_4 c_s^2 - \frac{11}{8} \omega_3 \omega_4 u^2 - \frac{3}{4} v^3 \omega_3 \omega_2 + \frac{1}{4} v^2 \omega_3 \omega_4 u - \frac{1}{2} v^2 \omega_3^2 \omega_1 u - \frac{3}{2} \omega_1 u + \frac{3}{8} v \omega_4^2 - \frac{1}{4} v^2 \omega_4^2 \omega_2 - \frac{3}{8} v^2 \omega_3 \omega_1 + \\
& \frac{1}{4} v^4 \omega_3^2 \omega_2 - \frac{1}{4} v \omega_3^2 u^2 w_2 - \frac{1}{2} v \omega_3^2 \omega_4 u^3 + \frac{3}{4} v \omega_3 \omega_4 u^2 w_2 + \frac{1}{8} \omega_4^2 + \frac{1}{2} v \omega_3 c_s^2 \omega_2^2 - \frac{1}{2} \omega_3 \omega_4 c_s^2 \omega_1 u + \frac{3}{8} \omega_3 \omega_4 u^2 w_2 + \\
& \frac{1}{2} v^3 \omega_3^2 \omega_2 - \frac{1}{2} v \omega_3 \omega_4 c_s^2 \omega_1 + \frac{1}{4} v \omega_3 \omega_4 u w_2 - \frac{1}{2} v^2 \omega_4^2 \omega_1 u^3 + \frac{1}{4} \omega_3 \omega_4^2 u^2 + v \omega_3 c_s^2 \omega_1 u w_2 - v \omega_3 \omega_4 \omega_1 u^2 + \frac{1}{8} \omega_3^2 u^2 w_2 + \\
& \omega_3 u^2 - \frac{1}{4} \omega_3^2 \omega_4 u^3 - \frac{7}{4} \omega_3 \omega_1 u^3 + \frac{1}{4} v^2 \omega_4^2 u w_2 - \frac{1}{8} v \omega_3^2 u^2 + \frac{3}{8} v^2 \omega_4^2 - \frac{9}{4} v \omega_3 \omega_4 u^2 - \frac{3}{4} v \omega_3^2 \omega_1 u^2 - v \omega_3 \omega_1 u^3 + \\
& \frac{7}{8} v^2 \omega_4 \omega_2 + \frac{1}{4} v \omega_3^2 u w_2 - \frac{1}{4} v \omega_1 \omega_2 - \frac{1}{2} \omega_1^2 u^2 w_2 + \frac{11}{8} \omega_3 \omega_1 u^2 + \frac{1}{4} \omega_3^2 \omega_4 u^2 + \frac{1}{2} v \omega_3^2 \omega_4 c_s^2 u + 2 v \omega_3 \omega_4 \omega_1 u^3 - \\
& 5 v \omega_1 u^2 \omega_2 - \frac{1}{4} \omega_3 \omega_2^2 u^3 + \frac{1}{2} v^2 \omega_3^2 c_s^2 \omega_2 - \frac{1}{4} \omega_3 u w_2 + \frac{3}{4} \omega_3 c_s^2 \omega_1 - \frac{1}{4} v \omega_4^2 u - v^2 \omega_1 \omega_2^2 + \frac{1}{4} v \omega_4^2 \omega_2 + \frac{1}{2} v^4 \omega_4 \omega_2^2 + \\
& \frac{1}{4} \omega_4 \omega_2 + \frac{1}{4} v^2 \omega_3 \omega_2^2 - \frac{3}{2} v \omega_3 \omega_1 u^3 w_2 + \frac{3}{4} v \omega_4 \omega_1 u - \frac{1}{2} v \omega_3 \omega_1 u^2 + \frac{1}{2} v \omega_3^2 \omega_1 u^3 + \frac{1}{4} v \omega_3 \omega_1 + \frac{5}{4} v \omega_3 \omega_2 u^2 + \\
& \frac{1}{4} v^2 \omega_3 \omega_4 u w_2 - \frac{1}{2} \omega_2 + \frac{1}{2} \omega_4 u - \frac{3}{4} v^2 \omega_3 \omega_1 u - v^2 \omega_3 \omega_4 \omega_1 u^2 - \frac{3}{2} v \omega_4 \omega_1 u^3 w_2 + \frac{1}{4} v^3 \omega_3 \omega_1 \omega_2 + \frac{1}{2} v \omega_2 + 2 v^2 \omega_3 \omega_1 u^2 w_2 - \\
& \omega_1^2 u^3 \omega_2 - \frac{1}{4} v \omega_3 u^2 w_2^2 - \frac{1}{2} \omega_3 \omega_4 c_s^2 \omega_2 + \frac{1}{2} \omega_4 u^2 + \frac{1}{2} \omega_3^2 c_s^2 + \frac{1}{4} \omega_4^2 \omega_1 u^3 - \frac{1}{4} \omega_3 \omega_2^2 \omega_2 - \frac{1}{2} v^2 \omega_3 \omega_1 u w_2 - \frac{1}{8} \omega_4 u^2 \omega_2 + \\
& \frac{1}{8} v^3 \omega_2^2 - \frac{1}{2} v^3 \omega_2^2 \omega_2 - \frac{1}{2} v^2 \omega_3 \omega_4 \omega_1 u + 2 \omega_1^2 u^3 + \frac{1}{2} v^2 \omega_3^2 \omega_4 u^2 + \frac{3}{2} v \omega_3 \omega_4 c_s^2 - \frac{1}{4} \omega_4 \omega_1 u^2 + \frac{1}{4} v \omega_3 \omega_4 + \frac{7}{8} \omega_3 \omega_1 u + \\
& \frac{1}{2} v^2 \omega_4 u^2 \omega_2^2 - \frac{1}{8} v \omega_3^2 - \frac{1}{8} v \omega_4^2 u^2 + 2 v^2 \omega_4 \omega_1 u^2 w_2 - \frac{3}{4} \omega_3 \omega_4 c_s^2 u + v \omega_1 u^2 w_2^2 - \frac{1}{4} \omega_3^2 u^3 \omega_2 - \frac{3}{4} \omega_3^2 c_s^2 u + \frac{1}{4} v \omega_4 \omega_2 + \\
& \frac{1}{8} v^2 \omega_3 \omega_2 - \frac{1}{4} \omega_3 \omega_4 u^3 \omega_2 + v^2 \omega_1 \omega_2 + \frac{5}{2} v \omega_4 \omega_1 u^2 - \frac{3}{4} v \omega_3 \omega_4^2 c_s^2 + \frac{1}{4} v^3 \omega_4 \omega_2 u^2 - \frac{1}{2} \omega_4 \omega_1 u^3 - \frac{1}{4} v \omega_3^2 u - \\
& \frac{1}{2} v^2 \omega_4 + \omega_1^2 u^2 + \frac{3}{4} v \omega_4 \omega_1 u^2 w_2 - \frac{1}{4} \omega_4^2 \omega_1 u^2 + \frac{1}{2} v^2 \omega_3 \omega_4 u^2 - \frac{1}{2} v \omega_3 \omega_1 u + \frac{1}{2} \omega_3^2 c_s^2 u w_2 - \frac{1}{2} v \omega_3 \omega_4 u - \frac{1}{2} v^3 \omega_4 \omega_1 \omega_2 - \\
& \frac{1}{2} v^4 \omega_3 \omega_2^2 - \frac{1}{4} v^2 \omega_4 \omega_2^2 - \frac{1}{8} v \omega_3^2 \omega_2 + \frac{1}{4} v \omega_4 \omega_1 - \frac{1}{4} v \omega_4^2 u^2 w_2 - \frac{5}{2} v \omega_3 c_s^2 \omega_2 - \frac{3}{4} v \omega_3^2 \omega_4 c_s^2 + \frac{1}{2} v \omega_3 \omega_4^2 c_s^2 u + \\
& \frac{1}{2} \omega_3 \omega_4 c_s^2 u w_2 + \frac{3}{4} v \omega_3 \omega_1 u^2 w_2 - \frac{1}{8} v \omega_3 \omega_4 \omega_2 + \frac{1}{2} v^3 \omega_3 \omega_1 u w_2 + \frac{1}{2} v \omega_3 c_s^2 \omega_1 w_2 - \frac{1}{4} \omega_3 \omega_1 u w_2 - \frac{1}{2} v \omega_3 \omega_4 \omega_1 u + \frac{1}{2} \omega_3 u,
\end{aligned}$$

$$\begin{aligned}
& v^2 \omega_3 u \omega_2^2 - v^2 \omega_3^2 \omega_4 u + \frac{1}{4} \omega_4 \omega_1^2 u - \frac{1}{2} v \omega_4 \omega_1 \omega_2 - 4 v \omega_2 + \frac{1}{2} v^2 \omega_3 \omega_4 \omega_1 + \frac{1}{2} v \omega_3 \omega_1 \omega_2 + v^2 \omega_3 \omega_4 \omega_1 u + \frac{1}{4} \omega_3^2 \omega_4 + \\
& \frac{1}{2} \omega_4 \omega_1 u^2 - \frac{7}{2} v \omega_3 \omega_4 - \frac{3}{4} \omega_3^2 \omega_4 u - 2 \omega_3 \omega_1 u - v \omega_3^2 - 3 v \omega_4 u \omega_2 + \frac{5}{2} v^2 \omega_3 \omega_2 - \frac{1}{2} \omega_3^2 + \frac{1}{2} v \omega_3^2 u - 2 \omega_1^2 u^2 + 2 v \omega_4 \omega_1 u^2 \omega_2 - \\
& \frac{1}{4} \omega_4^2 \omega_1 u^2 + \frac{3}{4} v \omega_3^2 \omega_1 u + 5 v \omega_3 \omega_4 u + \frac{1}{2} \omega_4 \omega_1 u \omega_2 - \frac{1}{2} v \omega_1 \omega_2^2 + \frac{1}{2} v^2 \omega_4 \omega_2^2 - \frac{9}{8} \omega_3 \omega_2 - \frac{1}{4} v \omega_3^2 \omega_2 - \frac{1}{2} v \omega_4 \omega_1 - \\
& \frac{1}{2} v \omega_4^2 u^2 \omega_2 + 2 v \omega_3 \omega_1 u^2 \omega_2 + \frac{1}{2} v^2 \omega_4^2 \omega_1 u - \frac{3}{4} \omega_3 \omega_4^2 u - \frac{1}{2} v \omega_3 \omega_4 \omega_2 + \frac{1}{2} v^2 \omega_3^2 \omega_4 + \frac{1}{2} \omega_3 \omega_1 u \omega_2 + \frac{3}{2} v \omega_3 \omega_4 \omega_1 u - \frac{5}{2} \omega_3 u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y+\delta_i}^{[\mu_1],t-2\delta_t} = & 2 - \frac{1}{2} v^2 \omega_3^2 \omega_1 u^2 - 2 v \omega_4 + \frac{1}{2} \omega_4^2 u^2 \omega_2 - \frac{1}{4} v^2 \omega_3 \omega_1^2 + \frac{7}{4} \omega_4 \omega_1 - \frac{1}{2} \omega_3 - 2 \omega_4 \omega_1 u^2 \omega_2 - \frac{5}{4} v \omega_4^2 \omega_1 u^2 - \frac{1}{2} v \omega_3 \omega_2 - \\
& \frac{3}{4} v \omega_2^2 \omega_1 - 2 \omega_3 \omega_1 u^2 \omega_2 + \omega_1^2 + \frac{1}{4} v^2 \omega_3 \omega_4 + \omega_4 \omega_1^2 u^4 + \frac{3}{2} v^2 \omega_4 \omega_1 \omega_2 + 2 v^2 \omega_2 + v^2 \omega_3 \omega_1^2 u^2 + \frac{17}{4} \omega_4 \omega_1 u^2 + \frac{1}{4} v^3 \omega_3^2 \omega_1 - \\
& v^3 \omega_4 \omega_2 + \frac{1}{4} \omega_3 \omega_4 - \frac{5}{4} \omega_4^2 u^2 + \omega_3 c_s^2 + \frac{1}{2} v \omega_3^2 c_s^2 - \frac{1}{2} v^2 \omega_3^2 - \frac{1}{2} \omega_4^2 \omega_1 u^4 + \frac{1}{2} v \omega_3 \omega_1 \omega_2 - \frac{1}{2} v \omega_3 \omega_4 c_s^2 + 2 v \omega_4 \omega_1^2 u^2 - \\
& \omega_3^2 \omega_4 c_s^2 u^2 - \frac{1}{4} \omega_3 \omega_1^2 + \frac{3}{4} v^2 \omega_4 \omega_1 - \frac{1}{2} v^2 \omega_3 + \frac{5}{4} \omega_3 \omega_1^2 u^2 + v^3 \omega_4 \omega_1 \omega_2 - \frac{1}{2} \omega_4 \omega_1 \omega_2 + \frac{3}{4} \omega_3 \omega_1 - \frac{1}{4} v^2 \omega_4 \omega_1^2 + \\
& \frac{1}{4} v \omega_3^2 \omega_1 - 3 v^2 \omega_1 \omega_2 + 2 v \omega_3^2 \omega_4 u^2 - \frac{3}{2} \omega_4 - \frac{1}{2} v \omega_3 \omega_4 \omega_1 - 2 v^2 \omega_3 \omega_4 u^2 \omega_2 - \frac{11}{4} \omega_3 \omega_4 \omega_1 u^2 + \frac{1}{2} \omega_3 \omega_4 c_s^2 \omega_1 + \frac{3}{2} \omega_1 \omega_2 - \\
& 2 v \omega_1^2 u^2 \omega_2 - \frac{1}{4} v^3 \omega_3^2 - \omega_3 \omega_4 c_s^2 u^2 - \omega_3^2 u^2 - v^2 \omega_4^2 u^2 \omega_2 - 3 \omega_1 - v \omega_3 \omega_4 u^2 \omega_2 - \frac{1}{2} \omega_3 \omega_1 u^2 - \frac{7}{4} \omega_3 \omega_4 u^2 + v^3 \omega_3 \omega_2 - \\
& \frac{1}{4} v^3 \omega_4^2 \omega_1 + \frac{3}{4} v \omega_4^2 + \frac{3}{4} v^2 \omega_3 \omega_1 - \frac{1}{4} \omega_4 \omega_1^2 - \frac{1}{2} v \omega_3^2 u^2 \omega_2 + \frac{1}{2} v \omega_1^2 \omega_2 + 2 v \omega_3 \omega_4 u^2 + \frac{1}{4} \omega_4^2 - \frac{1}{2} \omega_1^2 \omega_2 - \frac{1}{2} v \omega_4 \omega_1^2 + \\
& \omega_3 \omega_4 u^2 \omega_2 + \frac{1}{2} v \omega_3 \omega_4 c_s^2 \omega_1 - \frac{1}{2} v^2 \omega_4^2 \omega_1 u^2 + \omega_3 \omega_1^2 u^2 - \frac{11}{2} v \omega_3 \omega_4 \omega_1 u^2 + \frac{1}{2} \omega_3^2 u^2 \omega_2 - \frac{1}{2} \omega_3 u^2 - \frac{1}{4} v \omega_3^2 u^2 - \\
& 2 \omega_3 c_s^2 \omega_1^2 u^2 + \frac{3}{4} v^2 \omega_4^2 - \omega_3 \omega_1^2 u^4 + \frac{1}{2} v \omega_3 \omega_4 u^2 - \frac{5}{4} v \omega_2^2 \omega_1 u^2 - \frac{3}{2} v^2 \omega_4 \omega_2 + \frac{1}{2} v^2 \omega_3^2 \omega_1 - \frac{1}{2} v \omega_3^2 c_s^2 \omega_1 - \frac{3}{2} v \omega_1 \omega_2 + \\
& 2 \omega_1^2 u^2 \omega_2 + \frac{15}{4} \omega_3 \omega_1 u^2 + \omega_3 \omega_4 u^2 + v^2 \omega_4 \omega_1^2 u^2 - \frac{3}{2} \omega_3 c_s^2 \omega_1 + \frac{1}{2} \omega_4 \omega_2 - \frac{1}{4} \omega_3 \omega_4 \omega_1 - \frac{1}{2} v^2 \omega_3 \omega_1 \omega_2 + 2 v \omega_3 \omega_1^2 u^2 + \\
& \frac{1}{2} v \omega_3 \omega_1 + v^2 \omega_1^2 \omega_2 - \omega_2 + \frac{1}{2} \omega_3^2 \omega_1 u^4 - 3 v^2 \omega_3 \omega_4 \omega_1 u^2 - v^3 \omega_3 \omega_1 \omega_2 + v \omega_2 - \frac{1}{4} v^2 \omega_3 \omega_4 \omega_1 + 4 v^2 \omega_3 \omega_1 u^2 \omega_2 - \\
& \frac{1}{2} v \omega_3 \omega_1^2 + \frac{1}{2} \omega_4 u^2 + \frac{1}{4} v^3 \omega_4^2 + v^2 \omega_3^2 \omega_4 u^2 - \frac{1}{2} \omega_3 \omega_4 c_s^2 + \frac{3}{4} \omega_4 \omega_1^2 u^2 + \frac{1}{2} v \omega_3 \omega_4 + \frac{1}{2} \omega_3 c_s^2 \omega_1^2 - \frac{1}{4} v \omega_3^2 - \frac{1}{4} v \omega_4^2 u^2 + \\
& 4 v^2 \omega_4 \omega_1 u^2 \omega_2 - \frac{3}{4} v^2 \omega_4^2 \omega_1 + \frac{1}{2} v^2 \omega_3 \omega_2 - v^2 \omega_3^2 u^2 \omega_2 - \frac{1}{2} v^2 \omega_4 - 4 \omega_1^2 u^2 + 2 v \omega_4 \omega_1 u^2 \omega_2 - \frac{3}{4} v \omega_4^2 \omega_1 u^2 + \\
& v^2 \omega_3 \omega_4 u^2 + \omega_3^2 c_s^2 \omega_1 u^2 - \frac{1}{4} \omega_4^2 \omega_1 - 4 v^2 \omega_1^2 u^2 \omega_2 + \frac{5}{2} v \omega_4 \omega_1 - \frac{1}{2} v \omega_4^2 u^2 \omega_2 + 3 \omega_3 \omega_4 c_s^2 \omega_1 u^2 + 2 v \omega_3 \omega_1 u^2 \omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y+\delta_i}^{[\mu_4],t-2\delta_t} = & -2 + 2 v \omega_4 - \frac{1}{2} \omega_4^2 u^2 \omega_2 - \frac{5}{2} \omega_4 \omega_1 + 2 \omega_4 \omega_1 u^2 \omega_2 + v \omega_4^2 \omega_1 u^2 + \frac{1}{2} v \omega_3 \omega_2 + v \omega_4^2 \omega_1 + 2 \omega_3 \omega_1 u^2 \omega_2 - \omega_1^2 - \\
& v^2 \omega_4 \omega_1 \omega_2 - 3 \omega_4 \omega_1 u^2 + \frac{1}{2} \omega_4^2 u^2 + \frac{1}{2} v^2 \omega_3^2 - \frac{1}{2} v \omega_3 \omega_1 \omega_2 - 2 v \omega_4 \omega_1^2 u^2 + \frac{1}{2} \omega_4 \omega_1 \omega_2 + \frac{1}{2} v \omega_4 \omega_2 - 2 v \omega_3^2 \omega_4 u^2 + \\
& 2 \omega_4 + 3 \omega_3 \omega_4 \omega_1 u^2 - \frac{3}{2} \omega_1 \omega_2 + 4 v \omega_1^2 u^2 \omega_2 + \frac{3}{2} \omega_3^2 u^2 + 3 \omega_1 + 2 v \omega_3 \omega_4 u^2 \omega_2 + 2 \omega_3 \omega_4 u^2 - v \omega_4^2 + \frac{1}{2} \omega_4 \omega_1^2 + \\
& v \omega_3^2 u^2 \omega_2 - v \omega_1^2 \omega_2 - 2 v \omega_3 \omega_4 u^2 - \frac{1}{2} \omega_4^2 + \frac{1}{2} \omega_1^2 \omega_2 + \frac{1}{2} v \omega_4 \omega_1^2 - \omega_3 \omega_4 u^2 \omega_2 - \omega_3 \omega_4^2 u^2 + 6 v \omega_3 \omega_4 \omega_1 u^2 - \\
& \frac{1}{2} \omega_3^2 u^2 \omega_2 - \frac{1}{2} v^2 \omega_4^2 + v \omega_3^2 \omega_4 u^2 - \frac{1}{2} \omega_3 \omega_4 c_s^2 + \frac{3}{4} \omega_4 \omega_1^2 u^2 + \frac{1}{2} v \omega_3 \omega_4 + \frac{1}{2} \omega_3 c_s^2 \omega_1^2 - \frac{1}{4} v \omega_3^2 - \frac{1}{4} v \omega_4^2 u^2 + \\
& v^2 \omega_3 \omega_1 u^2 - \omega_2 + \frac{1}{2} \omega_3^2 \omega_1 u^4 - 3 v^2 \omega_3 \omega_4 \omega_1 u^2 - v^3 \omega_3 \omega_1 \omega_2 + v \omega_2 - \frac{1}{4} v^2 \omega_3 \omega_4 \omega_1 + 4 v^2 \omega_3 \omega_1 u^2 \omega_2 - \\
& \frac{1}{2} v \omega_3 \omega_1^2 + \frac{1}{2} \omega_4 u^2 + \frac{1}{4} v^3 \omega_4^2 + v^2 \omega_3^2 \omega_4 u^2 - \frac{1}{2} \omega_3 \omega_4 c_s^2 + \frac{3}{4} \omega_4 \omega_1^2 u^2 + \frac{1}{2} v \omega_3 \omega_4 + \frac{1}{2} \omega_3 c_s^2 \omega_1^2 - \frac{1}{4} v \omega_3^2 - \frac{1}{4} v \omega_4^2 u^2 + \\
& 4 v^2 \omega_4 \omega_1 u^2 \omega_2 - \frac{3}{4} v^2 \omega_4^2 \omega_1 + \frac{1}{2} v^2 \omega_3 \omega_2 - v^2 \omega_3^2 u^2 \omega_2 - \frac{1}{2} v^2 \omega_4 - 4 \omega_1^2 u^2 + 2 v \omega_4 \omega_1 u^2 \omega_2 - \frac{3}{4} v \omega_4^2 \omega_1 u^2 + \\
& v^2 \omega_3 \omega_4 u^2 + \omega_3^2 c_s^2 \omega_1 u^2 - \frac{1}{4} \omega_4^2 \omega_1 - 4 v^2 \omega_1^2 u^2 \omega_2 + \frac{5}{2} v \omega_4 \omega_1 - \frac{1}{2} v \omega_4^2 u^2 \omega_2 + 3 \omega_3 \omega_4 c_s^2 \omega_1 u^2 + 2 v \omega_3 \omega_1 u^2 \omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_i,y+\delta_i}^{[\mu_1],t-2\delta_t} = & 1 - \frac{1}{2} v^2 \omega_3^2 \omega_1 u^2 - \frac{1}{4} v \omega_4 \omega_1 u \omega_2 - \frac{1}{4} \omega_3^2 \omega_4 c_s^2 - \frac{1}{8} \omega_4^2 u^3 + \frac{5}{4} \omega_4 \omega_1 u^3 + \frac{5}{4} \omega_3 c_s^2 \omega_2 - \frac{3}{2} \omega_3 c_s^2 \omega_1 u - v \omega_4 - \\
& 3 \omega_1 u^2 + \frac{1}{2} v \omega_3^2 c_s^2 \omega_2 + \frac{1}{8} \omega_4 \omega_1 - \frac{1}{4} \omega_3 - \frac{1}{2} \omega_4 \omega_1 u^2 \omega_2 + \frac{1}{4} v \omega_3 \omega_1 u \omega_2 + \frac{1}{8} \omega_3 \omega_4 \omega_1 u - \frac{3}{4} v \omega_4^2 \omega_1 u^2 + \frac{3}{8} v \omega_3 \omega_2 - \\
& \frac{1}{8} \omega_3 c_s^2 \omega_1 \omega_2 + v \omega_4 \omega_1^2 u^3 - \frac{1}{4} \omega_3 \omega_1 u^2 \omega_2 - v^2 \omega_3 c_s^2 \omega_2 + \frac{1}{8} \omega_3^2 u - \frac{1}{4} \omega_3 \omega_2^2 c_s^2 u + \frac{3}{8} v \omega_3 \omega_4 c_s^2 \omega_2 - \frac{1}{8} v \omega_3 \omega_4 - \\
& \frac{1}{4} v^3 \omega_3 \omega_2 + \frac{1}{4} \omega_3 \omega_4 u + \frac{1}{8} \omega_3^2 \omega_1 u - \frac{1}{4} v \omega_3^2 u^3 \omega_2 - \frac{3}{2} v^2 \omega_3 \omega_1 \omega_2 u - \frac{7}{4} v \omega_3 \omega_1 u - \frac{1}{4} v^2 \omega_4 \omega_1 \omega_2 - v^2 \omega_2 + \\
& \frac{1}{4} v \omega_3 \omega_4 c_s^2 \omega_2 + \frac{1}{2} v \omega_3 \omega_4 c_s^2 \omega_2 + \frac{13}{8} \omega_4 \omega_1 u^2 - \frac{1}{4} \omega_3 \omega_4 c_s^2 + \frac{3}{4} v^3 \omega_4 \omega_2 + \frac{1}{8} \omega_3 \omega_4 - \frac{1}{8} v \omega_3^2 u^2 - \frac{3}{8} v \omega_3 \omega_2 - 2 \omega_3 c_s^2 + \\
& \frac{1}{4} \omega_4 u \omega_2 - \frac{1}{2} v \omega_1 \omega_2 + \frac{1}{4} v \omega_3^2 c_s^2 - \frac{1}{2} v^2 \omega_3^2 - 2 v \omega_1^2 u^3 \omega_2 - \frac{1}{4} v^2 \omega_4 \omega_1 u - \frac{1}{4} v \omega_3 \omega_1 \omega_2 - \frac{1}{2} v \omega_3 \omega_4 u^3 - \frac{1}{2} \omega_4 \omega_2 + \\
& \frac{1}{8} v \omega_4 \omega_1^2 u^2 + \frac{1}{8} v^2 \omega_4 \omega_1 + \frac{1}{8} v \omega_3^2 \omega_2 + \frac{5}{4} v \omega_4 \omega_2 u^2 + \frac{5}{2} v \omega_4 \omega_2 u^2 \omega_2 - \frac{1}{2} v \omega_4 \omega_1 u^3 - \frac{1}{4} v^4 \omega_4^2 \omega_2 + \frac{1}{2} v \omega_3^2 c_s^2 \omega_2 - \frac{1}{2} \omega_3 \omega_4 u^3 + v^2 \omega_3 - \\
& \frac{5}{8} \omega_3 u^2 \omega_2 - \frac{1}{4} \omega_2^2 \omega_1 u^3 + \frac{1}{2} v^2 \omega_4 \omega_2 u^2 + 2 v \omega_1 u \omega_2 - \omega_3 \omega_1 u^3 \omega_2 - \frac{1}{4} \omega_3 \omega_1^2 u^2 - \frac{3}{8} \omega_3^2 u^3 - \frac{1}{2} v^2 \omega_3 \omega_4 c_s^2 - \frac{1}{4} v^3 \omega_4 \omega_1 \omega_2 + \\
& \frac{1}{8} \omega_3 \omega_1 - \frac{1}{4} v \omega_4 \omega_1 u^2 \omega_2 - 2 v^2 \omega_1 u^2 \omega_2 - \omega_3 \omega_4 \omega_1 u^3 - \frac{1}{4} \omega_3^2 \omega_4 c_s^2 u - \frac{1}{8} v \omega_4 \omega_2 + \omega_3 c_s^2 \omega_1 \omega_2 + \frac{1}{2} v^2 \omega_1 \omega_2 + \frac{1}{2} v \omega_3 \omega_4 u^3 - \\
& \frac{1}{4} v \omega_3 \omega_2 - \frac{1}{2} \omega_4 \omega_1 u^3 \omega_2 + \frac{3}{2} \omega_1 u^2 \omega_2 + \frac{3}{4} v \omega_3^2 \omega_4 u^2 + \frac{5}{2} v \omega_3 \omega_1 u^2 - \frac{3}{4} \omega_4 + \frac{1}{4} v^3 \omega_4 \omega_2 - \frac{3}{8} \omega_4 \omega_1 u + v \omega_3 \omega_4 c_s^2 \omega_1 u + \\
& \frac{1}{8} \omega_2^2 u + \frac{1}{2} v^2 \omega_3 \omega_2 \omega_2 - \frac{3}{2} v^2 \omega_3 \omega_4 u^2 \omega_2 - \frac{1}{2} v^2 \omega_3 \omega_4 \omega_2 - \frac{1}{4} \omega_3 \omega_4 c_s^2 \omega_1 + \frac{1}{4} \omega_1 \omega_2 + v \omega_1^2 u^2 \omega_2 - \\
& \frac{1}{8} v^3 \omega_3^2 + \frac{1}{4} v^3 \omega_3^2 \omega_2 + \frac{1}{8} v^2 \omega_4^2 u - \frac{1}{4} \omega_3^2 u^2 - \frac{1}{4} v^2 \omega_4 \omega_2 \omega_2 + \frac{1}{2} v \omega_3 \omega_2 \omega_2 - \frac{1}{4} v \omega_3 \omega_1 \omega_2 - \frac{1}{2} v \omega_3 \omega_4 u^2 - \\
& \frac{1}{8} v^2 \omega_3^2 \omega_4 c_s^2 - \frac{11}{8} \omega_3 \omega_4 \omega_1^2 - \frac{3}{4} v^3 \omega_3 \omega_2 - \frac{1}{4} v^2 \omega_3 \omega_4 u + \frac{1}{2} v^2 \omega_3^2 \omega_1 u + \frac{3}{8} \omega_1 u + \frac{3}{8} v \omega_4^2 - \frac{1}{4} v^2 \omega_4 \omega_2 - \frac{3}{8} v^2 \omega_3 \omega_1 + \\
& \frac{1}{4} v^4 \omega_3^2 \omega_2 - \frac{1}{4} v \omega_3^2 \omega_2 \omega_2 + \frac{1}{2} v \omega_3^2 \omega_4 u^3 + \frac{3}{4} v \omega_3 \omega_4 \omega_1^2 + \frac{1}{8} \omega_4^2 + \frac{1}{2} v \omega_3 c_s^2 \omega_2 + \frac{1}{8} \omega_3 \omega_4 c_s^2 \omega_1 u + \frac{3}{8} \omega_3 \omega_4 u^2 \omega_2 + \\
& \frac{1}{2} v^3 \omega_3^2 \omega_2 - \frac{1}{2} v \omega_3 \omega_4 c_s^2 \omega_1 - \frac{1}{4} v \omega_3 \omega_4 u \omega_2 - \frac{1}{2} v^2 \omega_4 \omega_2 \omega_2 + \frac{1}{4} \omega_3 \omega_4 \omega_1 \omega_2 - \frac{1}{2} v \omega_3 \omega_4 \omega_1 \omega_2 - \frac{1}{4} v \omega_3 \omega_4 \omega_1 \omega_2 + \\
& \omega_3 u^2 + \frac{1}{4} \omega_3^2 \omega_4 u^3 + \frac{7}{4} \omega_3 \omega_1 u^3 - \frac{1}{4} v^2 \omega_4 \omega_2 \omega_2 - \frac{1}{8} v \omega_3^2 u^2 + \frac{3}{8} v \omega_4^2 - \frac{9}{4} v \omega_3 \omega_4 u^2 - \frac{3}{4} v \omega_3^2 \omega_1 \omega_2 + v \omega_3 \omega_1^2 + \\
& \frac{7}{8} v^2 \omega_4 \omega_2 - \frac{1}{4} v \omega_3^2 \omega_2 \omega_2 - \frac{1}{2} v \omega_1 \omega_2 - \frac{1}{2} \omega_2^2 \omega_2 + \frac{11}{8} \omega_3 \omega_1 u^2 + \frac{1}{4} \omega_3^2 \omega_4 \omega_2 - \frac{1}{2} v \omega_3 \omega_4 c_s^2 \omega_2 - 2 v \omega_3 \omega_4 \omega_1 u^3 - \\
& 5 v \omega_1 u^2 \omega_2 + \frac{1}{4} \omega_3 \omega_4 u^3 + \frac{1}{2} v^2 \omega_3^2 \omega_2 \omega_2 + \frac{1}{4} \omega_3 \omega_4 c_s^2 \omega_1 + \frac{1}{4} v \omega_2^2 u + v^2 \omega_1 \omega_2 \omega_2 - \frac{1}{4} v \omega_2^2 u^3 \omega_2 + \frac{1}{2} v^4 \omega_4 \omega_2^2 + \\
& \frac{1}{4} \omega_4 \omega_2 + \frac{1}{4} v^2 \omega_3 \omega_2^2 + \frac{3}{2} v \omega_3 \omega_1 u^3 \omega_2 - \frac{3}{4} v \omega_4 \omega_1 u - \frac{1}{2} v \omega_3 \omega_1^2 \omega_2 - \frac{3}{4} \omega_1 \omega_2 \omega_2 + \frac{1}{2} v \omega_3 \omega_1 + \frac{5}{4} v \omega_3 \omega_2 \omega_2 - \\
& \frac{1}{4} v^2 \omega_3 \omega_4 \omega_2 - \frac{1}{2} \omega_2 \omega_2 - \frac{1}{2} \omega_4 \omega_2 + \frac{3}{4} v^2 \omega_3 \omega_1 \omega_2 - v^2 \omega_3 \omega_4 \omega_1 \omega_2 + \frac{3}{2} v \omega_4 \omega_1 \omega_2 + \frac{1}{4} v^3 \omega_3 \omega_1 \omega_2 + \frac{1}{2} v \omega_2 + 2 v^2 \omega_3 \omega_1 \omega_2 + \\
& \omega_1^2 \omega_2 - \frac{1}{4} v \omega_3 \omega_2 \omega_2 - \frac{1}{2} \omega_3 \omega_4 c_s^2 \omega_2 + \frac{1}{2} \omega_4 \omega_2^2 + \frac{1}{2} \omega_3 \omega_1 \omega_2 - \frac{1}{4} \omega_3 \omega_4 c_s^2 \omega_2 + \frac{1}{2} v \omega_3 \omega_2 \omega_2 - \frac{1}{2} v \omega_3 \omega_4 \omega_2 + \frac{1}{8} \omega_4 \omega_2^2 \omega_2 + \\
& \frac{1}{8} v^3 \omega_3^2 - \frac{1}{2} v^3 \omega_3^2 \omega_2 + \frac{1}{2} v^2 \omega_3 \omega_4 \omega_1 u - 2 \omega_1^2 u^3 + \frac{1}{2} v^2 \omega_3^2 \omega_4 u^2 + \frac{3}{2} v \omega_3 \omega_4 c_s^2 - \frac{1}{4} \omega_4 \omega_2^2 \omega_2 + \frac{1}{4} v \omega_3 \omega_4 \omega_1 u + \frac{1}{8} \omega_3 \omega_1 \omega_2 +
\end{aligned}$$

$$\begin{aligned}
& \frac{1}{2}v^2\omega_4u^2\omega_2^2 - \frac{1}{8}vw\omega_3^2 - \frac{1}{8}vw\omega_4^2u^2 + 2v^2\omega_4\omega_1u^2\omega_2 + \frac{3}{4}\omega_3\omega_4c_s^2u + v\omega_1u^2\omega_2^2 + \frac{1}{4}\omega_3^2u^3\omega_2 + \frac{3}{4}\omega_3^2c_s^2u - \frac{1}{4}vw_4u\omega_2 + \\
& \frac{1}{8}v^2\omega_3\omega_2 + \frac{1}{4}\omega_3\omega_4u^3\omega_2 - v^2\omega_1\omega_2 + \frac{5}{2}vw_4\omega_1u^2 - \frac{3}{4}v\omega_3\omega_4^2c_s^2 - \frac{1}{4}v^3\omega_4^2\omega_2 - \frac{1}{4}v^2\omega_3^2u^2\omega_2 + \frac{1}{2}\omega_4\omega_1^2u^3 + \frac{1}{4}vw_3^2u - \\
& \frac{1}{2}v^2\omega_4 + \omega_1^2u^2 + \frac{3}{4}vw_4\omega_1u^2\omega_2 - \frac{1}{4}\omega_2^2\omega_1u^2 + \frac{1}{2}v^2\omega_3\omega_4^2u^2 + \frac{1}{2}vw_3^2\omega_1u - \frac{1}{2}\omega_3^2c_s^2u\omega_2 + \frac{1}{2}vw_3\omega_4u + \frac{1}{2}v^3\omega_4\omega_1\omega_2 - \\
& \frac{1}{2}v^4\omega_3\omega_2^2 - \frac{1}{4}v^2\omega_4\omega_2^2 - \frac{1}{8}vw_3^2\omega_2 + \frac{1}{4}vw_4\omega_1 - \frac{1}{4}vw_4^2u^2\omega_2 - \frac{5}{2}vw_3\omega_4^2c_s^2 - \frac{3}{4}vw_3^2\omega_4c_s^2 - \frac{1}{2}vw_3\omega_4^2c_s^2u - \\
& \frac{1}{2}\omega_3\omega_4c_s^2u\omega_2 + \frac{3}{4}vw_3\omega_1u^2\omega_2 - \frac{1}{8}vw_3\omega_4\omega_2 - \frac{1}{2}v^3\omega_3\omega_1u\omega_2 + \frac{1}{2}vw_3\omega_4^2c_s^2\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1\omega_2 + \frac{1}{2}vw_3\omega_4\omega_1u - \frac{1}{2}\omega_3u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_t, y+\delta_t}^{[\mu_4], t-2\delta_t} = & -2 + v\omega_4\omega_1\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_2 + \frac{3}{2}vw_4 + \frac{1}{8}\omega_3^2\omega_2 - \frac{3}{8}\omega_4\omega_1 + \frac{5}{2}\omega_3 - \frac{1}{2}\omega_4\omega_1u^2\omega_2 + \frac{3}{8}\omega_3\omega_4\omega_2 + 2vw_3\omega_4^2u + vw_3\omega_1\omega_2 - \\
& \frac{1}{2}\omega_3\omega_4\omega_1u - \frac{1}{2}vw_4^2\omega_1u^2 - \frac{3}{4}vw_4^2\omega_2 + 2vw_3\omega_2 - \frac{3}{2}\omega_3\omega_1u^2\omega_2 - \omega_3^2u - v^2\omega_3\omega_4 - \frac{7}{4}\omega_3\omega_4u - \frac{1}{4}\omega_3^2\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2 + \\
& 2v^2\omega_3\omega_1\omega_2 - \frac{1}{2}vw_3\omega_2^2 - \frac{1}{4}vw_4\omega_2^2 + 3vw_3\omega_1u - \frac{1}{2}v^2\omega_4\omega_1\omega_2 + 2vw_3^2\omega_4u + \frac{3}{2}\omega_4\omega_1u^2 - \frac{7}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4^2u^2 - \frac{1}{2}\omega_4\omega_1\omega_2 + \\
& 2v^2\omega_4\omega_1\omega_2 + vw_1\omega_2 + v^2\omega_4\omega_2^2 - \frac{3}{4}v^2\omega_3^2 - \frac{1}{2}vw_3\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u^2 + \frac{3}{4}vw_3^2\omega_4 + vw_4\omega_1u^2 - \frac{1}{4}v^2\omega_3^2\omega_2 - 6vw_1\omega_2 + \\
& \frac{1}{2}\omega_3\omega_1^2u^2 - \frac{1}{2}vw_4\omega_1u - \frac{9}{8}\omega_3\omega_1 + \frac{1}{2}vw_3^2\omega_1 + 2vw_4\omega_2 + 3vw_3\omega_2 - 2v^2\omega_2^2 + vw_3^2\omega_4u^2 + \frac{1}{4}\omega_3\omega_4^2 + \frac{3}{2}\omega_4 + 2w_4\omega_1u + \\
& vw_3\omega_4\omega_1 - \frac{1}{2}\omega_4^2u - \frac{3}{2}v^2\omega_3\omega_4\omega_2 - \frac{3}{4}vw_4^2\omega_1u - \frac{3}{2}\omega_3\omega_4\omega_1u^2 + w_3\omega_4\omega_2u - \frac{1}{2}\omega_1\omega_2 - \frac{1}{4}vw_3\omega_2^2 - 2vw_3^2\omega_2^2 + \frac{1}{2}\omega_3^2\omega_2u - \\
& \frac{3}{4}\omega_3^2u^2 + w_1 - vw_3\omega_4u^2\omega_2 - \frac{1}{4}\omega_3^2\omega_1u^2 - w_3\omega_4u^2 + \frac{1}{2}v^2\omega_3^2\omega_1u - 4w_1u - \frac{1}{2}v\omega_2^2 - \frac{1}{2}\omega_1^2\omega_2 - \frac{1}{4}v^2\omega_4^2\omega_2 - \\
& \frac{1}{2}vw_3^2\omega_2^2 + vw_3\omega_4^2u^2 - \frac{1}{4}\omega_4^2 + \frac{1}{2}w_3\omega_4u^2\omega_2 - \frac{3}{2}vw_3\omega_4\omega_2u + \frac{1}{2}w_3\omega_4^2u^2 + \frac{1}{2}vw_3^2\omega_2^2 - \frac{1}{2}v^2\omega_4^2\omega_2u + \\
& vw_1^2\omega_2 + w_1^2u - \frac{1}{4}v^2\omega_4^2 - \frac{1}{4}\omega_4^2\omega_1u + v^2\omega_3\omega_4^2u - \frac{1}{2}vw_3^2\omega_1u^2 + \frac{3}{2}v^2\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_1 - \frac{3}{4}vw_3^2\omega_2u + 2vw_1\omega_2 + \frac{1}{2}w_1^2\omega_2 + \\
& \frac{5}{8}\omega_3\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_4u^2 + \frac{3}{4}vw_3\omega_4^2 - \frac{3}{2}\omega_3\omega_2u - \frac{1}{2}vw_2^2u + \frac{5}{2}vw_3\omega_1u - \frac{1}{2}vw_3^2\omega_2 + \frac{8}{3}\omega_3^2\omega_1 - \frac{8}{3}\omega_4\omega_2 - \frac{1}{2}vw_4\omega_2u^2 + \frac{1}{2}v^2\omega_3\omega_2^2 + \\
& \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{3}{2}v^2\omega_3\omega_1\omega_2 + 3vw_4\omega_1u + vw_3\omega_1^2u^2 + vw_2^2 + 2w_1\omega_2 - \frac{3}{2}vw_3\omega_1 - \frac{1}{4}vw_4^2\omega_2 - 3v^2\omega_3\omega_4\omega_2u + w_2 + \frac{3}{2}\omega_4u + \\
& v^2\omega_3\omega_2u^2 + v^2\omega_3^2\omega_4u - \frac{1}{4}\omega_4\omega_1^2u - \frac{1}{2}vw_4\omega_1\omega_2 - 4vw_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1 - \frac{1}{2}vw_3\omega_1u + \frac{1}{2}w_3\omega_1\omega_2 - v^2\omega_3\omega_4\omega_1u + \frac{1}{4}\omega_3^2\omega_4 + \\
& \frac{1}{5}\omega_4\omega_1^2u^2 - \frac{7}{2}vw_3\omega_4 + \frac{3}{4}\omega_3^2\omega_4u + 2w_3\omega_1u - vw_3^2 + 3vw_4\omega_2u + \frac{5}{2}v^2\omega_3\omega_2 - \frac{1}{2}\omega_3^2u - \frac{1}{2}vw_3^2\omega_2 - 2w_1^2u^2 + 2vw_4\omega_1u^2\omega_2 - \\
& \frac{1}{2}\omega_4^2\omega_1u^2 - \frac{3}{2}vw_3^2\omega_1u - 5vw_3\omega_4u - \frac{1}{2}\omega_4\omega_1\omega_2u - \frac{1}{2}vw_1\omega_2^2 + \frac{1}{2}v^2\omega_4\omega_2^2 - \frac{9}{8}\omega_3\omega_2 - \frac{1}{4}vw_3^2\omega_2 - \frac{1}{2}vw_4\omega_1 - \\
& \frac{1}{2}vw_4^2\omega_2u + 2vw_3\omega_1u^2\omega_2 - \frac{1}{2}v^2\omega_4^2\omega_1u + \frac{3}{4}\omega_3\omega_2u - \frac{1}{2}vw_3\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_4 - \frac{1}{2}w_3\omega_1\omega_2u + \frac{5}{2}\omega_3u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_t}^{[\mu_1], t-3\delta_t} = & -2 + \frac{1}{2}v^2\omega_3^2\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_4c_s^2 - \frac{5}{2}\omega_3c_s^2\omega_2 - 2vw_4 + 6w_1u^2 - \frac{1}{2}\omega_4^2u^2\omega_2 + v^2\omega_3\omega_1^2\omega_2 - \frac{3}{4}v^2\omega_3\omega_1^2 - \\
& \frac{7}{4}\omega_4\omega_1 + \frac{1}{2}\omega_3 + \frac{13}{4}\omega_4\omega_1u^2\omega_2 - v^3\omega_3^2\omega_1\omega_2 - \frac{11}{4}vw_4^2\omega_1u^2 + \frac{3}{2}v\omega_3^2\omega_4c_s^2\omega_1 + \frac{3}{4}vw_3\omega_2 - \frac{3}{4}vw_4^2\omega_1 + \frac{7}{2}\omega_3c_s^2\omega_1\omega_2 + \\
& \frac{3}{2}vw_3^2\omega_4\omega_1u^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1^2 + \frac{15}{4}\omega_3\omega_1u^2\omega_2 + 2v^2\omega_3\omega_4c_s^2\omega_2^2 - 3v^2\omega_3\omega_4c_s^2\omega_2 + v^2\omega_4\omega_1^2u^2\omega_2 - \omega_1^2 + \frac{1}{4}v^2\omega_3\omega_4 - \\
& v\omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}v^3\omega_3\omega_2^2 + w_4\omega_1^2u^4 + w_3^2\omega_4c_s^2u^2\omega_2 - v^2\omega_3^2\omega_4c_s^2\omega_1 - \frac{1}{2}\omega_3^2\omega_1u^4\omega_2 + \frac{9}{4}v^2\omega_4\omega_1\omega_2 - \frac{1}{2}v^3\omega_3\omega_1^2\omega_2 + \\
& 2v^2\omega_2 - v^2\omega_3^2\omega_4\omega_1u^2 - \frac{3}{2}vw_4\omega_1^2u^2\omega_2 + v^2\omega_3\omega_1^2u^2 + vw_3\omega_4c_s^2\omega_2 + 3v^2\omega_3\omega_4c_s^2\omega_1\omega_2 - \frac{33}{4}\omega_4\omega_1u^2 + \frac{1}{2}\omega_3\omega_2c_s^2 + \\
& \frac{1}{2}v^3\omega_3^2\omega_1 + \frac{3}{2}v^3\omega_4\omega_2 - \frac{1}{4}\omega_3\omega_4 + \frac{5}{4}\omega_4^2u^2 + 4w_3c_s^2 + \frac{1}{2}\omega_3^2\omega_1u^4\omega_2 + \frac{1}{2}vw_3^2\omega_3^2 + v^2\omega_3^2 - \frac{1}{2}\omega_4^2\omega_1u^4 - \frac{5}{4}vw_3\omega_1\omega_2 + \\
& \frac{3}{2}vw_3\omega_4c_s^2 + vw_4\omega_1^2u^2 - \frac{1}{2}v^3\omega_4\omega_1\omega_2 - \frac{3}{2}vw_3\omega_1^2u^2\omega_2 - w_3^2\omega_4c_s^2u^2 + \frac{1}{4}\omega_3\omega_1^2 - \frac{5}{4}v^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_3^2\omega_2 + \frac{3}{2}vw_4\omega_1^2\omega_2 + \\
& \frac{1}{2}v^4\omega_4\omega_2 + vw_2^2c_s^2\omega_2 - 2v^2\omega_3 + \frac{3}{2}vw_3\omega_4\omega_1u^2 + \frac{5}{4}\omega_3\omega_2^2\omega_2 + 2vw_3\omega_4\omega_1u^2\omega_2 + \frac{3}{2}vw_3\omega_4c_s^2\omega_1 + \frac{1}{4}\omega_3\omega_1^2u^2 + \\
& v^2\omega_3\omega_4c_s^2 - 2v^3\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2 - \frac{3}{4}\omega_3\omega_1 - vw_3\omega_4c_s^2\omega_1\omega_2 + \frac{1}{4}v^2\omega_4\omega_1^2 - \frac{1}{2}vw_4u^2\omega_2^2 + 4v^2\omega_1u^2\omega_2 + \frac{1}{4}vw_3^2\omega_1 - \\
& \frac{1}{4}vw_4\omega_2 - 3v^2\omega_1\omega_2 + v^2\omega_3^2\omega_1^2\omega_2 - 3\omega_1u^2\omega_2 - v^4\omega_3\omega_1\omega_2 + \frac{1}{2}vw_3^2\omega_4\omega_2^2 - \frac{1}{2}v^2\omega_4\omega_1\omega_2^2 + 5vw_3\omega_1u^2 + \frac{3}{2}\omega_4 + \\
& \frac{1}{2}v^3\omega_4\omega_2^2 - \frac{1}{2}vw_3\omega_4\omega_1 - v^2\omega_3\omega_2\omega_2^2 + v^2\omega_3\omega_4\omega_2^2 + \frac{1}{4}v^2\omega_3\omega_4\omega_2 + \frac{25}{4}\omega_3\omega_4\omega_1u^2 - \frac{1}{2}v^4\omega_4\omega_1\omega_2 - \\
& v\omega_3^2c_s^2\omega_1\omega_2 + \frac{7}{2}w_3\omega_4c_s^2\omega_1 - w_4\omega_1^2u^4\omega_2 - \frac{3}{2}\omega_1\omega_2 - \frac{1}{4}v^3\omega_3^2 - w_3\omega_4c_s^2\omega_1^2 + w_3^2c_s^2\omega_1 + vw_3\omega_4\omega_1u^2 + \frac{3}{2}\omega_3^2u^2 - \\
& \frac{1}{2}v^2\omega_4^2u^2\omega_2 + 3\omega_1 - 2vw_3\omega_4\omega_1u^2\omega_2 + \frac{3}{2}\omega_3^2\omega_1u^2 + v^2\omega_3^2\omega_4c_s^2 + \frac{19}{4}\omega_3\omega_4\omega_1^2 - \frac{3}{2}v^3\omega_3\omega_2 - \frac{1}{4}v^3\omega_4\omega_1 - v^2\omega_3\omega_2\omega_1u^2 - \\
& v^2\omega_3\omega_4c_s^2\omega_1 + w_3\omega_2^2u^4\omega_2 + \frac{3}{4}vw_4^2 + \frac{1}{2}v^2\omega_4^2\omega_2\omega_2 + \frac{11}{4}v^2\omega_3\omega_1 + 2w_3c_s^2\omega_1^2u^2\omega_2 + \frac{1}{4}\omega_4\omega_1^2 - \frac{1}{2}v^4\omega_3^2\omega_2 - w_3^2\omega_2\omega_2 + \\
& \frac{1}{2}vw_1^2\omega_2 + \frac{7}{2}vw_3\omega_4\omega_1u^2 - \frac{1}{4}\omega_4^2 + \frac{1}{2}\omega_3\omega_2 + vw_3c_s^2\omega_2^2 - \frac{1}{2}vw_4\omega_1^2 - \frac{1}{4}\omega_3\omega_1u^2\omega_2 - \frac{7}{2}vw_3\omega_4\omega_1u^2\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1u^2 - \\
& \frac{1}{2}w_3^2c_s^2\omega_1\omega_2 + v^3\omega_4\omega_1\omega_2 - \frac{1}{2}vw_3\omega_1u^2\omega_2 + v^3\omega_3^2\omega_2 - vw_3c_s^2\omega_1\omega_2 - \frac{11}{4}vw_3\omega_4c_s^2\omega_1 + \frac{1}{2}v^2\omega_4\omega_1u^2 - \\
& \frac{3}{2}\omega_3\omega_4\omega_1^2u^2 + w_3\omega_4c_s^2\omega_1\omega_2 - \frac{25}{2}vw_3\omega_4\omega_1u^2 - \frac{3}{2}\omega_3^2\omega_2\omega_2 - \frac{1}{2}\omega_3^2c_s^2\omega_1\omega_2 - \frac{1}{2}vw_3^2u^2 - 2w_3c_s^2\omega_1\omega_2 - \\
& \frac{3}{4}v^2\omega_4^2 - w_3\omega_4c_s^2\omega_1\omega_2 + v^2\omega_3\omega_4\omega_1u^2\omega_2 - w_3\omega_1^2u^4 - \frac{1}{2}vw_4\omega_1\omega_2\omega_2 - \frac{9}{2}vw_3\omega_4\omega_1u^2 - \frac{1}{4}vw_3\omega_1\omega_2^2 - \frac{7}{4}v^2\omega_4\omega_2 - \\
& v^2\omega_3\omega_1^2 - \frac{1}{2}vw_3\omega_4c_s^2\omega_1 - \frac{3}{2}vw_1\omega_2 - \frac{3}{4}w_3\omega_4\omega_1u^2\omega_2 - w_1^2u^2\omega_2 - vw_3\omega_4\omega_1u^2\omega_2 - \frac{3}{4}vw_3\omega_4\omega_1u^2\omega_2 - \frac{3}{2}\omega_3\omega_4\omega_1u^2\omega_2 + \\
& 10vw_1u^2\omega_2 - v^2\omega_4\omega_1u^2\omega_2^2 - v^2\omega_3\omega_4c_s^2\omega_1 - \frac{11}{4}w_3c_s^2\omega_1 - \frac{1}{2}w_3\omega_4c_s^2\omega_1 - v^4\omega_4\omega_1^2 - \frac{1}{2}w_4\omega_2 - \frac{1}{2}v^2\omega_3\omega_2 + \\
& \frac{1}{4}w_3\omega_4\omega_1 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{2}w_3\omega_4\omega_1u^2 + \frac{1}{2}v^3\omega_4\omega_1^2\omega_2 + vw_3\omega_1^2u^2 + \frac{1}{2}v^3\omega_3\omega_1\omega_2^2 + \frac{1}{2}vw_3\omega_1 - v^2\omega_3\omega_1u^2\omega_2 + \\
& v^2\omega_1^2\omega_2 + \frac{5}{2}vw_3\omega_2\omega_2 + w_2 - 2v^2\omega_3\omega_4c_s^2\omega_1\omega_2^2 - 3w_3\omega_4c_s^2\omega_1\omega_2\omega_2 + \frac{1}{2}w_3^2\omega_1u^4 + \frac{1}{4}vw_4\omega_1\omega_2 - v^2\omega_3\omega_4\omega_1u^2\omega_2 + \\
& 2v^3\omega_3\omega_1\omega_2 + vw_2 - \frac{1}{4}v^2\omega_3\omega_4\omega_1 - \frac{1}{2}v^2\omega_4\omega_1\omega_2 - \frac{1}{2}vw_3\omega_2\omega_2^2 - \frac{1}{2}vw_3\omega_1^2 + w_3\omega_4c_s^2\omega_2 + v^2\omega_3^2\omega_4\omega_2\omega_2 - w_4\omega_2^2 - \\
& w_3^2c_s^2 + \frac{1}{2}w_3^2c_s^2\omega_2 + \frac{1}{4}\omega_4u^2\omega_2 + \frac{1}{4}v^3\omega_4^2 - v^3\omega_4\omega_2 - 3w_3\omega_4c_s^2 - \frac{1}{4}\omega_4\omega_1^2\omega_2 + \frac{1}{2}vw_3\omega_4 - \frac{1}{2}vw_3\omega_1^2\omega_2 - \\
& v^2\omega_4\omega_1\omega_2^2 + \frac{3}{2}w_3\omega_4c_s^2\omega_1^2 - \frac{1}{4}vw_3^2 - \frac{1}{4}vw_4^2\omega_2^2 + 2vw_1u^2\omega_2^2 + \frac{3}{4}v^2\omega_4^2\omega_1 - \frac{1}{4}v^2\omega_3\omega_2 + v^4\omega_4\omega_1\omega_2^2 - \frac{1}{4}v^2\omega_3\omega_4\omega_1\omega_2 + \\
& 5vw_4\omega_1\omega_2^2 + \frac{1}{2}v^2\omega_3\omega_1\omega_2^2 - \frac{3}{2}vw_3\omega_4c_s^2\omega_1^2 - \frac{1}{2}v^2\omega_3^2\omega_2\omega_2 + v^2\omega_4 + 2\omega_1^2u^2 + 6vw_4\omega_1\omega_2^2 + \frac{5}{4}\omega_4\omega_1\omega_2^2
\end{aligned}$$

$$\begin{aligned} & \frac{1}{2}v^2\omega_4^2\omega_1\omega_2 + \frac{1}{2}v^4\omega_3^2\omega_1\omega_2 + v^4\omega_3\omega_2^2 + \omega_3^2c_s^2\omega_1u^2 + \frac{1}{4}v\omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}v^2\omega_4\omega_2^2 + \frac{1}{4}\omega_4^2\omega_1 - 4v^2\omega_1^2\omega_2 - \\ & \frac{1}{4}v\omega_3^2\omega_2 + \frac{5}{2}v\omega_4\omega_1 - v\omega_4^2u^2\omega_2 - \omega_3c_s^2\omega_1^2\omega_2 + 3\omega_3\omega_4c_s^2\omega_1u^2 - 5v\omega_3c_s^2\omega_2 - \frac{3}{2}v\omega_3^2\omega_4c_s^2 - v\omega_3^2\omega_4u^2\omega_2 + \\ & 6v\omega_3\omega_1u^2\omega_2 + \frac{1}{4}v\omega_3^2\omega_1\omega_2 + v\omega_3\omega_4c_s^2\omega_1^2 - \frac{1}{4}v\omega_3\omega_4\omega_2 + 6v\omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}\omega_3^2\omega_4\omega_1u^2 - \frac{1}{2}\omega_3^2\omega_4c_s^2\omega_1, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y-\delta_l}^{[\mu_4],t-3\delta_t} = & 3 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 + \frac{5}{2}v\omega_4 + \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{1}{4}\omega_3^2\omega_2 + \frac{13}{4}\omega_4\omega_1 - \frac{15}{4}\omega_3 - \omega_4\omega_1u^2\omega_2 + v^2\omega_3^2\omega_4\omega_1 - \frac{3}{4}\omega_3\omega_4\omega_2 + \\ & \frac{1}{4}\omega_3^2\omega_1\omega_2 + \frac{7}{2}v\omega_3\omega_2 + v\omega_4^2\omega_1 + \omega_3\omega_1u^2\omega_2 + \omega_1^2 + v^2\omega_3\omega_4 - 2v^2\omega_1\omega_2^2 - \frac{1}{2}v\omega_4\omega_2^2 + v^2\omega_3\omega_4^2\omega_1 + 2v^2\omega_4\omega_1\omega_2 + \\ & \frac{1}{2}\omega_3\omega_1^2\omega_2 - v\omega_3\omega_4\omega_1^2 + \omega_4\omega_1u^2 + \frac{13}{4}\omega_3\omega_4 - \frac{1}{2}\omega_4^2u^2 + \frac{1}{2}v^2\omega_3^2 - 4v\omega_3\omega_1\omega_2 + \frac{3}{2}v\omega_3^2\omega_4 - \omega_3\omega_1^2 + \frac{1}{2}v^2\omega_3^2\omega_2 + \\ & \omega_3\omega_1^2u^2 + \frac{1}{2}v\omega_3\omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_4^2\omega_1 - \frac{3}{4}\omega_4\omega_1\omega_2 + \frac{19}{4}\omega_3\omega_1 + v\omega_3^2\omega_1 + \frac{7}{2}v\omega_4\omega_2 + 2v^2\omega_2^2 + v^2\omega_4\omega_1\omega_2^2 - \frac{1}{2}\omega_3\omega_4^2 - \\ & \frac{11}{4}\omega_4 + 7v\omega_3\omega_4\omega_1 + \frac{1}{2}v\omega_4\omega_1^2\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_1 + 3v^2\omega_3\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1\omega_2 + 2\omega_1\omega_2 - \frac{1}{2}v\omega_3\omega_2^2 + \frac{1}{2}\omega_3^2u^2 - 4\omega_1 - \\ & \frac{1}{2}\omega_3^2\omega_1u^2 - v^2\omega_3\omega_2^2 + \frac{1}{2}v\omega_4^2\omega_1\omega_2 - v\omega_4^2 + \frac{1}{2}v^2\omega_4^2\omega_2 - \frac{1}{2}\omega_4\omega_1^2 - v\omega_1^2\omega_2 + \frac{1}{2}\omega_4^2 - \frac{1}{2}\omega_1^2\omega_2 + \frac{1}{2}v\omega_4\omega_1^2 + \frac{1}{2}\omega_3^2\omega_1u^2\omega_2 - \\ & \frac{1}{2}\omega_3^2u^2\omega_2 + \frac{1}{2}v^2\omega_4^2 - \frac{1}{2}\omega_4^2\omega_1u^2\omega_2 - \frac{3}{2}v\omega_3^2\omega_4\omega_1 - 2v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1 + 6v\omega_1\omega_2 - \omega_3\omega_1u^2 + \frac{3}{2}v\omega_3\omega_4^2 + \frac{5}{2}v\omega_3 - \\ & \frac{3}{4}\omega_3^2\omega_1 + \frac{3}{4}\omega_4\omega_2 - v^2\omega_3\omega_2^2 - \frac{15}{4}\omega_3\omega_4\omega_1 + 2v^2\omega_3\omega_1\omega_2 + v\omega_2^2 - 3v\omega_3\omega_1 - \frac{1}{2}v\omega_4\omega_2 - \frac{3}{2}\omega_2 - \frac{3}{2}v\omega_3\omega_4^2\omega_1 - 4v\omega_4\omega_1\omega_2 - \\ & 5v\omega_2 - v^2\omega_3\omega_4\omega_1 - \frac{9}{4}\omega_3\omega_1\omega_2 + \frac{1}{2}v\omega_3\omega_1^2 + \omega_4\omega_1^2u^2\omega_2 - \frac{1}{2}\omega_3^2\omega_4 + \frac{1}{2}v\omega_4\omega_1\omega_2^2 - \omega_4\omega_1^2u^2 - 6v\omega_3\omega_4 + \frac{1}{2}v\omega_3\omega_1^2\omega_2 - \\ & \omega_3\omega_1^2u^2\omega_2 - v\omega_3^2 - \frac{1}{2}v^2\omega_4^2\omega_1 - 2v^2\omega_3\omega_2 - 3v^2\omega_3\omega_4\omega_1\omega_2 + v^2\omega_3\omega_1\omega_2^2 + \frac{3}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_4\omega_1^2 + \frac{1}{2}\omega_4^2\omega_1u^2 - \frac{1}{2}v^2\omega_4^2\omega_1\omega_2 - \\ & v\omega_1\omega_2^2 + v\omega_3\omega_4\omega_1\omega_2 - v^2\omega_4\omega_2^2 + \frac{7}{4}\omega_3\omega_2 - \frac{1}{2}v\omega_3^2\omega_2 - 3v\omega_4\omega_1 + \frac{1}{2}v\omega_3^2\omega_1\omega_2 - v\omega_3\omega_4\omega_2 - v^2\omega_3\omega_4, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_l,y}^{[\mu_1],t-3\delta_t} = & -1 + \frac{1}{2}\omega_3^2\omega_4c_s^2 - \frac{1}{4}\omega_4^2u^3 + \frac{3}{2}\omega_4\omega_1u^3 + \frac{1}{4}v^2\omega_3^2\omega_2 - \frac{5}{2}\omega_3c_s^2\omega_1u + 4\omega_1u^2 - \frac{1}{4}\omega_4^2u^2\omega_2 - \frac{1}{4}\omega_4\omega_1 + \\ & \frac{1}{4}\omega_3 - \frac{1}{2}v\omega_3\omega_4^2c_s^2\omega_2 + \frac{13}{4}\omega_4\omega_1u^2\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_2 + \frac{1}{4}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4^2u^3\omega_2 + \frac{13}{4}\omega_3\omega_1u^2\omega_2 + \\ & \frac{1}{4}\omega_3^2u - \frac{1}{2}\omega_3\omega_4^2c_s^2u + \frac{1}{2}\omega_3^2\omega_4u^2\omega_2 + \frac{1}{2}\omega_3\omega_4u + \frac{1}{4}\omega_3^2\omega_1u + \omega_1u^2\omega_2^2 - \frac{3}{2}v^2\omega_3\omega_1\omega_2u + \frac{1}{4}v^2\omega_4\omega_1\omega_2 - \frac{11}{4}\omega_4\omega_1u^2 + \\ & \frac{1}{2}\omega_3\omega_4^2c_s^2 - \frac{1}{4}\omega_3\omega_4 + \frac{1}{4}\omega_4^2u^2 - \frac{1}{4}v^2\omega_3^2u + 2\omega_3c_s^2 + \frac{1}{2}\omega_4\omega_1\omega_2 + \frac{3}{2}v^2\omega_4\omega_1\omega_2u + \frac{3}{4}\omega_3^2\omega_3 - \frac{1}{4}\omega_3u^2\omega_2^2 - \\ & \frac{1}{2}v^2\omega_4\omega_1u - \frac{3}{4}v^2\omega_3^2\omega_2 - \frac{1}{2}\omega_3\omega_4u^3 - \frac{1}{2}\omega_3^2\omega_4u^3\omega_2 - v^2\omega_3 + \frac{5}{4}\omega_3u^2\omega_2 - \frac{1}{2}\omega_3\omega_4^2 + \frac{1}{2}v\omega_4\omega_1\omega_2^2 - \\ & \frac{3}{2}\omega_3\omega_1u^3\omega_2 + \frac{1}{2}\omega_3\omega_3^2u^2 - \frac{1}{4}\omega_3^2u^3 + \frac{1}{4}\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1 + \frac{1}{4}\omega_4^2\omega_2 + \frac{1}{2}\omega_3\omega_4^2u^2\omega_2 - 2\omega_3\omega_4\omega_1u^3 - \frac{1}{2}\omega_3^2\omega_4c_s^2u + \\ & \omega_3c_s^2\omega_1\omega_2u + v^2\omega_3\omega_1\omega_2^2 - \frac{3}{2}\omega_4\omega_1u^3\omega_2 - 5\omega_1u^2\omega_2 + \frac{5}{4}\omega_4 - \frac{3}{4}\omega_4\omega_1u - \omega_3\omega_4c_s^2\omega_1\omega_2u + \frac{1}{4}\omega_4^2u + \frac{1}{4}\omega_4^2u^3\omega_2 - \\ & \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \frac{1}{2}\omega_3\omega_4\omega_1u^2 - \frac{1}{2}\omega_3\omega_4u\omega_2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{2}\omega_1\omega_2 - \frac{1}{4}\omega_3^2\omega_1\omega_2u - \frac{1}{4}\omega_3^2\omega_1\omega_2 + \frac{1}{4}v^2\omega_4^2u + \frac{1}{4}\omega_3^2u^2 + \\ & \omega_3\omega_1^2u^3 + \frac{1}{2}\omega_1 - \frac{1}{2}\omega_3\omega_1u^2\omega_2^2 + \frac{1}{2}\omega_3^2\omega_1u^2 + \frac{1}{2}\omega_3\omega_4^2c_s^2u\omega_2 + \frac{1}{2}\omega_3\omega_4u^2u^2 + \frac{1}{2}v^2\omega_3^2\omega_1u + 2\omega_1u + \frac{1}{2}\omega_3c_s^2\omega_2^2 - \\ & \frac{1}{2}\omega_4\omega_1u^2\omega_2^2 + \frac{3}{4}v^2\omega_3^2\omega_2 + \frac{1}{4}v^2\omega_3\omega_1 - \frac{1}{4}\omega_3\omega_4\omega_1\omega_2u - \frac{1}{4}\omega_4^2 + \omega_3\omega_4c_s^2\omega_1u - \frac{1}{2}\omega_3^2\omega_1u^2\omega_2 - 3\omega_3\omega_4u^2\omega_2 - \\ & \frac{1}{2}\omega_3\omega_4^2u^2 - \frac{1}{4}\omega_3^2\omega_2u^2 - \omega_3u^2 + \frac{1}{2}\omega_3^2\omega_4u^3 + \frac{3}{2}\omega_3\omega_1u^3 - \frac{1}{4}v^2\omega_4^2u\omega_2 - \frac{1}{2}\omega_3\omega_1\omega_2^2 - \omega_3\omega_1^2u^3\omega_2 - \frac{3}{4}v^2\omega_4^2 - \\ & \frac{1}{2}\omega_3\omega_4c_s^2\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_1u^2\omega_2^2 - \frac{1}{4}v^2\omega_4\omega_2 - \frac{1}{4}\omega_3\omega_2^2 - \omega_4\omega_1^2u^3\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1u^2\omega_2 + \omega_1^2\omega_2 - \frac{11}{4}\omega_3\omega_1u^2 - \\ & \frac{1}{2}\omega_3^2\omega_4u^2 + \frac{1}{2}\omega_3\omega_3^2u^3 + \frac{1}{2}\omega_3\omega_2u^2 - \frac{1}{2}\omega_3c_s^2\omega_1 + \frac{1}{2}v^2\omega_3^2\omega_1\omega_2u - \frac{3}{2}\omega_4\omega_2 + \frac{3}{4}v^2\omega_3\omega_2^2 - \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{5}{2}\omega_1\omega_2 - \\ & \frac{1}{2}\omega_3\omega_4c_s^2\omega_2^2 + \omega_2 - \frac{1}{4}\omega_4u^2\omega_2^2 - \frac{1}{2}\omega_4u - \frac{1}{2}v^2\omega_3^2\omega_1\omega_2u + \frac{1}{2}\omega_3\omega_1\omega_2 + 2\omega_1^2u^3\omega_2 + \frac{1}{2}\omega_1\omega_2^2 + \\ & \frac{1}{2}\omega_3\omega_4c_s^2\omega_2u^2 - \frac{1}{2}\omega_4\omega_1u^2\omega_2^2 + 2\omega_3\omega_4\omega_1\omega_2^2 + 3\omega_3\omega_4c_s^2\omega_2 - \omega_4u^2 - \frac{1}{2}\omega_3^2c_s^2 - \frac{1}{2}\omega_4^2\omega_1u^3 + \frac{1}{2}\omega_3^2c_s^2\omega_2 + \\ & \frac{1}{2}\omega_4\omega_1u^3\omega_2 + \frac{5}{4}\omega_4u^2\omega_2^2 - 2\omega_1^2u^3 - \frac{5}{2}\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_4\omega_1u^2 - \frac{7}{4}\omega_3\omega_1u - \frac{1}{2}\omega_3\omega_1u^2\omega_2 + \frac{1}{2}\omega_3\omega_4c_s^2u + \frac{1}{4}\omega_3^2u^3\omega_2 + \\ & \frac{1}{4}\omega_4\omega_2^2 + \frac{1}{2}\omega_3^2c_s^2u + \frac{1}{4}v^2\omega_3\omega_2 + \frac{1}{2}\omega_3\omega_4u^3\omega_2 + \frac{1}{2}\omega_3^2\omega_1u^3\omega_2 + \omega_4\omega_1^2u^3 + v^2\omega_4 - \omega_1^2u^2 - \frac{1}{4}\omega_4^2u\omega_2 + \frac{1}{2}\omega_4^2\omega_1u^2 - \\ & \frac{1}{2}\omega_3^2c_s^2\omega_2u^2 + \frac{3}{4}\omega_4\omega_1\omega_2u^2 + \frac{1}{2}\omega_3\omega_4u^2\omega_2^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2u^2 - \frac{1}{2}\omega_3\omega_4\omega_1u^2u^2 - \frac{1}{2}\omega_3^2u^2\omega_2 + \frac{9}{4}\omega_3\omega_1\omega_2u^2 - \frac{1}{2}\omega_3u, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_l,y}^{[\mu_4],t-3\delta_t} = & 3 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{3}{4}\omega_3^2\omega_2 + \frac{3}{4}\omega_4\omega_1 - \frac{15}{4}\omega_3 + 2\omega_4\omega_1u^2\omega_2 - \frac{15}{4}\omega_3\omega_4\omega_2 + \frac{1}{4}\omega_3^2\omega_1\omega_2 - \omega_3\omega_4\omega_1u - \\ & \frac{1}{2}\omega_1\omega_2^2 - \omega_3\omega_4\omega_2^2 + 2\omega_3\omega_1u^2\omega_2 - \omega_3^2u + \omega_3^2\omega_4u^2\omega_2 - 6\omega_3\omega_4u - \frac{1}{2}\omega_3^2\omega_1u + \frac{1}{2}\omega_4\omega_1^2u\omega_2 - v^2\omega_4\omega_1\omega_2 - 2\omega_4\omega_1u^2 + \\ & \frac{13}{4}\omega_3\omega_4 + \frac{1}{2}\omega_4^2u^2 - 3\omega_4\omega_2u + \frac{1}{2}\omega_3\omega_1^2\omega_2 + \frac{1}{2}v^2\omega_3^2 - \frac{1}{2}\omega_3\omega_2^2u - \omega_3\omega_1^2u^2 - \frac{3}{4}\omega_4\omega_1\omega_2 + \frac{7}{4}\omega_3\omega_1 - \\ & \frac{1}{4}\omega_4^2\omega_2 + \omega_3\omega_2^2u^2\omega_2 + v^2\omega_4\omega_1\omega_2^2 - \frac{1}{2}\omega_3\omega_2^2 - \frac{1}{2}\omega_3\omega_2^2u - \frac{1}{4}\omega_4\omega_2 + \frac{7}{2}\omega_4\omega_1u + \frac{1}{2}\omega_4\omega_1\omega_2^2 - \omega_4^2u + \frac{1}{2}v^2\omega_3^2\omega_1\omega_2 + 3\omega_3\omega_4\omega_1u^2 + \\ & 7\omega_3\omega_4\omega_2u + 2\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2u + \frac{1}{2}\omega_3\omega_2u + \frac{1}{2}\omega_3\omega_2^2u - \frac{3}{2}\omega_1 + \frac{1}{2}\omega_3\omega_1u^2 + \omega_3\omega_4u^2 + \frac{1}{2}\omega_4\omega_1\omega_2u - 5\omega_1u - \omega_1^2\omega_2 + \\ & \frac{1}{2}v^2\omega_4^2\omega_2 + \omega_3\omega_4\omega_1\omega_2u + \frac{1}{2}\omega_3\omega_1\omega_2u + \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_3\omega_4\omega_2^2 - \frac{1}{2}\omega_3\omega_2\omega_2^2 - \omega_3\omega_4\omega_2u^2 - \omega_3\omega_4^2u^2 - \frac{1}{2}\omega_3^2u^2\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2u^2 + \\ & \omega_1^2u - \frac{1}{2}\omega_3\omega_4u^2 - \frac{1}{2}\omega_4\omega_1\omega_2u^2 - \frac{1}{2}\omega_3\omega_2\omega_2u + v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3\omega_2^2 - \omega_3\omega_2^2 - 3\omega_3\omega_4\omega_1u^2\omega_2 - 2\omega_1^2u^2\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2^2 + \\ & 2\omega_3\omega_1u^2 - \omega_3^2\omega_4u^2 - 3\omega_3\omega_2u^2 - \frac{3}{2}\omega_3\omega_4\omega_2u^2 - \frac{1}{4}\omega_3\omega_3^2u + \frac{13}{4}\omega_4\omega_2 + v^2\omega_3\omega_2^2 - \frac{3}{4}\omega_3\omega_4\omega_1 + v^2\omega_3\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2^2 + \\ & 6\omega_1\omega_2 + \omega_2^2 - 4\omega_2 + \frac{5}{2}\omega_4u - \frac{1}{2}\omega_4\omega_1u + \frac{1}{2}\omega_3\omega_4\omega_2 - \frac{9}{4}\omega_3\omega_1\omega_2 - \omega_1\omega_2^2 + \omega_4\omega_1^2u^2\omega_2 - \frac{1}{2}\omega_3^2\omega_4 - \omega_4\omega_1^2u^2 + \\ & \frac{3}{2}\omega_3\omega_4u^2 + \frac{7}{2}\omega_3\omega_1\omega_2 + \omega_3\omega_2^2u^2\omega_2 + \frac{1}{2}\omega_3\omega_2\omega_2^2 - \frac{1}{2}\omega_4\omega_2^2 + \frac{1}{2}v^2\omega_4\omega_1u - v^2\omega_3\omega_2^2 + \frac{3}{4}\omega_3^2 + 2\omega_1^2u^2 + \omega_4^2\omega_1\omega_2^2 + \\ & \frac{1}{2}\omega_4^2\omega_1u^2 - \frac{1}{2}v^2\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_2^2\omega_2 - 4\omega_4\omega_1\omega_2 - v^2\omega_4\omega_2^2 + \frac{19}{4}\omega_3\omega_2 + \frac{3}{2}\omega_3\omega_4\omega_2u - \frac{3}{2}\omega_3^2\omega_4\omega_1\omega_2 - 4\omega_3\omega_1\omega_2 + \frac{5}{2}\omega_3u, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_1],t-3\delta_t} = & -2 - \frac{1}{2}\omega_3\omega_4\omega_1\omega_2 - v^2\omega_3^2\omega_1u^2 + 2\omega_1u^2 - \frac{3}{2}\omega_4^2u^2\omega_2 - 2v^2\omega_3\omega_1^2u^2\omega_2 + \frac{1}{2}v^2\omega_3\omega_2^2 - 3\omega_4\omega_1 + \frac{1}{2}\omega_3 + \\ & \frac{11}{2}\omega_4\omega_1u^2\omega_2 + \frac{1}{2}\omega_3\omega_4\omega_2 - \omega_3c_s^2\omega_1\omega_2 + \frac{9}{2}\omega_3\omega_1u^2\omega_2 - 4v^2\omega_3c_s^2\omega_2^2 + 6v^2\omega_3\omega_4c_s^2\omega_2 - 2v^2\omega_4\omega_1^2u^2\omega_2 + \\ & 2\omega_3^2\omega_4u^2\omega_2 - \omega_1^2 - \frac{1}{2}v^2\omega_3\omega_4 - 2\omega_4\omega_1u^4 - 2\omega_3^2\omega_4c_s^2u^2\omega_2 + 2\omega_1u^2\omega_2^2 + 2v^2\omega_3^2\omega_4c_s^2\omega_1 + \omega_3^2\omega_1u^4\omega_2 - \end{aligned}$$

$$\begin{aligned}
& \frac{11}{2}v^2\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_1^2\omega_2 - 4v^2\omega_2 + 2v^2\omega_3^2\omega_4\omega_1u^2 - 2v^2\omega_3\omega_1^2u^2 - 6v^2\omega_3\omega_4c_s^2\omega_1\omega_2 - 5\omega_4\omega_1u^2 - \frac{1}{2}\omega_3\omega_4 + \\
& \frac{3}{2}\omega_4^2u^2 - \omega_3c_s^2 - \omega_4^2\omega_1u^4\omega_2 + v^2\omega_3^2 - \frac{1}{2}\omega_3u^2\omega_2^2 + \omega_4^2\omega_1u^4 - \frac{1}{2}\omega_4\omega_1\omega_2^2 + 2\omega_3^2\omega_4c_s^2u^2 + \frac{1}{2}\omega_3\omega_1^2 - 2v^2\omega_4\omega_1 - \\
& v^2\omega_3^2\omega_2 - v^4\omega_4^2\omega_2 + \frac{1}{2}v^2\omega_3 - \frac{5}{2}\omega_3\omega_1^2u^2 - 2v^2\omega_3\omega_4c_s^2 + \frac{7}{2}\omega_4\omega_1\omega_2 + \frac{1}{2}v^2\omega_3\omega_1^2\omega_2 - \omega_3\omega_1 + \frac{1}{2}\omega_4^2\omega_2 + \frac{1}{2}v^2\omega_4\omega_1^2 - \\
& 8v^2\omega_1u^2\omega_2^2 + 2\omega_3\omega_4^2u^2\omega_2 + 6v^2\omega_1\omega_2 - 2v^2\omega_3^2c_s^2\omega_1\omega_2 - 4\omega_1u^2\omega_2 + 2v^4\omega_3\omega_1\omega_2^2 + \frac{5}{2}v^2\omega_4\omega_1\omega_2^2 + \frac{5}{2}v^2\omega_4\omega_1^2 + \\
& 2v^2\omega_3u^2\omega_2^2 - 2v^2\omega_3\omega_4u^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_2 + v^2\omega_3^2\omega_1\omega_2 + \frac{11}{2}\omega_3\omega_4\omega_1u^2 + v^4\omega_4^2\omega_1\omega_2 - \omega_3\omega_4c_s^2\omega_1 + 2\omega_4\omega_1^2u^4\omega_2 - \\
& 3\omega_1\omega_2 - \omega_3c_s^2\omega_1\omega_2^2 + 2\omega_3\omega_4^2c_s^2u^2 + \omega_3^2u^2 + v^2\omega_4^2\omega_1\omega_2 + 3\omega_1 - \frac{1}{2}\omega_3\omega_1u^2\omega_2^2 + \omega_3^2\omega_1u^2 - 2v^2\omega_3^2\omega_4c_s^2 + \frac{3}{2}\omega_3\omega_4u^2 + \\
& 2v^2\omega_3\omega_4^2\omega_1u^2 + 2v^2\omega_3\omega_4^2c_s^2\omega_1 - 2\omega_3\omega_1^2u^4\omega_2 + \omega_3c_s^2\omega_2^2 - \frac{1}{2}\omega_4\omega_1u^2\omega_2^2 + \frac{1}{2}v^2\omega_4^2\omega_2 - v^2\omega_3\omega_1 - 4\omega_3c_s^2\omega_1^2u^2\omega_2 + \\
& \frac{1}{2}\omega_4\omega_1^2 + v^4\omega_3^2\omega_2 - \frac{1}{2}\omega_4^2 + \omega_1^2\omega_2 - \omega_3^2\omega_1u^2\omega_2 - \frac{3}{2}\omega_3\omega_4\omega_1u^2\omega_2 + 2\omega_3^2c_s^2\omega_1u^2\omega_2 - \frac{1}{2}\omega_4^2\omega_1\omega_2 - v^2\omega_4^2\omega_1u^2 - \\
& 2\omega_3\omega_4^2u^2 - 2\omega_3\omega_4^2c_s^2u^2\omega_2 - \omega_3^2u^2\omega_2 + \frac{1}{2}\omega_3u^2 + 4\omega_3c_s^2\omega_1^2u^2 - \frac{3}{2}v^2\omega_4^2 + \omega_3\omega_4c_s^2\omega_1\omega_2 - 2v^2\omega_3\omega_4^2u^2\omega_2 - \\
& \frac{3}{2}\omega_4\omega_1u^2\omega_2 + 2\omega_3\omega_1^2u^4 + 5v^2\omega_4\omega_2 - v^2\omega_3^2\omega_1 - \frac{1}{2}\omega_3\omega_2^2 - \frac{11}{2}\omega_3\omega_4\omega_1u^2\omega_2 - 4\omega_1u^2\omega_2 - 4\omega_3\omega_1u^2 - 2\omega_3^2\omega_4u^2 - \\
& 2v^2\omega_4\omega_1^2u^2 + 2v^2\omega_4\omega_1u^2\omega_2^2 + 2v^2\omega_3^2c_s^2\omega_2 + 2\omega_3\omega_4c_s^2\omega_1 + 2v^4\omega_4\omega_2^2 - 3\omega_4\omega_2 + \frac{5}{2}v^2\omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_1\omega_2 + \\
& \frac{1}{2}v^2\omega_3\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2^2 + 2v^2\omega_3\omega_1u^2\omega_2^2 - 2v^2\omega_1^2\omega_2 + 2\omega_2 - \frac{1}{2}\omega_4\omega_1u^2\omega_2^2 + 4v^2\omega_3c_s^2\omega_1\omega_2^2 + 6\omega_3\omega_4c_s^2\omega_1u^2\omega_2 - \\
& \omega_3^2\omega_1u^4 + 2v^2\omega_3\omega_4\omega_1u^2 + \frac{1}{2}v^2\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2 + \frac{3}{2}\omega_4\omega_1^2u^2\omega_2 - \omega_3\omega_4c_s^2\omega_2 - 2v^2\omega_3^2\omega_4u^2\omega_2 - \\
& \frac{3}{2}\omega_4u^2 + 2\omega_4u^2\omega_2 + \omega_3\omega_4c_s^2 - \frac{3}{2}\omega_4\omega_1^2u^2 + \frac{5}{2}\omega_3\omega_1^2u^2\omega_2 + 2v^2\omega_4u^2\omega_2^2 - \omega_3c_s^2\omega_1^2 + \frac{1}{2}\omega_4\omega_2^2 + \frac{3}{2}v^2\omega_4^2\omega_1 - \\
& v^2\omega_3\omega_2 - 2v^4\omega_4\omega_1\omega_2^2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1\omega_2 - \frac{5}{2}v^2\omega_3\omega_1\omega_2^2 + v^2\omega_3^2u^2\omega_2 + \frac{3}{2}v^2\omega_4 + 4\omega_1^2u^2 + \frac{3}{2}\omega_4^2\omega_1u^2 - \frac{1}{2}v^2\omega_4^2\omega_1\omega_2 - \\
& v^4\omega_3\omega_1\omega_2 - 2v^4\omega_3\omega_2^2 - 2\omega_3^2c_s^2\omega_1\omega_2^2 - \frac{3}{2}v^2\omega_4\omega_2^2 + \frac{1}{2}\omega_4^2\omega_1 + 8v^2\omega_1^2u^2\omega_2 + \omega_3c_s^2\omega_1\omega_2^2 - 6\omega_3\omega_4c_s^2\omega_1\omega_2^2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_4],t-3\delta_t} = & 3 + 5\omega_4\omega_1 - 2\omega_4\omega_1u^2\omega_2 - 2v^2\omega_3^2\omega_4\omega_1 - \omega_1\omega_2^2 - 6\omega_3\omega_1u^2\omega_2 - 2\omega_3^2\omega_4u^2\omega_2 + \omega_1^2 - 2v^2\omega_3\omega_4 + 4v^2\omega_1\omega_2^2 - \\
& 2v^2\omega_3\omega_4^2\omega_1 - 2v^2\omega_4\omega_1\omega_2 + 2\omega_4\omega_1u^2 - 2v^2\omega_3^2 + \omega_4\omega_1\omega_2^2 - 6\omega_4\omega_1\omega_2 - \omega_4^2\omega_2 - 2\omega_3\omega_4^2u^2\omega_2 - 4v^2\omega_2^2 - 4v^2\omega_4\omega_1\omega_2^2 - \\
& 4\omega_4 - 6v^2\omega_3\omega_4\omega_2 - 6\omega_3\omega_4\omega_1u^2 + 5\omega_1\omega_2 - 2\omega_3^2u^2 - 4\omega_1 - 2\omega_3\omega_4u^2 + 2v^2\omega_3\omega_4^2 - 2v^2\omega_4\omega_2 - \omega_4\omega_1^2 + \omega_4^2 - \\
& \omega_1^2\omega_2 + 2\omega_3\omega_4u^2\omega_2 + \omega_4^2\omega_1\omega_2 + 2\omega_3\omega_4^2u^2 + 2\omega_3^2u^2\omega_2 + 2\omega_4^2\omega_1u^2\omega_2 + 2v^2\omega_4\omega_2 + 2v^2\omega_3^2\omega_1 + 6\omega_3\omega_4\omega_1u^2\omega_2 + \\
& 4\omega_1^2u^2\omega_2 + 6\omega_3\omega_1u^2 + 2\omega_3^2\omega_4u^2 + 5\omega_4\omega_2 + \omega_4\omega_1^2\omega_2 - 6v^2\omega_3\omega_1\omega_2 + \omega_2^2 - 4\omega_2 + 2v^2\omega_3\omega_4\omega_1 - 4\omega_4\omega_1^2u^2\omega_2 + \\
& 4\omega_4\omega_1u^2 - \omega_4\omega_2^2 + 6v^2\omega_3\omega_2 + 6v^2\omega_3\omega_4\omega_1\omega_2 - 4\omega_1^2u^2 - 2\omega_4^2\omega_1u^2 + 4v^2\omega_4\omega_2^2 - \omega_4^2\omega_1 + 2v^2\omega_3^2\omega_4,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l,y}^{[\mu_1],t-3\delta_t} = & -1 + \frac{1}{2}\omega_3^2\omega_4c_s^2 + \frac{1}{4}\omega_4^2u^3 - \frac{3}{2}\omega_4\omega_1u^3 - \frac{1}{4}v^2\omega_3^2\omega_2 + \frac{5}{2}\omega_3c_s^2\omega_2 + \omega_3c_s^2\omega_1\omega_2 + 4\omega_1u^2 - \frac{1}{4}\omega_4^2u^2\omega_2 - \frac{1}{4}\omega_4\omega_1 + \\
& \frac{1}{4}\omega_3 - \frac{1}{2}\omega_3\omega_4^2c_s^2\omega_2 + \frac{13}{4}\omega_4\omega_1u^2\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_2 - \frac{1}{4}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4^2u^3\omega_2 + \frac{13}{4}\omega_3\omega_1u^2\omega_2 - \\
& \frac{1}{4}\omega_3^2u + \frac{1}{2}\omega_3\omega_4^2c_s^2u + \frac{1}{2}\omega_3^2\omega_4u^2\omega_2 - \frac{1}{2}\omega_3\omega_4u - \frac{1}{4}\omega_3^2\omega_1\omega_2 + \omega_1u^2\omega_2^2 + \frac{3}{2}v^2\omega_3\omega_1\omega_2 + \frac{1}{4}v^2\omega_4\omega_1\omega_2 - \frac{11}{4}\omega_4\omega_1\omega_2 + \\
& \frac{1}{2}\omega_3\omega_4^2c_s^2 - \frac{1}{4}\omega_3\omega_4 + \frac{1}{4}\omega_4^2u^2 + \frac{1}{4}v^2\omega_3^2u + 2\omega_3c_s^2 - \frac{1}{2}\omega_4\omega_1\omega_2 - \frac{3}{2}v^2\omega_4\omega_1\omega_2 + \frac{3}{4}v^2\omega_3^2 - \frac{1}{4}\omega_3u^2\omega_2^2 + \\
& \frac{1}{2}v^2\omega_4\omega_1u - \frac{1}{4}v^2\omega_4\omega_1 - \frac{3}{4}v^2\omega_3^2\omega_2 + \frac{1}{2}\omega_3\omega_4u^3 + \frac{1}{2}\omega_3^2\omega_4u^3\omega_2 - v^2\omega_3 + \frac{5}{4}\omega_3u^2\omega_2 + \frac{1}{2}\omega_3^2\omega_1u^3 + v^2\omega_4\omega_1\omega_2 + \\
& \frac{3}{2}\omega_3\omega_1u^3\omega_2 + \frac{1}{2}\omega_3\omega_1^2u^2 + \frac{1}{4}\omega_3^2u^3 + \frac{1}{4}\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1 + \frac{1}{4}\omega_4^2\omega_2 + \frac{1}{2}\omega_3\omega_4^2u^2\omega_2 + 2\omega_3\omega_4\omega_1u^3 + \frac{1}{2}\omega_3^2\omega_4c_s^2u - \\
& \omega_3c_s^2\omega_1\omega_2 - v^2\omega_3\omega_1\omega_2 + \frac{5}{2}\omega_4\omega_1u^3\omega_2 - 5\omega_1\omega_2 + \frac{5}{4}\omega_4 + \frac{3}{4}\omega_4\omega_1u + \omega_3\omega_4c_s^2\omega_1\omega_2 - \frac{1}{4}\omega_4^2u - \frac{1}{4}\omega_4^2u^3\omega_2 - \\
& \frac{1}{2}\omega_3^2\omega_4c_s^2\omega_2 + \frac{1}{2}\omega_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3\omega_4u\omega_2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}\omega_3^2\omega_1\omega_2 + \frac{1}{4}\omega_2^2\omega_2 - \frac{1}{4}v^2\omega_4^2u + \frac{1}{4}\omega_3^2u^2 - \\
& \omega_3\omega_1^3 + \frac{1}{2}\omega_1 - \frac{1}{2}\omega_3\omega_1u^2\omega_2^2 + \frac{1}{2}\omega_3^2\omega_1u^2 - \frac{1}{2}\omega_3\omega_4^2c_s^2\omega_2 + \frac{5}{2}\omega_3\omega_4u^2 - \frac{1}{2}v^2\omega_3^2\omega_1u - 2\omega_1u + \frac{1}{2}\omega_3c_s^2\omega_2 - \\
& \frac{1}{2}\omega_4\omega_1u^2\omega_2^2 + \frac{3}{4}v^2\omega_4^2\omega_2 + \frac{1}{4}v^2\omega_3\omega_1 + \frac{1}{4}\omega_3\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_4^2 - \omega_3\omega_4c_s^2\omega_1u - \frac{1}{2}\omega_3^2\omega_1u^2\omega_2 - 3\omega_3\omega_4u^2\omega_2 - \\
& \frac{1}{2}\omega_3\omega_4^2u^2 - \frac{1}{4}\omega_3^2u^2\omega_2 - \omega_3u^2 - \frac{1}{2}\omega_3^2\omega_4u^3 - \frac{1}{2}\omega_3\omega_1u^3 + \frac{1}{4}v^2\omega_4^2\omega_2\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2^2 + \omega_3\omega_1^2\omega_2 - \frac{3}{4}v^2\omega_4^2 - \\
& \frac{1}{2}\omega_3\omega_4c_s^2\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4^2\omega_1\omega_2^2 - \frac{1}{4}v^2\omega_4\omega_2 - \frac{1}{4}\omega_3\omega_2^2 + \omega_4\omega_1^2\omega_2^3 - \frac{1}{2}\omega_3\omega_4\omega_1u^2\omega_2 + \omega_1^2\omega_2 - \frac{11}{4}\omega_3\omega_1u^2 - \\
& \frac{1}{2}\omega_3^2\omega_4u^2 - \frac{1}{2}\omega_3\omega_4^2u^3 - \frac{1}{2}\omega_3\omega_2\omega_2 - \frac{1}{2}\omega_3c_s^2\omega_1 - \frac{1}{2}v^2\omega_4\omega_1\omega_2 - \frac{3}{2}\omega_4\omega_2 + \frac{3}{4}v^2\omega_3\omega_2^2 - \frac{1}{2}\omega_3\omega_4\omega_1\omega_2 + \frac{5}{2}\omega_1\omega_2 - \\
& \frac{1}{2}\omega_3\omega_4c_s^2\omega_2^2 + \omega_2 - \frac{1}{4}\omega_4u^2\omega_2^2 + \frac{1}{2}\omega_4u + \frac{1}{2}v^2\omega_3\omega_1\omega_2 - \frac{1}{2}v^2\omega_3\omega_1u + \frac{1}{4}\omega_3\omega_1\omega_2 - 2\omega_1^2\omega_2 - \frac{1}{2}\omega_1\omega_2^2 - \\
& \frac{1}{2}\omega_3^2\omega_4c_s^2\omega_2 - \frac{1}{2}\omega_4\omega_1u^2\omega_2 - 2\omega_3\omega_4\omega_1u^3\omega_2 + 3\omega_3\omega_4c_s^2\omega_2 - \omega_4u^2 - \frac{1}{2}\omega_3^2c_s^2 + \frac{1}{2}\omega_4^2\omega_1u^3 + \frac{1}{2}\omega_3^2\omega_4c_s^2\omega_2 - \\
& \frac{1}{2}\omega_3^2\omega_1u^3\omega_2 + \frac{5}{4}\omega_4u^2\omega_2 + 2\omega_1^2u^3 - \frac{5}{2}\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_4\omega_1u^2u^2 + \frac{7}{4}\omega_3\omega_1u - \frac{1}{2}\omega_3\omega_1^2u^2\omega_2 - \frac{1}{2}\omega_3\omega_4c_s^2u - \frac{1}{4}\omega_3^2\omega_1u^3\omega_2 + \\
& \frac{1}{4}\omega_4\omega_2^2 - \frac{1}{2}\omega_3^2c_s^2u + \frac{1}{4}v^2\omega_3\omega_2 - \frac{1}{2}\omega_3\omega_4u^3\omega_2 - \frac{1}{2}\omega_3^2\omega_1u^3\omega_2 - \omega_4\omega_1^2u^3 + v^2\omega_4 - \frac{1}{2}\omega_1^2u^2 + \frac{1}{4}\omega_4^2\omega_1u^2 + \frac{1}{2}\omega_4^2\omega_1u^2 + \\
& \frac{1}{2}\omega_3^2c_s^2\omega_2 - \frac{3}{4}\omega_4\omega_1u\omega_2 - \frac{3}{4}v^2\omega_4\omega_2^2 + \frac{1}{2}\omega_3\omega_4u^2\omega_2^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \frac{1}{2}\omega_4\omega_1u^2\omega_2 + \frac{9}{4}\omega_3\omega_1\omega_2 + \frac{1}{2}\omega_3u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l,y}^{[\mu_4],t-3\delta_t} = & 3 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{3}{4}\omega_4\omega_1 - \frac{15}{4}\omega_3 + 2\omega_4\omega_1u^2\omega_2 - \frac{15}{4}\omega_3\omega_4\omega_2 + \frac{1}{4}\omega_3^2\omega_1\omega_2 + \omega_3\omega_4\omega_1u - \\
& \frac{1}{2}\omega_1\omega_2^2 + \omega_3\omega_4\omega_1\omega_2^2 + 2\omega_3\omega_1u^2\omega_2 + \omega_3^2u + \omega_3\omega_4u^2\omega_2 + 6\omega_3\omega_4u + \frac{1}{2}\omega_3^2\omega_1u - \frac{1}{2}\omega_4\omega_1^2\omega_2 - v^2\omega_4\omega_1\omega_2 - 2\omega_4\omega_1u^2 + \\
& \frac{13}{4}\omega_3\omega_4 + \frac{1}{2}\omega_4^2u^2 + 3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_1\omega_2 + \frac{1}{2}\omega_3^2\omega_2 + \frac{1}{2}\omega_3\omega_1^2u - \frac{1}{2}v^2\omega_3^2\omega_2 - \omega_3\omega_1^2u^2 - \frac{3}{4}\omega_4\omega_1\omega_2 + \frac{7}{4}\omega_3\omega_1 - \\
& \frac{1}{2}\omega_4^2\omega_2 + \omega_3\omega_4^2\omega_1\omega_2 + v^2\omega_4\omega_1\omega_2^2 - \frac{1}{2}\omega_3\omega_4^2 - \frac{11}{4}\omega_4 - \frac{7}{2}\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_4\omega_1\omega_2^2 + \omega_4^2u + \frac{1}{2}v^2\omega_3\omega_1\omega_2 + 3\omega_3\omega_4\omega_1\omega_2^2 - \\
& 7\omega_3\omega_4\omega_1\omega_2 + 2\omega_1\omega_2 - \frac{1}{2}\omega_3^2\omega_1\omega_2 - \omega_3^2\omega_2 + \frac{1}{2}\omega_3^2\omega_1u^2 + \frac{1}{2}\omega_3\omega_1u^2 + \omega_3\omega_4u^2 + \frac{1}{2}\omega_4\omega_1\omega_2 + 5\omega_1u + \omega_1^2\omega_2 + \\
& \frac{1}{2}v^2\omega_4^2\omega_2 - \omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_3\omega_4\omega_2^2 - \frac{1}{2}\omega_3^2\omega_1u^2\omega_2 - \omega_3\omega_4u^2\omega_2 - \omega_3\omega_4\omega_1\omega_2^2 - \frac{1}{2}\omega_3^2u^2\omega_2 - \frac{1}{2}\omega_3\omega_1\omega_2^2 - \\
& \omega_1^2u - \frac{1}{2}v^2\omega_4^2 - \frac{1}{2}\omega_4^2\omega_1u^2\omega_2 + \frac{1}{2}\omega_4^2\omega_1u + v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3\omega_1\omega_2 - \omega_3\omega_2^2 - 3\omega_3\omega_4\omega_1u^2\omega_2 - 2\omega_1^2u^2\omega_2 - \frac{1}{2}\omega_4\omega_1\omega_2^2 -
\end{aligned}$$

$$\begin{aligned}
& 2w_3w_1u^2 - w_3^2w_4u^2 + 3w_3uw_2 + \frac{3}{4}w_3w_4^2uw_2 - \frac{1}{4}w_3^2w_1 + \frac{13}{4}w_4w_2 + v^2w_3w_2^2 - \frac{3}{4}w_3w_4w_1 + v^2w_3w_1w_2 + \frac{1}{2}w_3w_1w_2^2 - \\
& 6w_1uw_2 + w_2^2 - 4w_2 - \frac{5}{2}w_4u + \frac{1}{2}w_4w_1^2u + \frac{1}{2}w_3^2w_4w_2 - \frac{9}{4}w_3w_1w_2 + w_1uw_2^2 + w_4w_1^2u^2w_2 - \frac{1}{2}w_3^2w_4 - w_4w_1^2u^2 - \\
& \frac{3}{2}w_3^2w_4u - \frac{7}{2}w_3w_1u + w_3w_1^2u^2w_2 - \frac{1}{2}w_3uw_2^2 - \frac{1}{2}w_4w_2^2 + \frac{1}{2}v^2w_4^2w_1 - v^2w_3w_2 - v^2w_3w_1w_2^2 + \frac{3}{4}w_3^2 + 2w_1^2u^2 - w_4^2uw_2 + \\
& \frac{1}{2}w_4^2w_1u^2 - \frac{1}{2}v^2w_4^2w_1w_2 + \frac{1}{2}w_3w_4^2w_2 + 4w_4w_1uw_2 - v^2w_4w_2^2 + \frac{19}{4}w_3w_2 - \frac{3}{2}w_3w_4^2u + \frac{3}{2}w_3^2w_4uw_2 + 4w_3w_1uw_2 - \frac{5}{2}w_3u,
\end{aligned}$$

$$\begin{aligned}
& \alpha_{x,y+\delta_1}^{[\mu_1,t-\delta t]} = -2 + \frac{1}{2}v^2\omega_3^2\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_4c_s^2 - \frac{5}{2}\omega_3c_s^2\omega_2 + 2vw_4 + 6\omega_1u^2 - \frac{1}{2}\omega_4^2u^2\omega_2 + v^2\omega_3\omega_1^2u^2\omega_2 - \frac{3}{4}v^2\omega_3\omega_1^2 \\
& \frac{7}{3}w_4\omega_1 + \frac{1}{2}\omega_3 + \frac{13}{4}\omega_4\omega_1u^2\omega_2 + v^3\omega_3^2\omega_1\omega_2 + \frac{11}{4}vw_4^2\omega_1u^2 - \frac{3}{4}vw_3^2\omega_4c_s^2\omega_1 - \frac{3}{4}vw_3\omega_2 + \frac{3}{4}v\omega_4^2\omega_1 + \frac{7}{2}\omega_3c_s^2\omega_1\omega_2 - \\
& \frac{3}{2}vw_3^2\omega_4\omega_1u^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1^2 + \frac{15}{4}\omega_3\omega_1u^2\omega_2 + 2v^2\omega_3c_s^2\omega_2^2 - 3v^2\omega_3\omega_4c_s^2\omega_2 + v^2\omega_4\omega_1^2u^2\omega_2 - \omega_1^2 + \frac{1}{4}v^2\omega_3\omega_4 \\
& + v\omega_3c_s^2\omega_1^2\omega_2 + \frac{1}{2}v^3\omega_3\omega_2^2 + w_4\omega_1^2u^4 + w_3^2\omega_4c_s^2u^2\omega_2 - v^2\omega_3^2\omega_4c_s^2\omega_1 - \frac{1}{2}\omega_3^2\omega_1u^4\omega_2 + \frac{9}{4}v^2\omega_4\omega_1\omega_2 + \frac{1}{2}v^3\omega_3\omega_1^2\omega_2 + \\
& 2v^2\omega_2 - v^2\omega_3^2\omega_4\omega_1u^2 + \frac{3}{2}vw_4\omega_1^2u^2\omega_2 + v^2\omega_3\omega_1^2u^2 - vw_3\omega_4c_s^2\omega_2 + 3v^2\omega_3\omega_4c_s^2\omega_1\omega_2 - \frac{33}{4}vw_4\omega_1u^2 + \frac{1}{2}\omega_3\omega_4c_s^2 - \\
& \frac{1}{4}v^3\omega_3^2\omega_1 - \frac{3}{2}v^3\omega_4\omega_2 - \frac{1}{4}\omega_3\omega_4 + \frac{5}{4}\omega_4^2u^2 + 4\omega_3c_s^2 + \frac{1}{2}\omega_4^2\omega_1u^4\omega_2 - \frac{1}{2}vw_3^2\omega_3^2 + v^2\omega_3^2 - \frac{1}{2}\omega_4^2\omega_1u^4 + \frac{5}{4}vw_3\omega_1\omega_2 - \\
& \frac{9}{2}vw_3\omega_4c_s^2 - vw_4\omega_1^2u^2 + \frac{1}{2}v^3\omega_4\omega_1\omega_2^2 + \frac{3}{2}vw_3\omega_1^2u^2\omega_2 - \omega_3^2\omega_4c_s^2u^2 + \frac{1}{4}\omega_3\omega_1^2 - \frac{5}{4}v^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_3\omega_2 - \frac{5}{2}vw_4\omega_1^2\omega_2 + \\
& \frac{1}{2}v^4\omega_2^2 - vw_3^2\omega_3^2\omega_2 - 2v^2\omega_3 - \frac{3}{2}vw_3\omega_2^2\omega_1u^2 + \frac{5}{4}\omega_3u^2\omega_2 - 2vw_3\omega_4\omega_1u^2\omega_2 - \frac{3}{2}vw_3\omega_4^2c_s^2\omega_1 + \frac{1}{4}\omega_3\omega_1^2u^2 + \\
& v^2\omega_3\omega_4c_s^2 + 2v^3\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2 - \frac{3}{4}\omega_3\omega_1 + vw_3\omega_4c_s^2\omega_1\omega_2 + \frac{1}{4}v^2\omega_4\omega_1^2 + \frac{1}{2}vw_4\omega_1^2u^2 + 4v^2\omega_1\omega_2^2 - \frac{1}{4}vw_3\omega_1 + \\
& \frac{1}{4}vw_4\omega_2 - 3v^2\omega_1\omega_2 + v^2\omega_3^2c_s^2\omega_1\omega_2 - 3\omega_1u^2\omega_2 - v^4\omega_3\omega_1\omega_2^2 - \frac{1}{2}vw_3^2\omega_4u^2 - \frac{1}{2}v^2\omega_4\omega_1\omega_2^2 - 5vw_3\omega_1u^2 + \frac{3}{2}\omega_4 - \\
& \frac{1}{2}v^3\omega_4\omega_2^2 + \frac{1}{2}vw_3\omega_4\omega_1 - v^2\omega_3u^2\omega_2^2 + v^2\omega_3\omega_4u^2\omega_2 + \frac{1}{4}v^2\omega_3\omega_4\omega_2 + \frac{1}{4}v^2\omega_3^2\omega_1\omega_2 + \frac{25}{4}vw_3\omega_4\omega_1u^2 - \frac{1}{2}v^4\omega_4^2\omega_1\omega_2 + \\
& v\omega_3^2c_s^2\omega_1\omega_2 + \frac{7}{2}vw_3\omega_4c_s^2\omega_1 - \omega_4\omega_1^2u^4\omega_2 - \frac{3}{2}\omega_1\omega_2 + \frac{1}{4}v^3\omega_3^2 - \omega_3\omega_2^2c_s^2u^2 + \omega_3^2c_s^2\omega_1 - vw_3\omega_4\omega_1^2u^2 + \frac{3}{2}\omega_3^2u^2 - \\
& \frac{1}{2}v^2\omega_4^2u^2\omega_2 + 3\omega_1 + 2vw_3\omega_4u^2\omega_2 + \frac{3}{2}\omega_3^2\omega_1u^2 + v^2\omega_3^2\omega_4c_s^2 + \frac{19}{4}vw_3\omega_4u^2 + \frac{3}{2}v^3\omega_3\omega_2 + \frac{1}{4}v^3\omega_4^2\omega_1 - v^2\omega_3\omega_4^2\omega_1u^2 - \\
& v^2\omega_3\omega_4^2c_s^2\omega_1 + \omega_3\omega_1^2u^4\omega_2 - \frac{3}{4}vw_4^2 + \frac{1}{2}v^2\omega_4^2\omega_2 + \frac{11}{4}v^2\omega_3\omega_1 + 2\omega_3c_s^2\omega_1^2u^2\omega_2 + \frac{1}{4}\omega_4\omega_1^2 - \frac{1}{2}v^4\omega_3^2\omega_2 + vw_3^2\omega_2^2 - \\
& \frac{1}{2}vw_1^2\omega_2 - \frac{7}{2}vw_3\omega_4u^2 - \frac{1}{4}w_4^2 + \frac{1}{2}w_1^2\omega_2 - vw_3c_s^2\omega_2^2 + \frac{1}{2}vw_4\omega_1^2 - \frac{1}{4}\omega_3^2\omega_1u^2\omega_2 - \frac{7}{4}vw_3\omega_4u^2\omega_2 - \frac{1}{2}vw_3\omega_4\omega_1^2u^2 - \\
& \omega_3^2c_s^2\omega_1u^2\omega_2 - v^3\omega_4^2\omega_1\omega_2 + \frac{1}{2}vw_3\omega_1u^2\omega_2^2 - v^3\omega_3^2\omega_2 + vw_3c_s^2\omega_1\omega_2^2 + \frac{11}{2}vw_3\omega_4c_s^2\omega_1 + \frac{1}{2}v^2\omega_4^2\omega_1u^2 - \\
& \frac{3}{2}\omega_3\omega_4^2u^2 + \omega_3\omega_4^2c_s^2\omega_1u^2\omega_2 + \frac{25}{2}vw_3\omega_4\omega_1u^2 - \frac{3}{4}\omega_3^2\omega_1u^2\omega_2 - 2\omega_3u^2 - \frac{1}{2}\omega_3^2c_s^2\omega_1\omega_2 + \frac{1}{2}vw_3^2\omega_3^2u^2 - 2\omega_3c_s^2\omega_1^2u^2 - \\
& \frac{3}{4}v^2\omega_4^2 - \omega_3\omega_4c_s^2\omega_1\omega_2 + v^2\omega_3\omega_4^2u^2\omega_2 - \omega_3\omega_1^2u^4 + \frac{1}{2}vw_4\omega_1u^2\omega_2^2 + \frac{9}{2}vw_3\omega_4u^2 + \frac{11}{4}vw_3^2\omega_1u^2 - \frac{7}{4}v^2\omega_4\omega_2 - \\
& v^2\omega_3^2\omega_1 + \frac{1}{2}vw_3^2c_s^2\omega_1 + \frac{3}{2}vw_1\omega_2 - \frac{3}{2}\omega_3\omega_4\omega_1u^2\omega_2 - \omega_1^2u^2\omega_2 + vw_3\omega_4^2u^2\omega_2 - \frac{35}{4}\omega_3\omega_1u^2 - \frac{3}{2}\omega_3^2\omega_4u^2 + v^2\omega_4\omega_1u^2 + \\
& 10vw_1u^2\omega_2 - v^2\omega_4\omega_1u^2\omega_2^2 - v^2\omega_3^2c_s^2\omega_2 - \frac{11}{2}\omega_3c_s^2\omega_1 - \frac{1}{2}\omega_3\omega_4^2c_s^2\omega_1 - v^4\omega_4\omega_2^2 - \frac{1}{2}\omega_4\omega_2 - \frac{1}{2}v^2\omega_3\omega_2^2 + \\
& \frac{1}{4}\omega_3\omega_4\omega_1 + \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4^2\omega_1u^2 - \frac{1}{2}v^3\omega_4\omega_1^2\omega_2 - vw_3\omega_1^2u^2 - \frac{1}{2}v^3\omega_3\omega_1\omega_2^2 - \frac{1}{2}vw_3\omega_1 - v^2\omega_3\omega_1u^2\omega_2^2 + \\
& v^2\omega_1^2\omega_2 - \frac{5}{2}vw_3u^2\omega_2 + \omega_2 - 2v^2\omega_3c_s^2\omega_1\omega_2^2 - 3\omega_3\omega_4c_s^2\omega_1u^2\omega_2 + \frac{1}{2}\omega_3^2\omega_1u^4 - \frac{1}{4}vw_4\omega_1\omega_2 - v^2\omega_3\omega_4\omega_1u^2 - \\
& 2v^3\omega_3\omega_1\omega_2 - vw_2 - \frac{1}{4}v^2\omega_3\omega_4\omega_1 - \frac{1}{2}v^2\omega_4\omega_1^2\omega_2 + \frac{1}{2}vw_3u^2\omega_2^2 + \frac{1}{2}vw_3\omega_1^2 + \omega_3\omega_4c_s^2\omega_2 + v^2\omega_3^2\omega_4u^2\omega_2 - \omega_4u^2 - \\
& \omega_3^2c_s^2 + \frac{1}{2}\omega_3^2c_s^2\omega_2 + \frac{1}{4}\omega_4u^2\omega_2 - \frac{1}{4}v^3\omega_4^2 + v^3\omega_4^2\omega_2 - 3\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_4\omega_1^2u^2 - \frac{1}{2}vw_3\omega_4 - \frac{1}{2}vw_3\omega_1^2\omega_2 - \frac{1}{2}\omega_3\omega_1^2u^2\omega_2 - \\
& v^2\omega_4u^2\omega_2^2 + \frac{3}{2}\omega_3c_s^2\omega_1^2 + \frac{1}{4}vw_3^2 + \frac{1}{4}vw_4^2u^2 - 2vw_1u^2\omega_2^2 + \frac{3}{4}v^2\omega_4^2\omega_1 - \frac{1}{4}v^2\omega_3\omega_2 + v^4\omega_4\omega_1\omega_2^2 - \frac{1}{4}v^2\omega_3\omega_4\omega_1\omega_2 - \\
& 5vw_4\omega_1u^2 + \frac{1}{2}v^2\omega_3\omega_1\omega_2^2 + \frac{3}{2}vw_3\omega_4^2c_s^2 - \frac{1}{2}v^2\omega_3^2u^2\omega_2 + v^2\omega_4 + 2\omega_1^2u^2 - 6vw_4\omega_1u^2\omega_2 + \frac{5}{4}\omega_4^2\omega_1u^2 - \\
& \frac{1}{2}v^2\omega_4^2\omega_1\omega_2 + \frac{1}{2}v^4\omega_3^2\omega_1\omega_2 + v^4\omega_3\omega_2^2 + \omega_3^2c_s^2\omega_1u^2 - \frac{1}{4}vw_3\omega_4\omega_1\omega_2 + \frac{1}{2}v^2\omega_4\omega_2^2 + \frac{1}{4}\omega_4^2\omega_1 - 4v^2\omega_1^2u^2\omega_2 + \\
& \frac{1}{4}vw_3^2\omega_2 - \frac{5}{2}vw_4\omega_1 + vw_4^2u^2\omega_2 - \omega_3c_s^2\omega_1^2\omega_2 + 3\omega_3\omega_4c_s^2\omega_1u^2 + 5vw_3c_s^2\omega_2 + \frac{3}{2}vw_3\omega_4c_s^2 + vw_3^2\omega_4u^2\omega_2 - \\
& 6vw_3\omega_1u^2\omega_2 - \frac{1}{4}vw_3^2\omega_1\omega_2 - vw_3\omega_4c_s^2\omega_1^2 + \frac{1}{4}vw_3\omega_4\omega_2 - 6vw_3c_s^2\omega_1\omega_2 - \frac{1}{2}\omega_3^2\omega_4\omega_1u^2 - \frac{1}{2}\omega_3^2\omega_4c_s^2\omega_1,
\end{aligned}$$

$$\begin{aligned} \alpha_{x,y+\delta_1}^{[\mu_4],t-3\delta t} = & 3 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 - \frac{5}{2}v\omega_4 + \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{1}{4}\omega_3^2\omega_2 + \frac{13}{4}\omega_4\omega_1 - \frac{15}{4}\omega_3 - \omega_4\omega_1u^2\omega_2 + v^2\omega_3^2\omega_4\omega_1 - \frac{3}{4}\omega_3\omega_4\omega_2 + \\ & \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{7}{2}v\omega_3\omega_2 - v\omega_4^2\omega_1 + \omega_3\omega_1u^2\omega_2 + \omega_1^2 + v^2\omega_3\omega_4 - 2v^2\omega_1\omega_2^2 + \frac{1}{2}v\omega_4\omega_2^2 + v^2\omega_3\omega_4^2\omega_1 + 2v^2\omega_4\omega_1\omega_2 + \\ & \frac{1}{2}\omega_3\omega_1^2\omega_2 + v\omega_3\omega_4\omega_1^2 + \omega_4\omega_1u^2 + \frac{13}{4}\omega_3\omega_4 - \frac{1}{2}\omega_4^2u^2 + \frac{1}{2}v^2\omega_3^2 + 4v\omega_3\omega_1\omega_2 - \frac{3}{2}v\omega_3^2\omega_4 - \omega_3\omega_1^2 + \frac{1}{2}v^2\omega_3^2\omega_2 + \\ & \omega_3\omega_1^2u^2 - \frac{1}{2}v\omega_3\omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_4^2\omega_1 - \frac{3}{4}\omega_4\omega_1\omega_2 + \frac{19}{4}\omega_3\omega_1 - v\omega_3^2\omega_1 - \frac{7}{2}v\omega_4\omega_2 + 2v^2\omega_2^2 + v^2\omega_4\omega_1\omega_2^2 - \frac{1}{2}\omega_3\omega_4^2 - \\ & \frac{11}{4}\omega_4 - 7v\omega_3\omega_4\omega_1 - \frac{1}{2}v\omega_4\omega_1^2\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_1 + 3v^2\omega_3\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1\omega_2 + 2\omega_1\omega_2 + \frac{1}{2}v\omega_3\omega_2^2 + \frac{1}{2}\omega_3^2u^2 - 4\omega_1 - \\ & \frac{1}{2}\omega_3^2\omega_1u^2 - v^2\omega_3\omega_4^2 - \frac{1}{2}v\omega_4^2\omega_1\omega_2 + v\omega_4^2 + \frac{1}{2}v^2\omega_4^2\omega_2 - \frac{1}{2}\omega_4\omega_1^2 + v\omega_1^2\omega_2 + \frac{1}{2}\omega_4^2 - \frac{1}{2}\omega_1^2\omega_2 - \frac{1}{2}v\omega_4\omega_1^2 + \frac{1}{2}\omega_3^2\omega_1u^2\omega_2 - \\ & \frac{1}{2}\omega_3^2u^2\omega_2 + \frac{1}{2}v^2\omega_4^2 - \frac{1}{2}\omega_4^2\omega_1u^2\omega_2 + \frac{3}{2}v\omega_3^2\omega_4\omega_1 - 2v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1 - 6v\omega_1\omega_2 - \omega_3\omega_1u^2 - \frac{3}{2}v\omega_3\omega_4^2 - \frac{5}{2}v\omega_3 - \\ & \frac{3}{4}\omega_3^2\omega_1 + \frac{3}{4}\omega_4\omega_2 - v^2\omega_3\omega_2^2 - \frac{15}{4}\omega_3\omega_4\omega_1 + 2v^2\omega_3\omega_1\omega_2 - v\omega_2^2 + 3v\omega_3\omega_1 + \frac{1}{2}v\omega_4^2\omega_2 - \frac{3}{2}\omega_2 + \frac{3}{2}v\omega_3\omega_4^2\omega_1 + 4v\omega_4\omega_1\omega_2 + \\ & 5v\omega_2 - v^2\omega_3\omega_4\omega_1 - \frac{9}{4}\omega_3\omega_1\omega_2 - \frac{1}{2}v\omega_3\omega_1^2 + \omega_4\omega_1^2u^2\omega_2 - \frac{1}{2}\omega_3^2\omega_4 - \frac{1}{2}v\omega_4\omega_1\omega_2^2 - \omega_4\omega_1^2u^2 + 6v\omega_3\omega_4 - \frac{1}{2}v\omega_3\omega_1^2\omega_2 - \\ & \omega_3\omega_1^2u^2\omega_2 + v\omega_3^2 - \frac{1}{2}v^2\omega_4^2\omega_1 - 2v^2\omega_3\omega_2 - 3v^2\omega_3\omega_4\omega_1\omega_2 + v^2\omega_3\omega_1\omega_2^2 + \frac{3}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_4\omega_1^2 + \frac{1}{2}\omega_4^2\omega_1u^2 - \frac{1}{2}v^2\omega_4^2\omega_1\omega_2 + \\ & v\omega_1\omega_2^2 - v\omega_3\omega_4\omega_1\omega_2 - v^2\omega_4\omega_2^2 + \frac{7}{4}\omega_3\omega_2 - \frac{1}{2}\omega_4^2\omega_1 + \frac{1}{2}v\omega_3^2\omega_2 + 3v\omega_4\omega_1 - \frac{1}{2}v\omega_3^2\omega_1\omega_2 + v\omega_3\omega_4\omega_2 - v^2\omega_3^2\omega_4, \end{aligned}$$

$$\alpha_{x,y}^{[\mu_1],t=4\delta_t} = 2 + \frac{1}{2}\omega_3\omega_4\omega_1\omega_2 - \omega_3^2\omega_4c_s^2 + 5\omega_3c_s^2\omega_2 - \omega_3\omega_4^2\omega_1u^2\omega_2 - 8\omega_1u^2 + \frac{3}{2}\omega_4^2u^2\omega_2 - \omega_3\omega_4^2c_s^2\omega_1\omega_2 + \frac{1}{2}v^2\omega_3\omega_1^2 + 3\omega_4\omega_1 - \frac{1}{2}\omega_3 + \omega_3\omega_4^2c_s^2\omega_2 - 13\omega_4\omega_1u^2\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_2 - 6\omega_3c_s^2\omega_1\omega_2 + \omega_3\omega_4c_s^2\omega_1^2 - 13\omega_3\omega_1u^2\omega_2 - 3\omega_2^2\omega_4u^2\omega_2 + \omega_1^2 - 2\omega_1u^2\omega_2^2 - v^2\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1^2\omega_2 + \frac{23}{2}\omega_4\omega_1u^2 - \omega_3\omega_4^2c_s^2 + \frac{1}{2}\omega_3\omega_4 - \frac{3}{2}\omega_4^2u^2 - 4\omega_3c_s^2 -$$

$$\begin{aligned}
& \frac{3}{2}v^2\omega_3^2 + \frac{1}{2}\omega_3u^2\omega_2^2 + \frac{1}{2}\omega_4\omega_1\omega_2^2 - \frac{1}{2}\omega_3\omega_1^2 + \frac{5}{2}v^2\omega_3^2\omega_2 + 2v^2\omega_3 - \frac{5}{2}\omega_3u^2\omega_2 + \frac{1}{2}\omega_3\omega_1^2u^2 - \frac{7}{2}\omega_4\omega_1\omega_2 - \\
& \frac{1}{2}v^2\omega_3\omega_1^2\omega_2 + \omega_3\omega_1 - \frac{1}{2}\omega_4^2\omega_2 - \frac{1}{2}v^2\omega_4\omega_1^2 - 3\omega_3\omega_4^2u^2\omega_2 - \omega_3\omega_4\omega_1^2u^2\omega_2 + 10\omega_1u^2\omega_2 - \frac{3}{2}v^2\omega_4\omega_1\omega_2^2 - \frac{5}{2}\omega_4 + \\
& \omega_3^2\omega_4c_s^2\omega_2 - \frac{3}{2}v^2\omega_3^2\omega_1\omega_2 - 12\omega_3\omega_4\omega_1u^2 - 6\omega_3\omega_4c_s^2\omega_1 + 3\omega_1\omega_2 + \omega_3c_s^2\omega_1\omega_2^2 - \omega_3^2c_s^2\omega_1 - \frac{3}{2}\omega_3^2u^2 - 3\omega_1 + \\
& \frac{3}{2}\omega_3\omega_1u^2\omega_2^2 - \frac{5}{2}\omega_3^2\omega_1u^2 - 7\omega_3\omega_4u^2 - \omega_3c_s^2\omega_2^2 - \omega_3\omega_4c_s^2\omega_1\omega_2 + \frac{3}{2}\omega_4\omega_1u^2\omega_2^2 - \frac{3}{2}v^2\omega_4^2\omega_2 - \frac{5}{2}v^2\omega_3\omega_1 - \frac{1}{2}\omega_4\omega_1^2 + \\
& \frac{1}{2}\omega_4^2 - \omega_1^2\omega_2 + \frac{5}{2}\omega_3^2\omega_1u^2\omega_2 + 8\omega_3\omega_4u^2\omega_2 + \omega_3\omega_4\omega_1^2u^2 + \frac{1}{2}\omega_4^2\omega_1\omega_2 + 3\omega_3\omega_4^2u^2 + \frac{3}{2}\omega_3^2u^2\omega_2 + 2\omega_3u^2 + \omega_3^2c_s^2\omega_1\omega_2 + \\
& \frac{3}{2}v^2\omega_4^2 + 7\omega_3\omega_4c_s^2\omega_1\omega_2 + \frac{5}{2}\omega_4^2\omega_1u^2\omega_2 + \frac{1}{2}v^2\omega_4\omega_2 + \frac{3}{2}v^2\omega_3^2\omega_1 + \frac{1}{2}\omega_3\omega_2^2 + 13\omega_3\omega_4\omega_1u^2\omega_2 + 2\omega_1^2u^2\omega_2 + \\
& \frac{23}{2}\omega_3\omega_1u^2 + 3\omega_3^2\omega_4u^2 - \omega_3^2\omega_4c_s^2\omega_1\omega_2 + 5\omega_3c_s^2\omega_1 + \omega_3\omega_4^2c_s^2\omega_1 + 3\omega_4\omega_2 - \frac{3}{2}v^2\omega_3\omega_2^2 - \frac{1}{2}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4\omega_1^2\omega_2 + \\
& v^2\omega_3\omega_1\omega_2 + \omega_3\omega_4^2\omega_1u^2 - \omega_3^2\omega_4\omega_1u^2\omega_2 - \frac{1}{2}\omega_3\omega_1\omega_2^2 + \omega_3\omega_4c_s^2\omega_2^2 - 2\omega_2 + \frac{1}{2}\omega_4u^2\omega_2^2 + \frac{1}{2}v^2\omega_4\omega_1^2\omega_2 - \frac{1}{2}\omega_3\omega_1\omega_2 - \\
& \frac{1}{2}\omega_4\omega_1^2u^2\omega_2 - 6\omega_3\omega_4c_s^2\omega_2 + 2\omega_4u^2 + \omega_3^2c_s^2\omega_2 - \frac{5}{2}\omega_4u^2\omega_2 + 5\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_4\omega_1^2u^2 - \frac{1}{2}\omega_3\omega_1^2u^2\omega_2 - \\
& \omega_3c_s^2\omega_1^2 - \frac{1}{2}\omega_4\omega_2^2 - \frac{3}{2}v^2\omega_4^2\omega_1 - \frac{1}{2}v^2\omega_3\omega_2 + \frac{3}{2}v^2\omega_3\omega_1\omega_2^2 - \omega_3\omega_4c_s^2\omega_1\omega_2^2 - 2v^2\omega_4 - 2\omega_1^2u^2 - \frac{5}{2}\omega_4^2\omega_1u^2 + \\
& \frac{3}{2}v^2\omega_4^2\omega_1\omega_2 - \omega_3\omega_4\omega_1u^2\omega_2^2 + \frac{3}{2}v^2\omega_4\omega_2^2 - \frac{1}{2}\omega_4^2\omega_1 - \omega_3\omega_4u^2\omega_2^2 + \omega_3c_s^2\omega_1\omega_2 + \omega_3^2\omega_4\omega_1u^2 + \omega_3^2\omega_4c_s^2\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_4],t-4\delta_t} = & -4 - 8\omega_3\omega_4\omega_1\omega_2 + \omega_3^2\omega_2 - 6\omega_4\omega_1 + 5\omega_3 + 7\omega_3\omega_4\omega_2 - \omega_3^2\omega_1\omega_2 + \omega_1\omega_2^2 - \omega_1^2 - \omega_3\omega_1^2\omega_2 - 6\omega_3\omega_4 - \omega_4\omega_1\omega_2^2 + \\
& \omega_3\omega_1^2 - \omega_3\omega_4^2\omega_1 + 7\omega_4\omega_1\omega_2 - 6\omega_3\omega_1 + \omega_4^2\omega_2 + \omega_3\omega_4^2 + 5\omega_4 - \omega_3^2\omega_4\omega_1 - 6\omega_1\omega_2 + 5\omega_1 + \omega_3\omega_4\omega_1\omega_2^2 + \omega_4\omega_1^2 - \\
& \omega_4^2 - \omega_3\omega_4\omega_2^2 + \omega_1^2\omega_2 - \omega_4^2\omega_1\omega_2 + \omega_3^2\omega_4\omega_1\omega_2 + \omega_3\omega_2^2 + \omega_3^2\omega_1 - 6\omega_4\omega_2 + 7\omega_3\omega_4\omega_1 - \omega_4\omega_1^2\omega_2 - \omega_3\omega_1\omega_2^2 - \omega_2^2 + \\
& 5\omega_2 - \omega_3\omega_4\omega_2 + 7\omega_3\omega_1\omega_2 + \omega_3^2\omega_4 + \omega_3\omega_4^2\omega_1\omega_2 + \omega_4\omega_2^2 - \omega_3^2 - \omega_3\omega_4\omega_1^2 + \omega_3\omega_4\omega_1\omega_2^2 - \omega_3\omega_4^2\omega_2 - 6\omega_3\omega_2 + \omega_4\omega_1,
\end{aligned}$$

## 8.6 EFDE for $\mu_5$

$$\mu_{5,x,y}^{t+\delta_t} = \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_t, y+j\delta_t}^{[\mu_1], t-\ell\delta_t} \mu_{x+i\delta_t, y+j\delta_t}^{t-\ell\delta_t} + \sum_{\ell=0}^4 \sum_{i,j=-\ell-1}^{\ell+1} \alpha_{x+i\delta_t, y+j\delta_t}^{[\mu_5], t-\ell\delta_t} \mu_{5,x+i\delta_t, y+j\delta_t}^{t-\ell\delta_t},$$

where the non-zero coefficients are given by:

$$\begin{aligned}
\alpha_{x,y-\delta_t}^{[\mu_1],t} = & 1 + \frac{1}{2}v\omega_4 - \frac{1}{4}\omega_3 + v^2\omega_2 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_4 - \frac{1}{4}\omega_3u^2 + \frac{1}{2}v\omega_3 - \frac{1}{2}\omega_2 - \frac{1}{2}v\omega_2 + \frac{1}{4}\omega_4u^2 - \frac{1}{4}v^2\omega_4. \\
\alpha_{x,y+\delta_t}^{[\mu_1],t} = & 1 - \frac{1}{2}v\omega_4 - \frac{1}{4}\omega_3 + v^2\omega_2 + \frac{1}{2}\omega_3c_s^2 - \frac{1}{4}v^2\omega_3 - \frac{1}{4}\omega_4 - \frac{1}{4}\omega_3u^2 - \frac{1}{2}v\omega_3 - \frac{1}{2}\omega_2 + \frac{1}{2}v\omega_2 + \frac{1}{4}\omega_4u^2 - \frac{1}{4}v^2\omega_4. \\
\alpha_{x-\delta_t,y-\delta_t}^{[\mu_1],t-\delta_t} = & -1 + \frac{1}{8}\omega_4^2u^3 - \frac{1}{2}\omega_4\omega_1u^3 + \frac{1}{4}\omega_3c_s^2\omega_2 - \frac{1}{2}v\omega_4 - \omega_1u^2 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_3 - \frac{1}{4}v\omega_3\omega_2 - \frac{1}{8}\omega_3^2u - \frac{1}{8}v^2\omega_3\omega_4 + \\
& \frac{1}{4}\omega_3\omega_4u + \frac{1}{4}v\omega_3\omega_1u + \frac{3}{4}\omega_4\omega_1u^2 + \frac{1}{4}v^3\omega_4\omega_2 - \frac{1}{8}\omega_3\omega_4 - \frac{3}{8}\omega_4^2u^2 - \frac{1}{8}v^2\omega_3^2u - \frac{1}{2}\omega_3c_s^2 + \frac{1}{4}\omega_4u\omega_2 - \frac{1}{4}v\omega_3^2c_s^2 - \\
& \frac{1}{4}v\omega_3\omega_4c_s^2 - \frac{1}{4}v\omega_4u^2\omega_2 + \frac{1}{2}v^2\omega_3 - \frac{1}{8}\omega_3u^2\omega_2 - \frac{1}{2}v\omega_1u\omega_2 - \frac{1}{8}\omega_3^2u^3 - \frac{1}{4}v\omega_4\omega_2 + \frac{1}{2}v\omega_3\omega_2 + \frac{1}{2}\omega_1u^2\omega_2 - \\
& \frac{1}{4}v\omega_3\omega_1u^2 + \frac{3}{4}\omega_4 + \frac{3}{8}\omega_4^2u - \frac{1}{4}\omega_1\omega_2 + \frac{1}{8}v^3\omega_3^2 - \frac{1}{8}v^2\omega_2^2u + \frac{1}{4}\omega_3^2u^2 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_3\omega_4u^2 - \frac{1}{4}v^3\omega_3\omega_2 + \frac{1}{4}v^2\omega_3\omega_4u + \\
& \frac{1}{2}\omega_1u + \frac{1}{8}v\omega_2^2 - \frac{1}{8}\omega_4^2 + \frac{1}{4}\omega_3u^2 + \frac{1}{2}\omega_3\omega_1u^3 + \frac{1}{8}v\omega_3^2u^2 + \frac{1}{8}v^2\omega_4^2 + \frac{1}{4}v\omega_3\omega_4u^2 + \frac{1}{8}v^2\omega_4\omega_2 - \frac{1}{2}v\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u^2 + \\
& v\omega_1u^2\omega_2 + \frac{1}{4}\omega_3u\omega_2 - \frac{1}{4}v\omega_4^2u - \frac{1}{2}v\omega_3 - \frac{1}{8}\omega_4\omega_2 + \frac{1}{4}v\omega_4u\omega_1 - \frac{1}{4}\omega_1u\omega_2 + \frac{1}{4}v\omega_3\omega_1 - \frac{1}{4}v\omega_3u^2\omega_2 + \frac{1}{2}\omega_2 - \omega_4u + \\
& v\omega_2 + \frac{1}{4}\omega_4u^2 - \frac{1}{8}\omega_4u^2\omega_2 - \frac{1}{8}v^3\omega_4^2 + \frac{1}{4}\omega_3\omega_4c_s^2 + \frac{1}{4}v\omega_3\omega_4 - \frac{1}{4}\omega_3\omega_1u + \frac{1}{8}v\omega_3^2 + \frac{1}{8}v\omega_4^2u^2 - \frac{1}{4}\omega_3\omega_4c_s^2u + \\
& \frac{1}{4}\omega_3^2c_s^2u + \frac{1}{2}v\omega_4u\omega_2 - \frac{1}{8}v^2\omega_3\omega_2 - \frac{1}{2}v\omega_4\omega_1u^2 - \frac{1}{4}v\omega_3^2u - \frac{1}{4}v^2\omega_4 - \frac{1}{2}v\omega_3\omega_4u - \frac{1}{8}\omega_3\omega_2 + \frac{1}{4}v\omega_4\omega_1 + \frac{1}{2}v\omega_3c_s^2\omega_2, \\
\alpha_{x-\delta_t,y-\delta_t}^{[\mu_5],t-\delta_t} = & 1 + v\omega_4 + \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}v\omega_3\omega_2 - \frac{1}{2}v\omega_3\omega_1u - \frac{1}{2}\omega_4\omega_1u^2 + \frac{1}{4}\omega_4^2u^2 - \frac{1}{4}\omega_4u\omega_2 - \frac{1}{4}v^2\omega_3^2 + v\omega_1u\omega_2 + \\
& \frac{1}{4}v\omega_4\omega_2 - \frac{1}{2}v\omega_3\omega_2 - \omega_4 + \frac{1}{4}\omega_4\omega_1u - \frac{1}{2}\omega_4^2u + \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}\omega_3^2u^2 - \frac{1}{2}\omega_1 - \omega_1u - \frac{1}{2}v\omega_4^2 + \frac{1}{4}\omega_4^2 + \frac{1}{4}v^2\omega_4^2 - \\
& \frac{1}{2}v^2\omega_4\omega_2 + \frac{1}{2}v\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1u^2 - \frac{1}{4}\omega_3\omega_2 + \frac{1}{2}v\omega_4^2u + \frac{1}{4}\omega_4\omega_2 - \frac{1}{2}v\omega_4\omega_1u + \frac{1}{2}\omega_1u\omega_2 - \frac{1}{4}v\omega_3\omega_1 - \frac{1}{2}\omega_2 + \\
& \omega_4u - v\omega_2 + \frac{1}{4}\omega_3\omega_1u - \frac{1}{2}v\omega_4\omega_2 + \frac{1}{2}v^2\omega_3\omega_2 + \frac{1}{2}v\omega_3^2u - \frac{1}{4}v\omega_4\omega_1, \\
\alpha_{x,y-\delta_t}^{[\mu_1],t-\delta_t} = & -1 - \omega_3c_s^2\omega_2 - \frac{1}{2}v\omega_4 + 2\omega_1u^2 + \frac{1}{4}\omega_3 - 2v^3\omega_2^2 + \frac{1}{4}v^2\omega_3\omega_4 + 2v^2\omega_2 - \frac{1}{2}\omega_4\omega_1u^2 + v^3\omega_4\omega_2 + 2\omega_3c_s^2 + \\
& v\omega_3^2c_s^2 + \frac{1}{4}v^2\omega_3^2 + v\omega_3\omega_4c_s^2 - v^2\omega_3 + \frac{1}{2}\omega_3u^2\omega_2 - \omega_1u^2\omega_2 - v^2\omega_2^2 + v\omega_3\omega_1u^2 + \frac{1}{4}\omega_4 - \frac{1}{2}v^3\omega_3^2 + \frac{1}{4}\omega_3^2u^2 + \\
& \frac{1}{4}\omega_3\omega_4u^2 + 2v^3\omega_3\omega_2 - \omega_3u^2 - \frac{1}{2}v\omega_3^2u^2 - \frac{1}{2}v\omega_3\omega_4u^2 - \frac{1}{2}v^2\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_1u^2 - 2v\omega_1u^2\omega_2 - \frac{1}{2}v\omega_3 - \\
& \frac{1}{2}v^3\omega_3\omega_4 + v\omega_3u^2\omega_2 + \frac{1}{2}\omega_2 + v\omega_2 - \frac{1}{2}\omega_3^2c_s^2 - \frac{1}{2}\omega_3\omega_4c_s^2 + v\omega_4\omega_1u^2 - 2v\omega_3c_s^2\omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_5],t-\delta_t} &= 1 + \frac{1}{2}vw_4 - \frac{5}{4}w_3 + \frac{1}{2}vw_3w_2 + v^2w_3w_4 + \frac{1}{4}w_3w_4 + v^2w_3^2 + \frac{1}{2}vw_4w_2 + 2v^2w_2^2 - \frac{1}{4}w_4 - v^2w_4w_2 + \frac{5}{2}vw_3 + \\
&\quad vw_2^2 - \frac{1}{2}w_2 - 3vw_2 - vw_3w_4 - vw_3^2 - 3v^2w_3w_2 + \frac{1}{4}w_3^2 + \frac{1}{2}w_3w_2, \\
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-\delta_t} &= -1 - \frac{1}{8}w_4^2u^3 + \frac{1}{2}w_4w_1u^3 + \frac{1}{4}w_3c_s^2w_2 - \frac{1}{2}vw_4 - w_1u^2 - \frac{1}{4}w_4w_1 + \frac{1}{4}w_3 - \frac{1}{4}vw_3w_2 + \frac{1}{8}w_3^2u - \frac{1}{8}v^2w_3w_4 - \\
&\quad \frac{1}{4}w_3w_4u - \frac{1}{4}vw_3w_1u + \frac{3}{4}w_4w_1u^2 + \frac{1}{4}v^3w_4w_2 - \frac{1}{8}w_3w_4 - \frac{3}{8}w_4^2u^2 + \frac{1}{8}v^2w_3^2u - \frac{1}{2}w_3c_s^2 - \frac{1}{4}w_4w_2 - \frac{1}{4}vw_3^2c_s^2 - \\
&\quad \frac{1}{4}vw_3w_4c_s^2 - \frac{1}{4}vw_4u^2w_2 + \frac{1}{4}v^2w_3 - \frac{1}{8}w_3u^2w_2 + \frac{1}{2}vw_1uw_2 + \frac{1}{8}w_3^2u^3 - \frac{1}{4}vw_4w_2 - \frac{1}{2}vw_3uw_2 + \frac{1}{2}w_1u^2w_2 - \\
&\quad \frac{1}{4}vw_3w_1u^2 + \frac{3}{4}w_4 - \frac{3}{8}w_4^2u - \frac{1}{4}w_1w_2 + \frac{1}{8}v^3w_3 + \frac{1}{8}v^2w_4^2u + \frac{1}{4}w_3^2u^2 + \frac{1}{2}w_1 - \frac{1}{8}w_3w_4u^2 - \frac{1}{4}v^3w_3w_2 - \frac{1}{4}v^2w_3w_4u - \\
&\quad \frac{1}{2}w_1u + \frac{1}{8}vw_4^2 - \frac{1}{8}w_4^2 + \frac{1}{4}w_3u^2 - \frac{1}{2}w_3w_1u^3 + \frac{1}{8}vw_3^2u^2 + \frac{1}{8}v^2w_4^2 + \frac{1}{4}vw_3w_4u^2 + \frac{1}{8}v^2w_4w_2 - \frac{1}{2}vw_1w_2 - \frac{1}{4}w_3w_1u^2 + \\
&\quad vw_1u^2w_2 - \frac{1}{4}w_3uw_2 + \frac{1}{4}v^2w_4u - \frac{1}{2}vw_3 - \frac{1}{8}w_4w_2 - \frac{1}{4}vw_4w_1u + \frac{1}{4}w_1uw_2 + \frac{1}{4}vw_3w_1 - \frac{1}{4}vw_3u^2w_2 + \frac{1}{2}w_2 + w_4u + \\
&\quad vw_2 + \frac{1}{4}w_4u^2 - \frac{1}{8}w_4u^2w_2 - \frac{1}{8}v^3w_4^2 + \frac{1}{4}w_3w_4c_s^2 + \frac{1}{4}vw_3w_4 + \frac{1}{4}w_3w_1u + \frac{1}{8}vw_3^2 + \frac{1}{8}vw_4^2u^2 + \frac{1}{4}w_3w_4c_s^2u - \\
&\quad \frac{1}{4}w_3^2c_s^2u - \frac{1}{2}vw_4uw_2 - \frac{1}{8}v^2w_3w_2 - \frac{1}{2}vw_4w_1u^2 + \frac{1}{4}vw_3^2u - \frac{1}{4}v^2w_4 + \frac{1}{2}vw_3w_4u - \frac{1}{8}w_3w_2 + \frac{1}{4}vw_4w_1 + \frac{1}{2}vw_3c_s^2w_2, \\
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_5],t-\delta_t} &= 1 + vw_4 + \frac{1}{4}w_4w_1 + \frac{1}{4}vw_3w_2 + \frac{1}{2}vw_3w_1u - \frac{1}{2}w_4w_1u^2 + \frac{1}{4}w_4^2u^2 + \frac{1}{4}w_4w_2 - \frac{1}{4}v^2w_3^2 - vw_1uw_2 + \\
&\quad \frac{1}{4}vw_4w_2 + \frac{1}{2}vw_3uw_2 - w_4 - \frac{1}{4}w_4w_1u + \frac{1}{2}w_2u + \frac{1}{4}w_1w_2 - \frac{1}{4}w_3^2u^2 - \frac{1}{2}w_1 + w_1u - \frac{1}{2}vw_4^2 + \frac{1}{4}w_4^2 + \frac{1}{4}v^2w_4^2 - \\
&\quad \frac{1}{2}v^2w_4w_2 + \frac{1}{2}vw_1w_2 + \frac{1}{2}w_3w_1u^2 + \frac{1}{4}w_3uw_2 - \frac{1}{2}vw_4^2u + \frac{1}{4}w_4w_2 + \frac{1}{2}vw_4w_1u - \frac{1}{2}w_1uw_2 - \frac{1}{4}vw_3w_1 - \frac{1}{2}w_2 - \\
&\quad w_4u - vw_2 - \frac{1}{4}w_3w_1u + \frac{1}{2}vw_4uw_2 + \frac{1}{2}v^2w_3w_2 - \frac{1}{2}vw_3^2u - \frac{1}{4}vw_4w_1, \\
\alpha_{x-\delta_l,y}^{[\mu_5],t-\delta_t} &= 1 - \frac{5}{4}w_3 - w_3^2u - w_3w_4u - w_4w_1u^2 + \frac{1}{4}w_3w_4 + \frac{1}{2}w_3w_1 - \frac{1}{4}w_4 + \frac{1}{2}w_4w_1u + w_3^2u^2 - \frac{1}{2}w_1 + w_3w_4u^2 - \\
&\quad 3w_1u + w_1^2u - 3w_3w_1u^2 + \frac{1}{2}w_4u + \frac{1}{2}w_3w_1u + \frac{1}{4}w_3^2 + 2w_1^2u^2 + \frac{5}{2}w_3u, \\
\alpha_{x,y}^{[\mu_1],t-\delta_t} &= -2 + w_3c_s^2w_2 + \frac{1}{2}w_3 + 2v^2w_3w_4 - 2v^2w_2 - w_3c_s^2 + v^2w_3^2 + \frac{1}{2}v^2w_3 - \frac{1}{2}w_3u^2w_2 + 4v^2w_2^2 + \frac{1}{2}w_4 + \\
&\quad \frac{1}{2}w_3u^2 + v^2w_4^2 - \frac{7}{2}v^2w_4w_2 - \frac{1}{2}w_4w_2 - w_2^2 + 3w_2 - \frac{1}{2}w_4u^2 + \frac{1}{2}w_4u^2w_2 - \frac{7}{2}v^2w_3w_2 + \frac{1}{2}v^2w_4 - \frac{1}{2}w_3w_2, \\
\alpha_{x,y}^{[\mu_5],t-\delta_t} &= 2 + w_1^2 - 2v^2w_3w_4 + 4w_4w_1u^2 - w_4^2u^2 - v^2w_3^2 - 4v^2w_2^2 - w_3^2u^2 - 2w_1 - 2w_3w_4u^2 - v^2w_4^2 + 4v^2w_4w_2 + \\
&\quad 4w_3w_1u^2 + w_2^2 - 2w_2 + 4v^2w_3w_2 - 4w_1^2u^2, \\
\alpha_{x+\delta_l,y}^{[\mu_5],t-\delta_t} &= 1 - \frac{5}{4}w_3 + w_3^2u + w_3w_4u - w_4w_1u^2 + \frac{1}{4}w_3w_4 + \frac{1}{2}w_3w_1 - \frac{1}{4}w_4 - \frac{1}{2}w_4w_1u + w_3^2u^2 - \frac{1}{2}w_1 + w_3w_4u^2 + \\
&\quad 3w_1u - w_1^2u - 3w_3w_1u^2 - \frac{1}{2}w_4u - \frac{1}{2}w_3w_1u + \frac{1}{4}w_3^2 + 2w_1^2u^2 - \frac{5}{2}w_3u, \\
\alpha_{x-\delta_l,y+\delta_l}^{[\mu_1],t-\delta_t} &= -1 + \frac{1}{8}w_4^2u^3 - \frac{1}{2}w_4w_1u^3 + \frac{1}{4}w_3c_s^2w_2 + \frac{1}{2}vw_4 - w_1u^2 - \frac{1}{4}w_4w_1 + \frac{1}{4}w_3 + \frac{1}{4}vw_3w_2 - \frac{1}{8}w_3^2u - \frac{1}{8}v^2w_3w_4 + \\
&\quad \frac{1}{4}w_3w_4u - \frac{1}{4}vw_3w_1u + \frac{3}{4}w_4w_1u^2 - \frac{1}{4}v^3w_4w_2 - \frac{1}{8}w_3w_4 - \frac{3}{8}w_4^2u^2 - \frac{1}{8}v^2w_3^2u - \frac{1}{2}w_3c_s^2 + \frac{1}{4}w_4w_2 + \frac{1}{4}vw_3^2c_s^2 + \\
&\quad \frac{1}{4}vw_3w_4c_s^2 + \frac{1}{4}vw_4u^2w_2 + \frac{1}{4}v^2w_3 - \frac{1}{8}w_3u^2w_2 + \frac{1}{2}vw_1uw_2 - \frac{1}{8}w_3^2u^3 + \frac{1}{4}vw_4w_2 - \frac{1}{2}vw_3uw_2 + \frac{1}{2}w_1u^2w_2 + \\
&\quad \frac{1}{4}vw_3w_1u^2 + \frac{3}{4}w_4 + \frac{3}{8}w_4^2u - \frac{1}{4}w_1w_2 - \frac{1}{8}v^3w_3 - \frac{1}{8}v^2w_4^2u + \frac{1}{4}w_3^2u^2 + \frac{1}{2}w_1 - \frac{1}{8}w_3w_4u^2 + \frac{1}{4}v^3w_3w_2 + \frac{1}{4}v^2w_3w_4u + \\
&\quad \frac{1}{2}w_1u - \frac{1}{8}vw_4^2 - \frac{1}{8}w_4^2 + \frac{1}{4}w_3u^2 + \frac{1}{2}w_3w_1u^3 - \frac{1}{8}vw_3^2u^2 + \frac{1}{8}v^2w_4^2 - \frac{1}{4}vw_3w_4u^2 + \frac{1}{8}v^2w_4w_2 + \frac{1}{2}vw_1w_2 - \frac{1}{4}w_3w_1u^2 - \\
&\quad vw_1u^2w_2 + \frac{1}{4}w_3uw_2 + \frac{1}{4}vw_4^2u + \frac{1}{2}vw_3 - \frac{1}{8}w_4w_2 - \frac{1}{4}vw_4w_1u - \frac{1}{4}w_1uw_2 - \frac{1}{4}vw_3w_1 + \frac{1}{4}vw_3u^2w_2 + \frac{1}{2}w_2 - w_4u - \\
&\quad vw_2 + \frac{1}{4}w_4u^2 - \frac{1}{8}w_4u^2w_2 + \frac{1}{8}v^3w_4^2 + \frac{1}{4}w_3w_4c_s^2 - \frac{1}{4}vw_3w_4 - \frac{1}{4}w_3w_1u - \frac{1}{8}vw_3^2 - \frac{1}{8}vw_4^2u^2 - \frac{1}{4}w_3w_4c_s^2u + \\
&\quad \frac{1}{4}w_3^2c_s^2u - \frac{1}{2}vw_4uw_2 - \frac{1}{8}v^2w_3w_2 + \frac{1}{2}vw_4w_1u^2 + \frac{1}{4}vw_3^2u - \frac{1}{4}v^2w_4 + \frac{1}{2}vw_3w_4u - \frac{1}{8}w_3w_2 - \frac{1}{2}vw_3c_s^2w_2, \\
\alpha_{x-\delta_l,y+\delta_l}^{[\mu_5],t-\delta_t} &= 1 - vw_4 + \frac{1}{4}w_4w_1 - \frac{1}{4}vw_3w_2 + \frac{1}{2}vw_3w_1u - \frac{1}{2}w_4w_1u^2 + \frac{1}{4}w_4^2u^2 - \frac{1}{4}w_4w_2 - \frac{1}{4}v^2w_3^2 - vw_1uw_2 - \\
&\quad \frac{1}{4}vw_4w_2 + \frac{1}{2}vw_3uw_2 - w_4 + \frac{1}{4}w_4w_1u - \frac{1}{2}w_2u + \frac{1}{4}w_1w_2 - \frac{1}{4}w_3^2u^2 - \frac{1}{2}w_1 - w_1u + \frac{1}{2}vw_4^2 + \frac{1}{4}w_4^2 + \frac{1}{4}v^2w_4^2 - \\
&\quad \frac{1}{2}v^2w_4w_2 - \frac{1}{2}vw_1w_2 + \frac{1}{2}w_3w_1u^2 - \frac{1}{4}w_3uw_2 - \frac{1}{2}vw_4^2u + \frac{1}{4}w_4w_2 + \frac{1}{2}vw_4w_1u + \frac{1}{2}w_1uw_2 + \frac{1}{4}vw_3w_1 - \frac{1}{2}w_2 + \\
&\quad w_4u + vw_2 + \frac{1}{4}w_3w_1u + \frac{1}{2}vw_4uw_2 + \frac{1}{2}v^2w_3w_2 - \frac{1}{2}vw_3^2u + \frac{1}{4}vw_4w_1, \\
\alpha_{x,y+\delta_l}^{[\mu_1],t-\delta_t} &= -1 - w_3c_s^2w_2 + \frac{1}{2}vw_4 + 2w_1u^2 + \frac{1}{4}w_3 + 2v^3w_2^2 + \frac{1}{4}v^2w_3w_4 + 2v^2w_2 - \frac{1}{2}w_4w_1u^2 - v^3w_4w_2 + 2w_3c_s^2 - \\
&\quad vw_2^2c_s^2 + \frac{1}{4}v^2w_3^2 - vw_3w_4c_s^2 - v^2w_3 + \frac{1}{2}w_3u^2w_2 - w_1u^2w_2 - v^2w_2^2 - vw_3w_1u^2 + \frac{1}{4}w_4 + \frac{1}{2}v^3w_3^2 + \frac{1}{4}w_3^2u^2 + \\
&\quad \frac{1}{4}w_3w_4u^2 - 2v^3w_3w_2 - w_3u^2 + \frac{1}{2}vw_3^2u^2 + \frac{1}{2}v^2w_3w_4u^2 - \frac{1}{2}w_3w_1u^2 + 2vw_1u^2w_2 + \frac{1}{2}vw_3 + \\
&\quad \frac{1}{2}v^3w_3w_4 - vw_3u^2w_2 + \frac{1}{2}w_2 - vw_2 - \frac{1}{2}w_3^2c_s^2 - \frac{1}{2}w_3w_4c_s^2 - vw_4w_1u^2 + 2vw_3c_s^2w_2, \\
\alpha_{x,y+\delta_l}^{[\mu_5],t-\delta_t} &= 1 - \frac{1}{2}vw_4 - \frac{5}{4}w_3 - \frac{1}{2}vw_3w_2 + v^2w_3w_4 + \frac{1}{4}w_3w_4 + v^2w_3^2 - \frac{1}{2}vw_4w_2 + 2v^2w_2^2 - \frac{1}{4}w_4 - v^2w_4w_2 - \frac{5}{2}vw_3 - \\
&\quad vw_2^2 - \frac{1}{2}w_2 + 3vw_2 + vw_3w_4 + vw_3^2 - 3v^2w_3w_2 + \frac{1}{4}w_3^2 + \frac{1}{2}w_3w_2,
\end{aligned}$$

$$\alpha_{x+\delta_1, y+\delta_1}^{[\mu_1], t-\delta_t} = -1 - \frac{1}{8}\omega_4^2 u^3 + \frac{1}{2}\omega_4\omega_1 u^3 + \frac{1}{4}\omega_3 c_s \omega_2 + \frac{1}{2}v\omega_4 - \omega_1 u^2 - \frac{1}{4}\omega_4\omega_1 + \frac{1}{4}\omega_3 + \frac{1}{4}v\omega_3\omega_2 + \frac{1}{8}\omega_3^2 u - \frac{1}{8}v^2\omega_3\omega_4 - \frac{1}{4}\omega_3\omega_4 u + \frac{1}{4}v\omega_3\omega_1 u + \frac{3}{4}\omega_4\omega_1 u^2 - \frac{1}{4}v^3\omega_4\omega_2 - \frac{1}{8}\omega_3\omega_4 - \frac{3}{8}\omega_4^2 u^2 + \frac{1}{8}v^2\omega_3^2 u - \frac{1}{2}\omega_3 c_s^2 - \frac{1}{4}\omega_4 u\omega_2 + \frac{1}{4}v\omega_3^2 c_s^2 + \frac{1}{4}v\omega_3\omega_4 c_s^2 + \frac{3}{4}v\omega_4 u^2\omega_2 + \frac{1}{4}v^2\omega_3 - \frac{1}{8}\omega_3 u^2\omega_2 - \frac{1}{2}v\omega_1 u\omega_2 + \frac{1}{8}\omega_3^2 u^3 + \frac{1}{4}v\omega_4\omega_2 + \frac{1}{2}v\omega_3 u\omega_2 + \frac{1}{2}\omega_1 u^2\omega_2 + \frac{1}{2}v\omega_3\omega_1 u^2 + \frac{3}{4}\omega_4 - \frac{3}{8}\omega_4^2 u - \frac{1}{4}\omega_1\omega_2 - \frac{1}{8}v^3\omega_3^2 + \frac{1}{8}v^2\omega_4^2 u + \frac{1}{4}\omega_3^2 u^2 + \frac{1}{2}\omega_1 - \frac{1}{8}\omega_3\omega_4 u^2 + \frac{1}{4}v^3\omega_3\omega_2 - \frac{1}{4}v^2\omega_3\omega_4 u - \frac{1}{2}\omega_1 u - \frac{1}{8}v\omega_4^2 - \frac{1}{8}\omega_4^2 + \frac{1}{4}\omega_3 u^2 - \frac{1}{2}\omega_3\omega_1 u^3 - \frac{1}{8}v\omega_3^2 u^2 + \frac{1}{8}v^2\omega_4^2 - \frac{1}{4}v\omega_3\omega_4 u^2 + \frac{1}{8}v^2\omega_4\omega_2 + \frac{1}{2}v\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1 u^2 - v\omega_1 u^2\omega_2 - \frac{1}{4}\omega_3 u\omega_2 - \frac{1}{4}v\omega_4^2 u + \frac{1}{2}v\omega_3 - \frac{1}{8}\omega_4\omega_2 + \frac{1}{4}v\omega_4\omega_1 u + \frac{1}{4}\omega_1 u\omega_2 - \frac{1}{4}v\omega_3\omega_1 + \frac{1}{4}v\omega_3 u^2\omega_2 + \frac{1}{2}\omega_2 + \omega_4 u - v\omega_2 + \frac{1}{4}\omega_4 u^2 - \frac{1}{8}\omega_4 u^2\omega_2 + \frac{1}{8}v^3\omega_4^2 + \frac{1}{4}\omega_3\omega_4 c_s^2 - \frac{1}{4}v\omega_3\omega_4 + \frac{1}{4}\omega_3\omega_1 u - \frac{1}{8}v\omega_3^2 - \frac{1}{8}v\omega_4^2 u^2 + \frac{1}{4}\omega_3\omega_4 c_s^2 u - \frac{1}{4}\omega_3^2 c_s^2 u + \frac{1}{2}v\omega_4 u\omega_2 - \frac{1}{8}v^2\omega_3\omega_2 + \frac{1}{2}v\omega_4\omega_1 u^2 - \frac{1}{4}v\omega_3^2 u - \frac{1}{4}v^2\omega_4 - \frac{1}{2}v\omega_3\omega_4 u - \frac{1}{8}\omega_3\omega_2 - \frac{1}{4}v\omega_4\omega_1 - \frac{1}{2}v\omega_3 c_s^2 \omega_2,$$

$$\alpha_{x+\delta_1, y+\delta_1}^{[\mu_5], t-\delta_t} = 1 - vw_4 + \frac{1}{4}vw_4w_1 - \frac{1}{4}vw_3w_2 - \frac{1}{2}vw_3w_1u - \frac{1}{2}\omega_4w_1u^2 + \frac{1}{4}\omega_4^2u^2 + \frac{1}{4}w_4uw_2 - \frac{1}{4}v^2w_3^2 + vw_1uw_2 - \frac{1}{4}vw_4w_2 - \frac{1}{2}vw_3uw_2 - w_4 - \frac{1}{4}\omega_4w_1u + \frac{1}{2}\omega_4^2u + \frac{1}{4}\omega_1w_2 - \frac{1}{4}w_3^2u^2 - \frac{1}{2}\omega_1 + \omega_1u + \frac{1}{2}vw_4^2 + \frac{1}{4}\omega_4^2 + \frac{1}{4}v^2w_4^2 - \frac{1}{2}v^2w_4w_2 - \frac{1}{2}vw_1w_2 + \frac{1}{2}w_3w_1u^2 + \frac{1}{4}w_3uw_2 + \frac{1}{2}vw_4^2u + \frac{1}{4}\omega_4w_2 - \frac{1}{2}vw_4w_1u - \frac{1}{2}\omega_1uw_2 + \frac{1}{4}vw_3w_1 - \frac{1}{2}\omega_2 - w_4u + vw_2 - \frac{1}{4}\omega_3w_1u - \frac{1}{2}vw_4uw_2 + \frac{1}{2}v^2w_3w_2 + \frac{1}{2}vw_3^2u + \frac{1}{4}vw_4w_1,$$

$$\begin{aligned} \alpha_{x-\delta_1, y-\delta_1}^{[\mu_1, t-2\delta_t]} = & 1 - \frac{1}{4}v^2 w_3^2 w_1 u^2 - \frac{1}{4}v w_4 w_1 u w_2 - \frac{1}{4}w_3^2 w_4 c_s^2 - \frac{1}{8}w_4^2 u^3 - \frac{3}{4}w_4 w_1 u^3 + \frac{3}{4}v^2 w_3^2 u w_2 + \frac{3}{4}w_3 c_s^2 w_2 + \frac{5}{2}w_3 c_s^2 w_1 u + \\ & \frac{1}{2}v w_4 - w_1 u^2 + \frac{1}{4}w_4 w_1 - \frac{1}{4}w_3 - \frac{1}{4}w_4 w_1 u^2 w_2 + v^3 w_3 w_4 w_2 + 2v^3 w_2^2 + \frac{1}{4}v w_3 w_1 u w_2 + \frac{1}{8}w_3 w_4 w_1 u + \frac{1}{4}v w_2^2 w_1 u^2 + \\ & \frac{1}{8}w v_3 w_2 - \frac{1}{2}w_3 c_s^2 w_1 w_2 - \frac{1}{2}v^3 w_3 w_4 w_1 u - v^2 w_2^2 u w_2 + \frac{1}{8}w_3^2 u + \frac{3}{4}w_3 w_4^2 c_s^2 u - \frac{1}{4}v^3 w_2^2 w_1 u - \frac{11}{8}v^2 w_3 w_4 - \frac{1}{2}v^3 w_3 w_2^2 + \\ & \frac{1}{2}w_4 w_1^2 u^4 - \frac{1}{4}w_3 w_4 u + \frac{1}{8}w_3^2 w_1 u - \frac{1}{2}v^2 w_1 w_2^2 - \frac{3}{4}v^2 w_3 w_1 u w_2 - \frac{1}{4}v w_3 w_1 u - \frac{1}{2}v^2 w_4 w_1 w_2 - 3v^2 w_2 + v w_3 w_4 c_s^2 u w_2 + \\ & \frac{5}{2}v^2 w_3 w_1^2 u^2 - \frac{1}{2}v w_3 w_4 c_s^2 w_2 + \frac{7}{8}w_4 w_1 u^2 - \frac{1}{4}w_3 w_4^2 c_s^2 - \frac{1}{4}v^3 w_2^2 w_1 - \frac{5}{8}v^3 w_4 w_2 + \frac{1}{8}w_3 w_4 + \frac{3}{8}w_4^2 u^2 + \frac{1}{8}v^2 w_3^2 u - 2w_3 c_s^2 - \\ & \frac{1}{4}w_4 w_2 - \frac{3}{4}v^2 w_4 w_1 u w_2 + \frac{1}{2}v^2 w_4 u w_2^2 - \frac{3}{4}v w_3^2 c_s^2 - \frac{1}{4}v^2 w_3^2 - \frac{1}{4}w_4^2 w_1 u^4 - \frac{5}{4}v^2 w_4 w_1 u - \frac{1}{4}v w_3 w_1 w_2 - \frac{3}{4}v w_3 w_4 c_s^2 - \\ & \frac{1}{2}w_3^2 w_4 c_s^2 u^2 - \frac{1}{4}v^2 w_4 w_1 - \frac{1}{4}v^2 w_3^2 w_2 + \frac{1}{4}v w_4 u^2 w_2 - \frac{1}{4}v w_4^2 w_1 u^3 + v^2 w_3 - \frac{3}{8}w_3 u^2 w_2 - \frac{1}{4}w_3^2 w_1 u^3 - \frac{5}{2}v^2 w_4 u w_2 + \\ & 2v w_1 u w_2 - \frac{1}{4}w_3 w_1 u^3 w_2 + \frac{1}{4}w_3 w_1^2 u^2 + \frac{1}{8}w_3^2 u^3 + \frac{1}{2}v^3 w_4 w_1 w_2 - \frac{1}{4}v^3 w_2^2 w_4 + \frac{3}{4}w_3^2 w_4 c_s^2 u + \frac{3}{8}v w_4 w_2 - \frac{1}{2}w_3 c_s^2 w_1 u w_2 + \\ & \frac{3}{2}v^2 w_1 w_2 - \frac{7}{4}v w_3 u w_2 + \frac{1}{4}w_4 w_1 u^3 w_2 + \frac{1}{2}w_1 u^2 w_2 + v^2 w_2^2 - \frac{1}{2}v w_3 w_1 u^2 - \frac{3}{4}w_4 - \frac{1}{2}v^3 w_4 w_2 + \frac{1}{8}w_4 w_1 u + \frac{1}{4}v^2 w_3 w_1 u + \\ & \frac{1}{2}v w_3 w_4 c_s^2 w_1 u - \frac{3}{8}w_4^2 u - v^2 w_3 w_4 u^2 w_2 + v^3 w_4 u w_2^2 - \frac{1}{4}v^2 w_3 w_4 w_2 - \frac{1}{8}w_3 w_4 w_1 u^2 - 2v^3 w_3 w_4 u w_2 - \frac{1}{2}w_3 w_4 c_s^2 w_1 + \\ & \frac{1}{4}w_1 w_2 - v w_2^2 u^2 w_2 + \frac{3}{8}v^3 w_3^2 - \frac{1}{2}w_3 w_4^2 c_s^2 u^2 - \frac{1}{2}v^3 w_3^2 u w_2 - \frac{1}{4}w_3^2 c_s^2 w_1 + \frac{1}{8}v^2 w_4^2 u - \frac{1}{2}w_2^2 u^2 - \frac{1}{2}v^2 w_4 u^2 w_2 + \frac{1}{4}w_3 w_1 u^3 - \\ & \frac{1}{4}w_1 - \frac{1}{2}v w_3 w_4 u^2 w_2 + \frac{1}{8}w_3^2 w_1 u^2 - \frac{1}{8}w_3 w_4 u^2 - \frac{7}{4}v^3 w_3 w_2 + \frac{1}{4}v^2 w_3 w_4^2 + \frac{9}{8}v^2 w_3 w_4 u + \frac{1}{4}v^2 w_3^2 w_1 u + \frac{1}{2}v w_3^2 c_s^2 w_1 u - \\ & \frac{5}{2}w_1 u - \frac{1}{8}v w_2^2 - \frac{1}{4}v^2 w_4^2 w_2 - \frac{5}{8}v^2 w_3 w_1 - \frac{1}{2}v w_3^2 u^2 w_2 + \frac{1}{8}w_4^2 - \frac{1}{2}w_3 w_4 c_s^2 w_1 u + \frac{1}{4}v^3 w_3^2 w_2 + \frac{1}{2}v w_3 w_4 c_s^2 w_1 + \\ & \frac{1}{2}v w_3 w_4 u w_2 - \frac{1}{4}v^2 w_4^2 w_1 u^2 - v w_3 c_s^2 w_1 u w_2 + \frac{1}{4}v w_3 w_4 w_1 u^2 + w_3 u^2 + \frac{3}{4}w_3 w_1 u^3 + \frac{3}{4}v^2 w_4^2 u w_2 - \frac{1}{2}v w_1^2 u w_2 + \\ & \frac{3}{8}v w_3^2 u^2 - w_3 c_s^2 w_1^2 u^2 - \frac{1}{8}v^2 w_4^2 - v^3 w_1 w_2^2 - \frac{1}{4}v^3 w_2^2 w_1 u - \frac{3}{4}v^2 w_3 w_4^2 u - \frac{1}{2}w_3 w_1 u^4 + \frac{1}{4}v w_3 w_4 u^2 + \frac{13}{8}v^2 w_4 w_2 + \\ & \frac{1}{8}v^2 w_3^2 w_1 + \frac{1}{2}v w_3^2 c_s^2 w_1 + \frac{1}{2}v w_3^2 u w_2 + \frac{3}{4}v w_1 w_2 - \frac{1}{2}w_3^2 c_s^2 w_1 u + \frac{1}{8}w_3 w_1 u^2 - \frac{1}{2}v w_3^2 w_4 c_s^2 u + \frac{1}{2}v^2 w_4 w_1^2 u^2 + v w_1 u^2 w_2 - \\ & \frac{1}{4}w_3 u w_2 + \frac{5}{4}w_3 c_s^2 w_1 + \frac{1}{4}v w_4^2 u + \frac{1}{2}v w_3 - v^2 w_1 u w_2^2 + \frac{1}{2}v^3 w_3 w_4 + \frac{1}{8}w_4 w_2 - \frac{1}{4}v^2 w_3 w_2^2 - \frac{1}{4}v^2 w_3 w_1 w_2 - \frac{1}{2}v w_3 w_1 u^3 w_2 - \\ & \frac{1}{4}v w_4 w_1 u - \frac{1}{4}v^3 w_3 w_4 w_1 + \frac{1}{4}w_1 u w_2 + \frac{1}{4}v w_3^2 w_1 u^3 - \frac{1}{4}v w_3 w_1 - \frac{3}{4}v w_3 u^2 w_2 + v^2 w_3 w_4 u w_2 - \frac{1}{2}w_2 + w_4 u + \frac{1}{2}v^2 w_3 u w_2^2 - \\ & \frac{3}{4}v^2 w_3^2 w_4 u + \frac{1}{4}w_3^2 w_1 u^4 - \frac{3}{4}v^2 w_3 w_1 u - \frac{3}{2}v^2 w_3 w_4 w_1 u^2 + \frac{1}{2}v w_4 w_1 u^3 w_2 + v^3 w_3 w_1 w_2 - \frac{3}{2}v w_2 + \frac{3}{8}v^2 w_3 w_4 w_1 + \\ & 2v^2 w_3 w_1 u^2 w_2 - 2v^3 w_1 u w_2^2 - \frac{1}{4}w_3 w_4 c_s^2 w_2 - \frac{1}{2}w_4 u^2 + \frac{1}{2}w_3^2 c_s^2 + \frac{1}{2}w_4^2 w_1 u^3 - \frac{5}{2}v^2 w_3 w_4 w_2 + \frac{1}{8}w_4 u^2 w_2 + \frac{1}{8}v^3 w_4^2 + \\ & \frac{1}{4}v^3 w_4^2 w_2 + \frac{1}{2}v^2 w_3 w_4 w_1 u + \frac{1}{2}v^2 w_3^2 w_4 u^2 + \frac{3}{2}w_3 w_4 c_s^2 - \frac{1}{4}w_4 w_1 u^2 w_2 - \frac{1}{4}v w_3 w_4 + \frac{1}{2}v^3 w_3^2 w_4 u + \frac{1}{4}v^2 w_4 w_1 u - \frac{3}{8}w_3 w_1 u - \\ & \frac{1}{8}v w_2^2 - \frac{1}{8}v w_2^2 u^2 + v^3 w_3 u w_2^2 + 2v^2 w_4 w_1 u^2 w_2 - \frac{9}{4}w_3 w_4 c_s^2 u - \frac{1}{4}w_3^2 c_s^2 u - \frac{3}{2}v w_4 u w_2 + \frac{11}{8}v^2 w_3 w_2 - \frac{1}{4}v^3 w_3 w_2^2 + \\ & 5v^2 w_1 u w_2 - \frac{1}{2}v w_4 w_1 u^2 + \frac{1}{4}v w_3 w_4^2 c_s^2 - \frac{1}{2}v^3 w_2^2 u w_2 - \frac{1}{2}v^2 w_3^2 u^2 w_2 - \frac{1}{4}w_4 w_1 u^2 w_2 + \frac{1}{4}v w_3^2 u + \frac{1}{2}v^2 w_4 - \frac{1}{2}w_3 c_s^2 w_1 u - \\ & \frac{1}{4}w_4^2 w_1 u^2 + \frac{1}{2}v^2 w_3 w_4^2 u^2 - \frac{1}{4}v w_3^2 w_1 u + \frac{1}{2}v w_3 w_4 u + \frac{3}{2}v^3 w_4 w_1 u w_2 + \frac{1}{2}w_3^2 c_s^2 w_1 u^2 - \frac{1}{4}v^2 w_4 w_2 + \frac{1}{8}w_3 w_2 - 2v^2 w_1^2 u^2 w_2 - \\ & \frac{1}{8}v w_3^2 w_2 - \frac{1}{4}v w_4 w_1 + \frac{3}{2}w_3 w_4 c_s^2 w_1 u^2 + \frac{3}{2}v w_3 c_s^2 w_2 + \frac{1}{4}v w_3^2 w_4 c_s^2 - \frac{1}{2}v w_3 w_4 c_s^2 u + \frac{1}{2}w_3 w_4 c_s^2 u w_2 + \frac{3}{2}v w_3 w_1 u^2 w_2 + \\ & \frac{1}{4}v^2 w_4^2 w_1 u - \frac{1}{8}v w_3 w_4 w_2 + \frac{3}{2}v^3 w_3 w_1 u w_2 - v w_3 c_s^2 w_1 w_2 + \frac{1}{4}v^2 w_3^2 w_4 + \frac{1}{2}v^3 w_3 w_4^2 u + \frac{1}{4}w_3 w_1 u w_2 - \frac{1}{4}v w_3 w_4 w_1 u, \end{aligned}$$

$$\begin{aligned} & \alpha_{x-\delta_1, y-\delta_1}^{[\mu_5], t-2\delta_t} = \\ & -2 + v w_4 w_1 u \omega_2 + \frac{1}{2} v^2 \omega_3^2 u \omega_2 - \frac{3}{2} v \omega_4 + \frac{1}{8} \omega_3^2 \omega_2 - \frac{3}{8} \omega_4 \omega_1 + \frac{5}{2} \omega_3 - \frac{1}{2} \omega_4 \omega_1 u^2 \omega_2 + \frac{3}{8} \omega_3 \omega_4 \omega_2 + 2 v \omega_3 \omega_4^2 u + v \omega_3 \omega_1 u \omega_2 + \\ & \frac{1}{2} \omega_3 \omega_4 \omega_1 u + \frac{1}{2} v \omega_4^2 \omega_1 u^2 - \frac{3}{4} v \omega_4^2 u \omega_2 - 2 v \omega_3 \omega_2 - \frac{3}{2} \omega_3 \omega_1 u^2 \omega_2 + \omega_3^2 u - v^2 \omega_3 \omega_4 + \frac{7}{2} \omega_3 \omega_4 u + \frac{1}{4} \omega_3^2 \omega_1 u + v^2 \omega_1 \omega_2^2 - \\ & 2 v^2 \omega_3 \omega_1 u \omega_2 - \frac{1}{2} v \omega_3 u \omega_2^2 + \frac{1}{4} v \omega_4 \omega_2^2 + 3 v \omega_3 \omega_1 u - \frac{1}{2} v^2 \omega_4 \omega_1 \omega_2 + 2 v \omega_3^2 \omega_4 u + \frac{3}{2} \omega_4 \omega_1 u^2 - \frac{7}{4} \omega_3 \omega_4 - \frac{1}{4} \omega_4^2 u^2 + \frac{1}{2} \omega_4 u \omega_2 - \\ & 2 v^2 \omega_4 \omega_1 u \omega_2 + v \omega_1 u \omega_2^2 - v^2 \omega_4 u \omega_2^2 - \frac{3}{4} v^2 \omega_3^2 + \frac{1}{2} v \omega_3 \omega_1 \omega_2 + \frac{1}{4} \omega_3 \omega_1^2 u - \frac{3}{4} v \omega_3^2 \omega_4 - v \omega_4 \omega_1^2 u^2 - \frac{1}{4} v^2 \omega_3^2 \omega_2 - 6 v \omega_1 u \omega_2 + \\ & \frac{1}{2} \omega_3 \omega_1^2 u^2 - \frac{1}{2} v \omega_4 \omega_1^2 u - \frac{9}{8} \omega_3 \omega_1 - \frac{1}{2} v \omega_3^2 \omega_1 - 2 v \omega_4 \omega_2 + 3 v \omega_3 u \omega_2 - 2 v^2 \omega_2^2 - v \omega_3^2 \omega_4 u^2 + \frac{1}{4} \omega_3 \omega_4^2 + \frac{3}{2} \omega_4 - 2 \omega_4 \omega_1 u - \\ & v \omega_3 \omega_4 \omega_1 + \frac{1}{2} \omega_4^2 u - \frac{3}{2} v^2 \omega_3 \omega_4 \omega_2 - \frac{3}{4} v \omega_4^2 \omega_1 u - \frac{3}{2} \omega_3 \omega_4 \omega_1 u^2 - \omega_3 \omega_4 u \omega_2 - \frac{1}{2} \omega_1 \omega_2 + \frac{1}{4} v \omega_3 \omega_2^2 + 2 v \omega_1^2 u^2 \omega_2 - \frac{1}{2} \omega_3^2 u \omega_2 - \\ & \frac{3}{4} \omega_3^2 u^2 + \omega_1 + v \omega_3 \omega_4 u^2 \omega_2 - \frac{1}{4} \omega_3^2 \omega_1 u^2 - \omega_3 \omega_4 u^2 + \frac{1}{2} v^2 \omega_3 \omega_4^2 + \frac{1}{2} v^2 \omega_3^2 \omega_1 u + 4 \omega_1 u + \frac{1}{2} v \omega_4^2 + \frac{1}{2} \omega_1^2 u \omega_2 - \frac{1}{4} v^2 \omega_4^2 \omega_2 + \end{aligned}$$

$$\begin{aligned}
& \frac{1}{2}vw_3^2u^2\omega_2 - vw_3\omega_4^2u^2 - \frac{1}{4}\omega_4^2 + \frac{1}{2}\omega_3\omega_4u^2\omega_2 - \frac{3}{2}vw_3\omega_4u\omega_2 + \frac{1}{2}\omega_3\omega_4^2u^2 + 3vw_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3^2u^2\omega_2 + \frac{1}{2}v^2\omega_4^2u\omega_2 - 2vw_1\omega_2 + \omega_1^2u^2\omega_2 + \\
& \frac{5}{2}\omega_1^2u\omega_2 - \omega_1^2u - \frac{1}{4}v^2\omega_4^2u^2 + \frac{1}{4}\omega_4^2\omega_1u - v^2\omega_3\omega_4^2u + \frac{1}{2}v\omega_3^2\omega_1u^2 + \frac{3}{2}v^2\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_1 - \frac{3}{4}vw_3^2\omega_2 - 2vw_1\omega_2 + \omega_1^2u^2\omega_2 + \\
& \frac{5}{2}\omega_3\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_4u^2 - \frac{3}{4}vw_3\omega_4^2 + \frac{3}{2}\omega_3u\omega_2 - \frac{1}{2}vw_4^2u - \frac{5}{2}vw_3 + 2v^2\omega_1u\omega_2 + \frac{1}{8}\omega_3^2\omega_1 - \frac{3}{8}\omega_4\omega_2 - \frac{1}{2}vw_4u\omega_2 + \frac{1}{2}v^2\omega_3\omega_2 + \\
& \frac{8}{8}\omega_3\omega_4\omega_1 - \frac{3}{2}v^2\omega_3\omega_1\omega_2 + 3vw_4\omega_1u - vw_3\omega_4^2u^2 - vw_2^2 - 2w_1u\omega_2 + \frac{3}{2}vw_3\omega_1 + \frac{1}{4}vw_4^2\omega_2 + 3v^2\omega_3\omega_4u\omega_2 + \omega_2 - \frac{3}{2}\omega_4u - \\
& v^2\omega_3u\omega_2^2 - v^2\omega_3^2\omega_4u + \frac{1}{4}\omega_4\omega_2u^2 + \frac{1}{2}vw_4\omega_1\omega_2 + 4vw_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1 - \frac{1}{2}vw_3\omega_1^2u + \frac{1}{2}\omega_3\omega_1\omega_2 + v^2\omega_3\omega_4\omega_1u + \frac{1}{4}\omega_3^2\omega_4 + \\
& \frac{1}{2}\omega_4\omega_1^2u^2 + \frac{7}{2}vw_3\omega_4 - \frac{3}{4}\omega_3^2\omega_4u - 2\omega_3\omega_1u + vw_3^2 + 3vw_4u\omega_2 + \frac{5}{2}v^2\omega_3\omega_2 - \frac{1}{2}\omega_3^2 - \frac{1}{2}vw_3^2u - 2\omega_1^2u^2 - 2vw_4\omega_1u^2\omega_2 - \\
& \frac{1}{4}\omega_4^2\omega_1u^2 - \frac{3}{4}vw_3^2\omega_1u - 5vw_3\omega_4u + \frac{1}{2}\omega_4\omega_1\omega_2 + \frac{1}{2}vw_1\omega_2^2 + \frac{1}{2}v^2\omega_4\omega_2^2 - \frac{9}{8}\omega_3\omega_2 + \frac{1}{4}vw_3^2\omega_2 + \frac{1}{2}vw_4\omega_1 + \\
& \frac{1}{2}vw_4^2u^2\omega_2 - 2vw_3\omega_1u^2\omega_2 + \frac{1}{2}v^2\omega_4^2\omega_1u - \frac{3}{4}\omega_3\omega_4^2u + \frac{1}{2}vw_3\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_4 + \frac{1}{2}\omega_3\omega_1\omega_2 - \frac{3}{2}vw_3\omega_4\omega_1u - \frac{5}{2}\omega_3u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_1],t-2\delta_t} = & 1 + \frac{1}{2}v^2\omega_3^2\omega_1u^2 - \frac{1}{2}\omega_3c_s^2\omega_2 + \frac{1}{2}vw_4 + 2\omega_1u^2 + \frac{1}{4}v^2\omega_3\omega_1^2 + \frac{3}{2}\omega_4\omega_1 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_4\omega_1u^2\omega_2 - \frac{1}{4}vw_4^2\omega_1u^2 + \\
& \frac{1}{2}vw_3\omega_2 + \frac{1}{4}v\omega_4^2\omega_1 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1u^2\omega_2 + \frac{1}{4}v^2\omega_3\omega_4 - \omega_4\omega_1^2u^4 + \frac{1}{4}v^2\omega_4\omega_1\omega_2 - v^2\omega_2 - v^2\omega_3\omega_1^2u^2 - \\
& \frac{5}{2}\omega_4\omega_1u^2 + \frac{1}{4}v^3\omega_3\omega_1 - \frac{1}{2}v^3\omega_4\omega_2 + \frac{1}{4}\omega_3\omega_4 + \frac{3}{2}\omega_4^2u^2 + \frac{1}{2}\omega_3c_s^2 + \frac{1}{2}v\omega_3^2\omega_2 + \frac{1}{2}\omega_4^2\omega_1u^4 - \frac{1}{2}vw_3\omega_1\omega_2 + \\
& \frac{1}{2}vw_3\omega_4c_s^2 + \omega_3^2\omega_4c_s^2u^2 + \frac{1}{2}\omega_3\omega_1^2 - v^2\omega_4\omega_1 + \frac{1}{2}vw_4u^2\omega_2 - \frac{1}{4}v^2\omega_3 + \frac{1}{4}\omega_3\omega_1^2u^2 - \frac{5}{4}\omega_3\omega_1^2u^2 + \frac{1}{2}v^3\omega_4\omega_1\omega_2 - \\
& \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{1}{4}v^2\omega_4\omega_1^2 + \frac{1}{4}vw_3^2\omega_1 + \frac{1}{2}vw_4\omega_2 + 2v^2\omega_1\omega_2 - \omega_1u^2\omega_2 + \frac{1}{2}vw_3\omega_1u^2 - \frac{5}{4}\omega_4 + \frac{1}{2}vw_3\omega_4\omega_1 + \\
& 2v^2\omega_3\omega_4u^2\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_1u^2 + \frac{1}{2}vw_3\omega_4c_s^2\omega_1 + \frac{1}{2}\omega_1\omega_2 + 2vw_1^2u^2\omega_2 - \frac{1}{4}v^3\omega_3^2 + \omega_3\omega_4c_s^2u^2 - \frac{1}{2}\omega_3^2u^2 + \\
& v^2\omega_4^2u^2\omega_2 - \omega_1 + vw_3\omega_4u^2\omega_2 + \frac{1}{2}\omega_3\omega_1u^2 + \frac{1}{4}\omega_3\omega_4u^2 + \frac{1}{2}v^3\omega_3\omega_2 - \frac{1}{4}v^2\omega_4\omega_1 - \frac{1}{4}\omega_4\omega_1^2 + \frac{1}{2}vw_3\omega_1\omega_2 + \\
& \frac{1}{2}vw_7^2\omega_2 + \frac{1}{4}\omega_4^2 - \frac{1}{2}vw_3\omega_4c_s^2\omega_1 + \frac{1}{2}v^2\omega_4^2\omega_1u^2 - \frac{1}{2}vw_3\omega_4\omega_1u^2 - \frac{1}{4}\omega_3u^2 - \frac{1}{4}vw_3^2\omega_2^2 + 2\omega_3c_s^2\omega_1^2u^2 - \frac{1}{4}v^2\omega_4^2 + \\
& \omega_3\omega_1^4u^4 - \frac{1}{2}vw_3\omega_4u^2 - \frac{1}{4}v^2\omega_3\omega_1u^2 - \frac{1}{4}v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1 + 2vw_1\omega_2 + \frac{1}{2}\omega_3\omega_1u^2 - v^2\omega_4\omega_1u^2 - 2vw_1u^2\omega_2 + \\
& \frac{1}{2}vw_3 + \frac{1}{4}\omega_4\omega_2 - \frac{1}{4}\omega_3\omega_4\omega_1 - \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{2}vw_3\omega_1 - v^2\omega_1^2\omega_2 + \frac{1}{2}vw_3u^2\omega_2 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3^2\omega_1u^4 - \frac{1}{2}vw_4\omega_1\omega_2 + \\
& 3v^2\omega_3\omega_4\omega_1u^2 - \frac{1}{2}v^3\omega_3\omega_1\omega_2 - \frac{3}{2}vw_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_3\omega_1\omega_2 - 4v^2\omega_3\omega_1u^2\omega_2 - \frac{3}{4}\omega_4u^2 + \frac{1}{4}\omega_4u^2\omega_2 + \frac{1}{4}v^3\omega_4^2 - \\
& v^2\omega_3^2\omega_4u^2 - \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{5}{4}\omega_4\omega_1^2u^2 - \frac{1}{2}vw_3\omega_4 - \frac{1}{2}\omega_3c_s^2\omega_1^2 - \frac{1}{4}vw_3^2 - \frac{1}{4}v^2\omega_4^2u^2 - 4v^2\omega_4\omega_1u^2\omega_2 + \frac{1}{4}v^2\omega_4^2\omega_1 + \\
& \frac{1}{2}v^2\omega_3\omega_2 + vw_4\omega_1u^2 + v^2\omega_3^2u^2\omega_2 + \frac{3}{4}v^2\omega_4 - \frac{3}{2}vw_4\omega_1u^2\omega_2 - \frac{1}{4}\omega_4\omega_1u^2 - v^2\omega_3\omega_4u^2 - \omega_3^2c_s^2\omega_1u^2 + \frac{1}{4}\omega_3\omega_2 - \\
& \frac{1}{4}\omega_4\omega_1 + 4v^2\omega_1^2u^2\omega_2 - \frac{1}{2}vw_4\omega_1 + \frac{1}{2}vw_4u^2\omega_2 - 3\omega_3\omega_4c_s^2\omega_1u^2 - vw_3c_s^2\omega_2 - \frac{3}{2}vw_3\omega_1u^2\omega_2 + vw_3c_s^2\omega_1\omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_5],t-2\delta_t} = & -2 - 2vw_4 - \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{5}{2}\omega_4\omega_1 + 2\omega_4\omega_1u^2\omega_2 - vw_4^2\omega_1u^2 - \frac{1}{2}vw_3\omega_2 - vw_4^2\omega_1 + 2\omega_3\omega_1u^2\omega_2 - \omega_1^2 - \\
& v^2\omega_4\omega_1\omega_2 - 3\omega_4\omega_1u^2 + \frac{1}{2}\omega_4^2u^2 + \frac{1}{2}v^2\omega_3^2 + \frac{1}{2}vw_3\omega_1\omega_2 + 2vw_4\omega_1^2u^2 + \frac{1}{2}\omega_4\omega_1\omega_2 - \frac{1}{2}vw_4\omega_2 + 2vw_3\omega_4u^2 + \\
& 2\omega_4 + 3\omega_3\omega_4\omega_1u^2 - \frac{3}{2}\omega_1\omega_2 - 4vw_1^2u^2\omega_2 + \frac{3}{2}\omega_3^2u^2 + 3\omega_1 - 2vw_3\omega_4u^2\omega_2 + 2\omega_3\omega_4u^2 + vw_4^2 + \frac{1}{2}\omega_4\omega_1^2 - \\
& vw_3^2u^2\omega_2 + vw_1^2\omega_2 + 2vw_3\omega_4u^2 - \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_1^2\omega_2 - \frac{1}{2}vw_4\omega_1^2 - \omega_3\omega_4u^2\omega_2 - \omega_3\omega_4^2u^2 - 6vw_3\omega_4\omega_1u^2 - \\
& \frac{1}{2}\omega_3^2u^2\omega_2 - \frac{1}{2}v^2\omega_4^2 - vw_3^2\omega_1u^2 + v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1 - 3vw_1\omega_2 - 2\omega_1^2u^2\omega_2 - 5\omega_3\omega_1u^2 - \omega_3^2\omega_4u^2 - \frac{1}{2}\omega_4\omega_2 + \\
& v^2\omega_3\omega_1\omega_2 + 2vw_3\omega_2^2 + \frac{1}{2}vw_3\omega_1 + \omega_2 + \frac{1}{2}vw_4\omega_1\omega_2 + 2vw_2 - \frac{1}{2}vw_3\omega_1^2 - 2\omega_4\omega_1^2u^2 + \frac{1}{2}v^2\omega_4^2\omega_1 - v^2\omega_3\omega_2 + \\
& 4\omega_1^2u^2 + 4vw_4\omega_1u^2\omega_2 + \frac{3}{2}\omega_4\omega_1u^2 + \frac{1}{2}vw_4\omega_1 - vw_4^2\omega_2 + 4vw_3\omega_1u^2\omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_l,y-\delta_l}^{[\mu_1],t-2\delta_t} = & 1 - \frac{1}{4}v^2\omega_3^2\omega_1u^2 + \frac{1}{4}vw_4\omega_1\omega_2 - \frac{1}{4}\omega_3^2\omega_4c_s^2 + \frac{1}{8}\omega_4^2u^3 + \frac{3}{4}\omega_4\omega_1u^3 - \frac{3}{4}v^2\omega_3^2\omega_2\omega_2 + \frac{3}{4}\omega_3c_s^2\omega_2\omega_1 + \\
& \frac{1}{2}vw_4 - \omega_1u^2 + \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_3 - \frac{1}{4}\omega_4\omega_1u^2\omega_2 + v^3\omega_3\omega_4\omega_2 + 2v^3\omega_2^2 - \frac{1}{4}vw_3\omega_1\omega_2 - \frac{1}{8}\omega_3\omega_4\omega_1u + \frac{1}{4}v\omega_4^2\omega_1u^2 + \\
& \frac{5}{8}vw_3\omega_2 - \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{2}v^3\omega_3\omega_4\omega_1u + v^2\omega_1^2\omega_2 - \frac{1}{8}\omega_3^2u - \frac{3}{4}\omega_3\omega_2^2c_s^2u + \frac{1}{4}v^3\omega_3^2\omega_1u - \frac{11}{8}v^2\omega_3\omega_4 - \frac{1}{2}v^3\omega_3\omega_2^2 + \\
& \frac{1}{2}\omega_4\omega_1^2u^4 + \frac{1}{4}\omega_3\omega_4u - \frac{1}{8}\omega_3^2\omega_1u - \frac{1}{2}v^2\omega_1^2\omega_2 + \frac{3}{4}v^2\omega_3\omega_1\omega_2 + \frac{1}{4}v^2\omega_4\omega_1\omega_2 - 3v^2\omega_2 - vw_3\omega_4c_s^2\omega_2 + \\
& \frac{1}{2}v^2\omega_3\omega_1u^2 - \frac{1}{2}vw_3\omega_4c_s^2\omega_2 + \frac{7}{8}\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_4^2c_s^2 - \frac{1}{4}v^3\omega_3^2\omega_1 - \frac{5}{4}v^3\omega_4\omega_2 + \frac{1}{8}\omega_3\omega_4 + \frac{3}{8}\omega_4^2u^2 - \frac{1}{8}v^2\omega_3^2u - 2\omega_3c_s^2 + \\
& \frac{1}{4}\omega_4\omega_2 + \frac{3}{4}v^2\omega_4\omega_1\omega_2 - \frac{1}{2}v^2\omega_4\omega_2\omega_2 - \frac{3}{4}vw_3c_s^2 - \frac{1}{4}v^2\omega_3^2 - \frac{1}{4}\omega_4^2\omega_1u^4 + \frac{5}{4}v^2\omega_4\omega_1u - \frac{1}{4}vw_3\omega_1\omega_2 - \frac{3}{4}vw_3\omega_4c_s^2 - \\
& \frac{1}{2}\omega_3^2\omega_4c_s^2u^2 - \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_3^2\omega_2 + \frac{1}{4}vw_4u^2\omega_2 + \frac{1}{4}vw_4^2\omega_1u^3 + v^2\omega_3 - \frac{3}{8}\omega_3u^2\omega_2 + \frac{1}{2}\omega_3^2\omega_1u^3 + \frac{5}{2}v^2\omega_4\omega_1 - \\
& 2vw_1\omega_2 + \frac{1}{4}\omega_3\omega_1u^3\omega_2 + \frac{1}{4}\omega_3\omega_1^2u^2 - \frac{1}{8}\omega_3^3u^3 + \frac{1}{2}v^3\omega_4\omega_1\omega_2 - \frac{1}{4}v^3\omega_3^2\omega_4 - \frac{3}{8}\omega_3^2\omega_4c_s^2u + \frac{3}{8}vw_4\omega_2 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \\
& \frac{3}{2}v^2\omega_1\omega_2 + \frac{4}{4}vw_3\omega_2 - \frac{1}{4}\omega_4\omega_1u^3\omega_2 + \frac{1}{2}\omega_1u^2\omega_2 + v^2\omega_2^2 - \frac{1}{2}vw_3\omega_1\omega_2 - \frac{3}{4}\omega_4 - \frac{1}{2}v^3\omega_4\omega_2^2 - \frac{1}{8}\omega_4\omega_1u - \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \\
& \frac{1}{2}vw_3\omega_4c_s^2\omega_1u + \frac{3}{8}\omega_4^2u - v^2\omega_3\omega_4u^2\omega_2 - v^3\omega_4\omega_2\omega_2 - \frac{1}{4}v^2\omega_3\omega_4\omega_2 - \frac{1}{8}\omega_3\omega_4\omega_1\omega_2^2 + 2v^3\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 + \\
& \frac{1}{2}\omega_1\omega_2 - vw_1^2\omega_2 + \frac{3}{8}v^3\omega_2^2 - \frac{1}{2}\omega_3\omega_4^2c_s^2u^2 + \frac{1}{4}v^3\omega_3^2\omega_2\omega_2 - \frac{1}{4}\omega_3^2c_s^2\omega_1 - \frac{1}{8}v^2\omega_4^2u - \frac{1}{2}\omega_3^2u^2 - \frac{1}{2}v^2\omega_4^2\omega_2\omega_2 - \frac{1}{4}\omega_3\omega_2^3 - \\
& \frac{1}{4}\omega_1 - \frac{1}{2}vw_3\omega_4u^2\omega_2 + \frac{1}{4}\omega_3\omega_1u^2 - \frac{1}{8}\omega_3\omega_4u^2 - \frac{7}{4}v^3\omega_3\omega_2 + \frac{1}{4}v^2\omega_3\omega_4^2 - \frac{9}{4}v^2\omega_3\omega_4u - \frac{1}{4}v^2\omega_3\omega_1u - \frac{1}{2}vw_3^2c_s^2\omega_1u + \\
& \frac{1}{4}\omega_1u - \frac{1}{8}vw_4^2 - \frac{1}{4}v^2\omega_4^2\omega_2 - \frac{5}{8}v^2\omega_3\omega_1 - \frac{1}{2}vw_3^2u^2\omega_2 + \frac{1}{8}\omega_4^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1u + \frac{1}{4}v^3\omega_3^2\omega_2 + \frac{1}{2}vw_3\omega_4c_s^2\omega_1 - \\
& \frac{1}{4}vw_3\omega_4\omega_1\omega_2 - \frac{1}{4}v^2\omega_4^2\omega_1u^2 + vw_3c_s^2\omega_1\omega_2 + \frac{1}{4}vw_3\omega_4\omega_1u^2 + \frac{1}{4}vw_3u^2 - \frac{3}{4}vw_3\omega_1u^3 - \frac{3}{4}vw_3\omega_2\omega_2 - \frac{1}{2}\omega_2 - \omega_4u - \frac{1}{2}v^2\omega_3\omega_2 + \\
& \frac{4}{4}vw_4\omega_1u - \frac{1}{4}v^3\omega_3\omega_4\omega_1 - \frac{1}{4}\omega_1\omega_2 - \frac{1}{4}vw_3^2\omega_1u^3 - \frac{1}{4}vw_3\omega_1u^3 - \frac{1}{4}vw_3u^2\omega_2 - v^2\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_2 - \omega_4u - \frac{1}{2}v^2\omega_3\omega_2 + 
\end{aligned}$$

$$\begin{aligned}
& \frac{3}{4}v^2\omega_3^2\omega_4u + \frac{1}{4}\omega_3^2\omega_1u^4 + \frac{5}{4}v^2\omega_3\omega_1u - \frac{3}{2}v^2\omega_3\omega_4\omega_1u^2 - \frac{1}{2}vw_4\omega_1u^3\omega_2 + v^3\omega_3\omega_1\omega_2 - \frac{3}{2}vw_2 + \frac{3}{8}v^2\omega_3\omega_4\omega_1 + \\
& 2v^2\omega_3\omega_1u^2\omega_2 + 2v^3\omega_1u\omega_2^2 - \frac{1}{4}\omega_3\omega_4c_s^2\omega_2 - \frac{1}{2}\omega_4u^2 + \frac{1}{2}\omega_3^2c_s^2 - \frac{1}{2}\omega_4^2\omega_1u^3 + \frac{5}{2}v^2\omega_3\omega_2 + \frac{1}{8}\omega_4u^2\omega_2 + \frac{1}{8}v^3\omega_4^2 + \\
& \frac{1}{4}v^3\omega_4^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1u + \frac{1}{2}v^2\omega_3^2\omega_4u^2 + \frac{3}{2}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_4\omega_1u^2 - \frac{1}{4}v\omega_3\omega_4 - \frac{1}{2}v^3\omega_3^2\omega_4u - \frac{1}{4}v^2\omega_4\omega_1u + \frac{3}{8}\omega_3\omega_1u - \\
& \frac{1}{8}vw_3^2 - \frac{1}{8}vw_4^2u^2 - v^3\omega_3\omega_2 + 2v^2\omega_4\omega_1u^2\omega_2 + \frac{9}{4}\omega_3\omega_4c_s^2u + \frac{1}{4}\omega_5^2c_s^2u + \frac{3}{4}vw_4\omega_1\omega_2 + \frac{11}{8}v^2\omega_3\omega_2 - \frac{1}{4}v^3\omega_3\omega_4^2 - \\
& 5v^2\omega_1u\omega_2 - \frac{1}{2}vw_4\omega_1u^2 + \frac{1}{4}vw_3\omega_4c_s^2 + \frac{1}{2}v^3\omega_4^2\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_2 + \frac{1}{4}\omega_4\omega_1u^3 - \frac{1}{4}vw_3^2u + \frac{1}{2}v^2\omega_4 + \frac{1}{2}\omega_3c_s^2\omega_2u - \\
& \frac{1}{4}\omega_4^2\omega_1u^2 + \frac{1}{2}v^2\omega_3\omega_4^2u^2 + \frac{1}{4}vw_3^2\omega_1u - \frac{1}{2}vw_3\omega_4u - \frac{3}{2}v^3\omega_4\omega_1u\omega_2 + \frac{1}{2}\omega_3^2c_s^2\omega_1u^2 - \frac{1}{4}v^2\omega_4\omega_2 + \frac{1}{8}\omega_3\omega_2 - 2v^2\omega_1^2\omega_2 - \\
& \frac{1}{8}vw_3^2\omega_2 - \frac{1}{4}vw_4\omega_1 + \frac{3}{2}\omega_3\omega_4c_s^2\omega_1u^2 + \frac{3}{2}vw_3\omega_4c_s^2\omega_2 + \frac{1}{4}vw_3^2\omega_4c_s^2 + \frac{1}{2}vw_3\omega_4c_s^2\omega_2 + \frac{3}{2}vw_3\omega_1u^2\omega_2 - \\
& \frac{9}{4}v^2\omega_4^2\omega_1u - \frac{1}{8}vw_3\omega_4\omega_2 - \frac{3}{2}v^3\omega_3\omega_1u\omega_2 - vw_3\omega_4c_s^2\omega_1\omega_2 + \frac{1}{4}v^2\omega_3^2\omega_4 - \frac{1}{2}v^3\omega_3\omega_4^2u - \frac{1}{4}\omega_3\omega_1\omega_2 + \frac{1}{4}vw_3\omega_4\omega_1u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l, y-\delta_l}^{[\mu_5], t-2\delta_t} = & -2 - vw_4\omega_1u\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_2 - \frac{3}{2}vw_4 + \frac{1}{8}\omega_3^2\omega_2 - \frac{3}{2}\omega_4\omega_1 + \frac{5}{2}\omega_3 - \frac{1}{2}\omega_4\omega_1u^2\omega_2 + \frac{3}{8}\omega_3\omega_4\omega_2 - 2vw_3\omega_4^2u - vw_3\omega_1u\omega_2 - \\
& \frac{1}{2}\omega_3\omega_4\omega_1u + \frac{1}{2}vw_4\omega_1u^2 + \frac{3}{4}vw_4^2\omega_2 - 2vw_3\omega_2 - \frac{3}{2}\omega_3\omega_1u^2\omega_2 - \omega_3^2u - v^2\omega_3\omega_4 - \frac{7}{8}\omega_3\omega_4u - \frac{1}{4}\omega_3^2\omega_1u + v^2\omega_1\omega_2^2 + \\
& 2v^2\omega_3\omega_1u\omega_2 + \frac{1}{2}vw_3\omega_2 + \frac{1}{4}vw_4\omega_2^2 - 3vw_3\omega_1u - \frac{1}{2}v^2\omega_4\omega_1\omega_2 - 2vw_3^2\omega_4u + \frac{3}{2}\omega_4\omega_1u^2 - \frac{7}{8}\omega_3\omega_4 - \frac{1}{4}\omega_4^2u^2 - \frac{1}{2}\omega_4u\omega_2 + \\
& 2v^2\omega_4\omega_1u\omega_2 - vw_1\omega_2 + v^2\omega_4\omega_2^2 - \frac{3}{4}v^2\omega_3^2 + \frac{1}{2}vw_3\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_2u - \frac{3}{4}vw_3^2\omega_4 - vw_4\omega_1u^2 - \frac{1}{4}v^2\omega_3\omega_2 + 6vw_1u\omega_2 + \\
& \frac{1}{2}\omega_3\omega_1u^2 + \frac{1}{2}vw_4\omega_1u^2 - \frac{9}{8}\omega_3\omega_1 - \frac{1}{2}vw_3\omega_1 - 2vw_4\omega_2 - 3vw_3\omega_2 - 2v^2\omega_3^2\omega_4u + \frac{1}{4}\omega_3\omega_4^2 + \frac{3}{2}\omega_4 + 2\omega_4\omega_1u - \\
& vw_3\omega_4\omega_1 - \frac{1}{2}\omega_4^2u - \frac{3}{2}v^2\omega_3\omega_4\omega_2 + \frac{3}{4}vw_4^2\omega_1u - \frac{3}{2}\omega_3\omega_4\omega_1u^2 + \omega_3\omega_4\omega_2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{4}vw_3\omega_2^2 + 2vw_3^2\omega_2 + \frac{1}{2}\omega_3\omega_2 - \\
& \frac{3}{4}\omega_3^2u^2 + \omega_1 + vw_3\omega_4\omega_2 - \frac{1}{4}\omega_3^2\omega_1u^2 - \omega_3\omega_4\omega_2 + \frac{1}{2}v^2\omega_3\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1u - 4\omega_1u + \frac{1}{2}vw_4^2 - \frac{1}{2}\omega_1^2\omega_2 - \frac{1}{4}v^2\omega_4^2\omega_2 + \\
& \frac{1}{2}vw_3^2\omega_2 - vw_3\omega_4^2u - \frac{1}{4}\omega_4^2u + \frac{1}{2}\omega_3\omega_4\omega_2 + \frac{3}{2}vw_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_4\omega_2^2 + 3vw_3\omega_4\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_2^2 - \frac{1}{2}v^2\omega_4^2\omega_2 - \\
& v\omega_1\omega_2 + \omega_1^2u - \frac{1}{4}v^2\omega_4^2 - \frac{1}{4}\omega_4^2\omega_1u + v^2\omega_3\omega_4^2u + \frac{1}{2}vw_3^2\omega_1u^2 + \frac{3}{2}v^2\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_2 + 3vw_3^2\omega_2 - 2vw_1\omega_2 + \omega_1^2\omega_2 + \\
& \frac{5}{8}\omega_3\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_4\omega_2^2 - \frac{3}{4}v\omega_3\omega_4^2 - \frac{3}{2}\omega_3\omega_2\omega_2 + \frac{1}{2}vw_4^2u - \frac{5}{2}vw_3 - 2v^2\omega_1\omega_2 + \frac{1}{8}\omega_3^2\omega_1 - \frac{3}{8}\omega_4\omega_2 + \frac{1}{2}vw_4\omega_2 + \frac{1}{2}v^2\omega_3\omega_2 + \\
& \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{3}{2}v^2\omega_3\omega_1\omega_2 - 3vw_4\omega_1u - vw_3\omega_2u^2 - vw_2^2 + 2\omega_1\omega_2 + \frac{3}{2}vw_3\omega_1 + \frac{1}{4}vw_2^2\omega_2 - 3v^2\omega_3\omega_4\omega_2 + \omega_2 + \frac{3}{2}\omega_4u + \\
& v^2\omega_3\omega_2 + v^2\omega_3^2\omega_4u - \frac{1}{4}\omega_4\omega_1^2u + \frac{1}{2}vw_4\omega_1\omega_2 + 4vw_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1 + \frac{1}{2}vw_3\omega_2^2 + \frac{1}{2}\omega_3\omega_1\omega_2 - v^2\omega_3\omega_4\omega_1u + \frac{1}{4}\omega_3\omega_4 + \\
& \frac{1}{2}\omega_4\omega_1u^2 + \frac{7}{2}vw_3\omega_4 + \frac{3}{4}\omega_3^2\omega_4u + 2\omega_3\omega_1u + vw_3^2 - 3vw_4\omega_2 + \frac{5}{2}v^2\omega_3\omega_2 - \frac{1}{2}\omega_3^2 + \frac{1}{2}vw_3^2\omega_2 - 2\omega_1^2u^2 - 2vw_4\omega_1u^2\omega_2 - \\
& \frac{1}{4}\omega_4^2\omega_1u^2 + \frac{3}{4}vw_3\omega_1u + 5vw_3\omega_4u - \frac{1}{2}\omega_4\omega_1\omega_2 + \frac{1}{2}vw_1\omega_2^2 + \frac{1}{2}v^2\omega_4\omega_2^2 - \frac{9}{8}\omega_3\omega_2 + \frac{1}{4}vw_3^2\omega_2 + \frac{1}{2}vw_4\omega_1 + \\
& \frac{1}{2}vw_2^2\omega_2 - 2vw_3\omega_1u^2\omega_2 - \frac{1}{2}v^2\omega_4^2\omega_1u + \frac{3}{4}\omega_3\omega_4u + \frac{1}{2}vw_3\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_4 - \frac{1}{2}\omega_3\omega_1\omega_2 + \frac{3}{2}vw_3\omega_4\omega_1u + \frac{5}{2}\omega_3u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l, y}^{[\mu_1], t-2\delta_t} = & 2 - v^2\omega_3^2\omega_1u^2 - \frac{1}{4}\omega_4^2u^3 + \omega_4\omega_1u^3 + \frac{5}{4}v^2\omega_3^2\omega_2 + 2\omega_1u^2 - \frac{3}{4}\omega_4^2u^2\omega_2 + \frac{1}{2}\omega_4\omega_1 - \frac{1}{2}\omega_3 + \\
& \frac{3}{2}\omega_4\omega_1u^2\omega_2 - \frac{1}{4}\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_1\omega_2^2 - \frac{1}{2}\omega_3\omega_1u^2\omega_2 - 2v^2\omega_3c_s^2\omega_2^2 + \frac{1}{4}\omega_3^2u + 3v^2\omega_3\omega_4c_s^2\omega_2 - \frac{7}{4}v^2\omega_3\omega_4 - \\
& \frac{1}{2}\omega_3\omega_4u + \omega_1u^2\omega_2^2 + 2v^2\omega_1\omega_2^2 - 2v^2\omega_3\omega_1\omega_2 - 2v^2\omega_4\omega_1\omega_2 - \frac{3}{2}\omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_4 + \frac{3}{4}\omega_4^2u^2 + \frac{1}{4}v^2\omega_3^2\omega_2 + \omega_3c_s^2 - \\
& \frac{3}{2}\omega_4\omega_1\omega_2 - 2v^2\omega_4\omega_1\omega_2 - 2v^2\omega_4\omega_1\omega_2^2 - v^2\omega_3^2 - \frac{1}{2}\omega_3u^2\omega_2^2 - \frac{1}{2}v^2\omega_3^2\omega_2 - \frac{1}{2}v^4\omega_4^2\omega_2 - \frac{1}{2}v^2\omega_3 + \frac{3}{4}\omega_3u^2\omega_2 + \\
& \omega_3\omega_1u^3\omega_2 + \frac{1}{4}\omega_3^2u^3 - v^2\omega_3\omega_4c_s^2 - \frac{1}{2}\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_4^2\omega_2 - 4v^2\omega_1u^2\omega_2^2 - \omega_4\omega_1u^3\omega_2 - 3\omega_1u^2\omega_2 - 4v^2\omega_2^2 - \frac{3}{2}\omega_4 + \\
& \frac{1}{2}\omega_4u\omega_2^2 - \frac{3}{4}\omega_4^2u + v^2\omega_3u^2\omega_2^2 + \frac{1}{4}\omega_4^2u^3\omega_2 - 3v^2\omega_3\omega_4u^2\omega_2 - \frac{11}{4}v^2\omega_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_4\omega_2u + \frac{3}{4}\omega_1\omega_2 - \frac{1}{4}\omega_3^2\omega_2u + \\
& \frac{1}{4}v^2\omega_4^2u - \frac{1}{2}\omega_3^2u^2 - \frac{1}{2}v^2\omega_4^2\omega_2^2 - \omega_1 - v^2\omega_3^2\omega_4c_s^2 + \frac{1}{4}\omega_3\omega_4u^2 + v^2\omega_3\omega_4^2 - \frac{1}{2}v^2\omega_3\omega_4u + \frac{1}{2}v^2\omega_3^2\omega_1u - \omega_1u + \\
& \frac{1}{2}\omega_3c_s^2\omega_2^2 - \frac{3}{4}v^2\omega_4^2\omega_2 + \frac{1}{4}v^4\omega_3^2\omega_2 + \frac{1}{4}\omega_4^2 - \frac{1}{4}\omega_3\omega_4u^2\omega_2 - v^2\omega_2^2\omega_1u^2 + \frac{1}{2}\omega_3^2u^2\omega_2 - \frac{1}{2}\omega_3\omega_1u^3 + \\
& \frac{5}{4}v^2\omega_4^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_4^2u + \frac{17}{4}v^2\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_1 - \frac{1}{4}\omega_3\omega_2 + \frac{1}{2}\omega_3\omega_1u^2 + v^2\omega_3^2\omega_2\omega_2 - \frac{1}{2}\omega_3\omega_1\omega_2 + \\
& 2v^2\omega_1\omega_2^2 + v^4\omega_4\omega_2^2 + \frac{7}{4}\omega_4\omega_2 + \frac{5}{4}v^2\omega_3\omega_2^2 - 2v^2\omega_3\omega_1\omega_2 + \frac{3}{2}\omega_1\omega_2u + \frac{1}{2}v^2\omega_3\omega_4u\omega_2 + \omega_2^2 - 3\omega_2 - \frac{1}{4}\omega_4u^2\omega_2^2 + \\
& 2\omega_4u - 2v^2\omega_3\omega_2 - 2v^2\omega_3^2\omega_4u - 2v^2\omega_3\omega_4\omega_1u^2 + v^2\omega_3\omega_4\omega_1 + 4v^2\omega_3\omega_1u^2\omega_2 - \frac{1}{2}\omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 - \\
& \frac{1}{2}\omega_4u^2 + \frac{3}{4}\omega_4u^2\omega_2 + v^2\omega_3\omega_4\omega_1u + v^2\omega_3\omega_4u^2 - \frac{1}{2}\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_3\omega_1u + v^2\omega_4u^2\omega_2^2 + \frac{1}{2}\omega_3\omega_2^2 + 4v^2\omega_4\omega_1u^2\omega_2 + \\
& \frac{1}{2}\omega_3\omega_4c_s^2u - \frac{1}{4}\omega_3^2u^3\omega_2 - \frac{1}{4}\omega_4\omega_2^2 - \frac{1}{2}\omega_3^2c_s^2u + \frac{1}{2}v^2\omega_4\omega_1 + \frac{15}{4}v^2\omega_3\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_2\omega_2 + \frac{1}{2}v^2\omega_4 + \frac{3}{4}\omega_4^2\omega_2 + \\
& v^2\omega_3\omega_4u^2 + \frac{1}{2}\omega_3^2c_s^2\omega_2 - v^4\omega_3\omega_2^2 + \frac{3}{4}v^2\omega_4\omega_2^2 + \frac{3}{4}\omega_3\omega_2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \frac{1}{2}v^2\omega_4\omega_1u + v^2\omega_3^2\omega_4 - \frac{1}{2}\omega_3\omega_1\omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l, y}^{[\mu_5], t-2\delta_t} = & -2 - v^2\omega_3^2\omega_2 + \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{1}{2}\omega_4\omega_1 - \omega_4\omega_1u^2\omega_2 + \frac{1}{2}\omega_1\omega_2^2 + \omega_3\omega_1u^2\omega_2 + 2v^2\omega_3\omega_4 - 2v^2\omega_1\omega_2^2 + \\
& 4v^2\omega_3\omega_1\omega_2 + 2v^2\omega_4\omega_1\omega_2 + \omega_4\omega_1u^2 - \frac{1}{2}\omega_4^2u^2 + \frac{5}{2}\omega_4\omega_1\omega_2 + 4v^2\omega_4\omega_1\omega_2 + 2v^2\omega_4\omega_2^2 + \frac{3}{2}v^2\omega_3^2 + \frac{1}{2}\omega_4\omega_1\omega_2 + \\
& \frac{1}{2}\omega_4^2\omega_2 + 4v^2\omega_2^2 + 2\omega_4 - \frac{1}{2}\omega_4\omega_1u - \frac{1}{2}\omega_4\omega_1\omega_2 + \omega_4^2u + 3v^2\omega_3\omega_4\omega_2 - \frac{3}{2}\omega_1\omega_2 + \frac{1}{2}\omega_3^2u^2 + \omega_1 - v^2\omega_3\omega_4^2 - \\
& v^2\omega_3^2\omega_1u + 2\omega_1u + v^2\omega_4\omega_2 - \frac{1}{2}\omega_4^2 - \frac{1}{2}\omega_3^2u^2\omega_2 - v^2\omega_4\omega_1\omega_2 + \frac{1}{2}v^2\omega_4^2 + 2v^2\omega_3\omega_4\omega_2 - \frac{1}{2}v^2\omega_3\omega_2\omega_1 - \\
& \omega_3\omega_1u^2 + \frac{1}{2}\omega_3\omega_2\omega_2 - 4v^2\omega_1\omega_2^2 - \frac{5}{2}\omega_4\omega_2 + 2v^2\omega_3\omega_1\omega_2 - 3\omega_1\omega_2 - 6v^2\omega_3\omega_4\omega_2 - \omega_2^2 + 3\omega_2 - 2\omega_4u + \\
& 2v^2\omega_3\omega_2^2 + 2v^2\omega_3^2\omega_4u - v^2\omega_3\omega_4\omega_1 + \omega_1\omega_2^2 - 2v^2\omega_3\omega_4\omega_1u - \frac{1}{2}\omega_3\omega_1u - \frac{1}{2}\omega_3\omega_2^2 + \frac{1}{2}\omega_4\omega_2^2 - \frac{1}{2}v^2\omega_4^2\omega_1 - \\
& 5v^2\omega_3\omega_2 - \omega_4^2\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2 - 2v^2\omega_4\omega_2^2 - v^2\omega_4\omega_1u - v^2\omega_3^2\omega_4 + \frac{1}{2}\omega_3\omega_1\omega_2,
\end{aligned}$$

$$\alpha_{x,y}^{[\mu_1], t-2\delta_t} = 2 + 2v^2\omega_3^2\omega_1u^2 + 6\omega_3c_s^2\omega_2 - 4\omega_1u^2 - \frac{1}{2}\omega_3 - \omega_4\omega_1u^2\omega_2 - \omega_3\omega_1u^2\omega_2 + 4v^2\omega_3c_s^2\omega_2^2 - 6v^2\omega_3\omega_4c_s^2\omega_2 -$$

$$\begin{aligned}
& \frac{5}{2}v^2\omega_3\omega_4 - 2\omega_1u^2\omega_2^2 - 4v^2\omega_2 + \omega_4\omega_1u^2 - 4\omega_3c_s^2 - \frac{3}{2}v^2\omega_3^2 + \omega_3u^2\omega_2^2 - \frac{1}{2}v^2\omega_3^2\omega_2 + v^4\omega_4^2\omega_2 + 2v^2\omega_3 - \\
& 3\omega_3u^2\omega_2 + 2v^2\omega_3\omega_4^2c_s^2 + 8v^2\omega_1u^2\omega_2^2 + 6\omega_1u^2\omega_2 - 2v^2\omega_2^2 - \frac{1}{2}\omega_4 - 2v^2\omega_3u^2\omega_2^2 + 6v^2\omega_3\omega_4u^2\omega_2 - \\
& \frac{1}{2}v^2\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_3^2u^2 + v^2\omega_4^2u^2\omega_2 + 2v^2\omega_3^2\omega_4c_s^2 - \frac{1}{2}\omega_3\omega_4u^2 - 2\omega_3c_s^2\omega_2^2 - v^4\omega_3^2\omega_2 + \frac{1}{2}\omega_3\omega_4u^2\omega_2 + \\
& 2v^2\omega_4^2\omega_1u^2 + \frac{1}{2}\omega_3^2u^2\omega_2 + 2\omega_3u^2 - v^2\omega_4^2 + 5v^2\omega_4\omega_2 + \omega_3\omega_1u^2 - 2v^2\omega_3^2c_s^2\omega_2 - 2v^4\omega_4\omega_2^2 + \frac{1}{2}\omega_4\omega_2 - \\
& v^2\omega_3\omega_2^2 + \omega_2^2 - 3\omega_2 + 4v^2\omega_3\omega_4\omega_1u^2 - 8v^2\omega_3\omega_1u^2\omega_2 - \omega_3\omega_4c_s^2\omega_2 + \omega_3^2c_s^2 - \omega_3^2c_s^2\omega_2 - 2v^2\omega_3^2\omega_4u^2 + \\
& \omega_3\omega_4c_s^2 - 2v^2\omega_4u^2\omega_2^2 - 8v^2\omega_4\omega_1u^2\omega_2 + 6v^2\omega_3\omega_2 + v^2\omega_3^2u^2\omega_2 - 2v^2\omega_3\omega_4u^2 + 2v^4\omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_5],t-2\delta_t} = & -4 + \frac{1}{2}\omega_3^2\omega_2 - \frac{1}{2}\omega_4\omega_1 + 5\omega_3 + \frac{1}{2}\omega_3\omega_4\omega_2 - \omega_1^2 - 2\omega_4\omega_1u^2 - \omega_3\omega_4 + \omega_4^2u^2 - v^2\omega_3^2 + \omega_3\omega_1^2 + v^2\omega_3^2\omega_2 - \\
& 2\omega_3\omega_1^2u^2 - \frac{7}{2}\omega_3\omega_1 + \omega_4 - \omega_3^2u^2 + 3\omega_1 + \omega_3^2\omega_1u^2 - v^2\omega_4^2\omega_2 + v^2\omega_4^2 - 2v^2\omega_4\omega_2 + \omega_3\omega_2^2 + 2\omega_3\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_1 - \\
& \frac{1}{2}\omega_4\omega_2 - 2v^2\omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_1 - \omega_2^2 + 3\omega_2 + 2\omega_4\omega_1^2u^2 + 2v^2\omega_3\omega_2 - \omega_3^2 - \omega_4^2\omega_1u^2 + 2v^2\omega_4\omega_2^2 - \frac{7}{2}\omega_3\omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_t,y}^{[\mu_1],t-2\delta_t} = & 2 - v^2\omega_3^2\omega_1u^2 + \frac{1}{4}\omega_4^2u^3 - \omega_4\omega_1u^3 - \frac{5}{4}v^2\omega_3^2u\omega_2 - \frac{3}{2}\omega_3c_s^2\omega_2 + 2\omega_1u^2 - \frac{3}{4}\omega_4^2u^2\omega_2 + \frac{1}{2}\omega_4\omega_1 - \frac{1}{2}\omega_3 + \\
& \frac{3}{2}\omega_4\omega_1u^2\omega_2 - \frac{1}{4}\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_1\omega_2^2 - \frac{1}{2}\omega_3\omega_1u^2\omega_2 - 2v^2\omega_3c_s^2\omega_2^2 - \frac{1}{4}\omega_3^2u + 3v^2\omega_3\omega_4c_s^2\omega_2 - \frac{7}{4}v^2\omega_3\omega_4 + \\
& \frac{1}{2}\omega_3\omega_4u + \omega_1u^2\omega_2^2 + 2v^2\omega_1\omega_2^2 + 2v^2\omega_3\omega_1u\omega_2 - 2v^2\omega_4\omega_1\omega_2 - \frac{3}{2}\omega_4\omega_1u^2 + \frac{1}{4}\omega_3\omega_4 + \frac{3}{4}\omega_4^2u^2 - \frac{1}{4}v^2\omega_3^2u + \omega_3c_s^2 + \\
& \frac{5}{2}\omega_4\omega_2 + 2v^2\omega_4\omega_1u\omega_2 + 2v^2\omega_4\omega_2\omega_2^2 - v^2\omega_3^2 - \frac{1}{4}\omega_3\omega_2\omega_2^2 - \frac{1}{2}v^2\omega_3^2\omega_2 - \frac{1}{2}v^4\omega_4^2\omega_2 - \frac{1}{2}v^2\omega_3 + \frac{3}{4}\omega_3u^2\omega_2 - \\
& \omega_3\omega_1u^3\omega_2 - \frac{1}{4}\omega_3^2u^3 - v^2\omega_3\omega_4^2c_s^2 - \frac{1}{2}\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_4^2\omega_2 - 4v^2\omega_1u^2\omega_2^2 + \omega_4\omega_1u^3\omega_2 - 3\omega_1u^2\omega_2 - 4v^2\omega_2^2 - \frac{3}{2}\omega_4 - \\
& \frac{1}{2}\omega_4\omega_1\omega_2^2 + \frac{3}{4}\omega_4^2u + v^2\omega_3u^2\omega_2^2 - \frac{1}{4}\omega_4^2u^3\omega_2 - 3v^2\omega_3\omega_4u^2\omega_2 - \frac{11}{4}v^2\omega_3\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_4u\omega_2 + \frac{3}{2}\omega_1\omega_2 + \frac{1}{4}\omega_3^2\omega_2 - \\
& \frac{1}{4}v^2\omega_4^2u - \frac{1}{2}\omega_3^2u^2 - \frac{1}{2}v^2\omega_4^2u^2\omega_2 - \omega_1 - v^2\omega_3^2\omega_4c_s^2 + \frac{1}{4}\omega_3\omega_4u^2 + v^2\omega_3\omega_4^2 + \frac{1}{2}v^2\omega_3\omega_4u - \frac{1}{2}v^2\omega_3^2\omega_1u + \omega_1u + \\
& \frac{1}{4}\omega_3c_s^2\omega_2^2 - \frac{3}{4}v^2\omega_4^2\omega_2 + \frac{1}{2}\omega_3^2\omega_2 + \frac{1}{4}\omega_4^2 - \frac{1}{4}\omega_3\omega_4u^2\omega_2^2 - v^2\omega_4^2\omega_1u^2 + \frac{1}{2}\omega_3^2u^2\omega_2 - \frac{1}{2}\omega_3u^2 + \omega_3\omega_1u^3 - \\
& \frac{5}{4}v^2\omega_4^2u\omega_2 - \frac{5}{4}v^2\omega_4^2 + 2v^2\omega_3\omega_4^2u + \frac{1}{4}v^2\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_1 - \frac{1}{4}\omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_1u^2 + v^2\omega_3^2c_s^2\omega_2 + \frac{1}{2}\omega_3\omega_2u - \\
& 2v^2\omega_1u\omega_2^2 + v^4\omega_4\omega_2^2 + \frac{7}{4}\omega_4\omega_2 + 5v^2\omega_3\omega_2^2 - 2v^2\omega_3\omega_1\omega_2 - \frac{3}{2}\omega_1u\omega_2 - \frac{11}{2}v^2\omega_3\omega_4u\omega_2 + \omega_2^2 - 3\omega_2 - \frac{1}{4}\omega_4u^2\omega_2^2 - \\
& 2\omega_4u + 2v^2\omega_3\omega_2^2 + 2v^2\omega_3^2\omega_4u - 2v^2\omega_3\omega_4\omega_1u^2 + v^2\omega_3\omega_4\omega_1 + 4v^2\omega_3\omega_1u^2\omega_2 + \frac{1}{2}\omega_1u\omega_2^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 - \\
& \frac{1}{2}\omega_4u^2 + \frac{3}{4}\omega_4u^2\omega_2^2 - v^2\omega_3\omega_4\omega_1u + v^2\omega_3^2\omega_4u^2 - \frac{1}{2}\omega_3\omega_4c_s^2 - \frac{1}{2}\omega_3\omega_1u + v^2\omega_4u^2\omega_2^2 - \frac{1}{2}\omega_3u\omega_2^2 + 4v^2\omega_4\omega_1u^2\omega_2 - \\
& \frac{1}{2}\omega_3\omega_4c_s^2u + \frac{1}{4}\omega_3^2\omega_3^2u - \frac{1}{4}\omega_4\omega_2^2 + \frac{1}{2}\omega_3^2c_s^2u + \frac{1}{2}v^2\omega_4^2\omega_1 + \frac{15}{4}v^2\omega_3\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_2^2 + \frac{1}{2}v^2\omega_4 - \frac{3}{4}\omega_4^2u\omega_2 + \\
& v^2\omega_3\omega_4u^2 - \frac{1}{2}\omega_3^2c_s^2u\omega_2 - v^4\omega_3\omega_2^2 + \frac{3}{4}v^2\omega_4\omega_2 + \frac{3}{2}\omega_3\omega_2 + \frac{1}{2}\omega_3\omega_4c_s^2u\omega_2 - \frac{1}{2}v^2\omega_4^2\omega_1u + v^2\omega_3^2\omega_4 + \frac{1}{2}\omega_3\omega_1u\omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta_t,y}^{[\mu_5],t-2\delta_t} = & -2 + v^2\omega_3^2u\omega_2 + \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{1}{2}\omega_4\omega_1 - \omega_4\omega_1u^2\omega_2 + \frac{1}{2}\omega_1\omega_2^2 + \omega_3\omega_1u^2\omega_2 + 2v^2\omega_3\omega_4 - 2v^2\omega_1\omega_2^2 - \\
& 4v^2\omega_3\omega_1u\omega_2 + 2v^2\omega_4\omega_1\omega_2 + \omega_4\omega_1u^2 - \frac{1}{2}\omega_4^2u^2 - \frac{5}{2}\omega_4u\omega_2 - 4v^2\omega_4\omega_1u\omega_2 - 2v^2\omega_4u\omega_2^2 + \frac{3}{2}v^2\omega_3^2 + \frac{1}{2}\omega_4\omega_1\omega_2 + \\
& \frac{1}{2}\omega_4^2\omega_2 + 4v^2\omega_2^2 + 2\omega_4 + \frac{1}{2}\omega_4\omega_1u + \frac{1}{2}\omega_4u\omega_2^2 - \omega_4^2u + 3v^2\omega_3\omega_4\omega_2 - \frac{3}{2}\omega_1\omega_2 + \frac{1}{2}\omega_3^2u^2 + \omega_1 - v^2\omega_3\omega_4^2 + \\
& v^2\omega_3^2\omega_1u - 2\omega_1u + v^2\omega_4^2\omega_2 - \frac{1}{2}\omega_4^2 - \frac{1}{2}\omega_3^2u^2\omega_2 + v^2\omega_4^2u\omega_2 + \frac{1}{2}v^2\omega_4^2 - 2v^2\omega_3\omega_4^2u - 3v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1 - \\
& \omega_3\omega_1u^2 - \frac{1}{2}\omega_3\omega_1\omega_2 + 4v^2\omega_1u\omega_2^2 - \frac{5}{2}\omega_4\omega_2 + 2v^2\omega_3\omega_1\omega_2 + 3\omega_1u\omega_2 + 6v^2\omega_3\omega_4u\omega_2 - \omega_2^2 + 3\omega_2 + 2\omega_4u - \\
& 2v^2\omega_3u\omega_2^2 - 2v^2\omega_3^2\omega_4u - v^2\omega_3\omega_4\omega_1 - \omega_1u\omega_2^2 + 2v^2\omega_3\omega_4\omega_1u + \frac{1}{2}\omega_3\omega_1u + \frac{1}{2}\omega_3u\omega_2^2 + \frac{1}{2}\omega_4\omega_2^2 - \frac{1}{2}v^2\omega_4^2\omega_1 - \\
& 5v^2\omega_3\omega_2 + \omega_4^2u\omega_2 - \frac{1}{2}\omega_4\omega_1u\omega_2 - 2v^2\omega_4\omega_2^2 + v^2\omega_4^2\omega_1u - v^2\omega_3^2\omega_4 - \frac{1}{2}\omega_3\omega_1u\omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_t,y+\delta_t}^{[\mu_1],t-2\delta_t} = & 1 - \frac{1}{4}v^2\omega_3^2\omega_1u^2 + \frac{1}{4}v\omega_4\omega_1u\omega_2 - \frac{1}{4}\omega_3^2\omega_4c_s^2 - \frac{1}{4}\omega_4^2u^3 - \frac{3}{4}\omega_4\omega_1u^3 + \frac{3}{4}v^2\omega_3^2u\omega_2 + \frac{3}{4}\omega_3c_s^2\omega_2 + \frac{5}{2}\omega_3\omega_1u - \\
& \frac{1}{2}v\omega_4 - \omega_1u^2 + \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_3 - \frac{1}{4}\omega_4\omega_1u^2\omega_2 - v^3\omega_3\omega_4\omega_2 - 2v^3\omega_2^2 - \frac{1}{4}v\omega_3\omega_1u\omega_2 + \frac{1}{8}\omega_3\omega_4\omega_1u - \frac{1}{4}v\omega_4^2\omega_1u^2 - \\
& \frac{7}{8}v\omega_3\omega_2 - \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{2}v^3\omega_3\omega_4\omega_1u - v^2\omega_1^2u\omega_2 + \frac{1}{8}\omega_3^2u + \frac{3}{4}\omega_3\omega_4^2c_s^2u + \frac{1}{4}v^3\omega_3^2\omega_1u - \frac{11}{8}v^2\omega_3\omega_4 + \frac{1}{2}v^3\omega_3\omega_2^2 + \\
& \frac{3}{2}\omega_4\omega_1^2u^4 - \frac{1}{4}\omega_3\omega_4u + \frac{1}{8}\omega_3^2\omega_1u - \frac{1}{2}v^2\omega_1\omega_2^2 - \frac{3}{4}v^2\omega_3\omega_1u\omega_2 + \frac{1}{4}v\omega_3\omega_1u - \frac{1}{2}v^2\omega_4\omega_1\omega_2 - 3v^2\omega_2 - v\omega_3\omega_4c_s^2u\omega_2 + \\
& \frac{1}{2}v^2\omega_3\omega_1u^2 + \frac{1}{2}v\omega_3\omega_4c_s^2\omega_2 + \frac{7}{8}\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_4c_s^2 + \frac{1}{4}v^3\omega_3^2\omega_1 + \frac{5}{4}v^3\omega_4\omega_2 + \frac{1}{8}\omega_3\omega_4 + \frac{3}{2}\omega_4^2u^2 + \frac{1}{2}v^2\omega_3^2u - 2\omega_3c_s^2 - \\
& \frac{1}{4}\omega_4u\omega_2 - \frac{3}{4}v^2\omega_4\omega_1u\omega_2 + \frac{1}{2}v^2\omega_4u\omega_2^2 + \frac{3}{4}v\omega_3^2c_s^2 - \frac{1}{4}v^2\omega_3^2 - \frac{1}{4}\omega_4^2\omega_1u^4 - \frac{5}{4}v^2\omega_4\omega_1u + \frac{1}{4}v\omega_3\omega_1\omega_2 + \frac{3}{4}v\omega_3\omega_4c_s^2 - \\
& \frac{1}{2}\omega_3^2\omega_4c_s^2u^2 - \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_3^2\omega_2 - \frac{1}{4}v\omega_4u\omega_2^2 + \frac{1}{4}v\omega_4^2\omega_1u^3 + v^2\omega_3 - \frac{3}{8}\omega_3u\omega_2^2 - \frac{1}{2}\omega_3^2\omega_1u^3 - \frac{5}{2}v^2\omega_4\omega_1\omega_2 - \\
& 2v\omega_1u\omega_2 - \frac{1}{4}\omega_3\omega_1u^3\omega_2 + \frac{1}{4}\omega_3\omega_2^2u^2 + \frac{1}{8}\omega_3^2u^3 - \frac{1}{2}v^3\omega_3\omega_4\omega_1u + \frac{1}{4}v^3\omega_3^2\omega_4 + \frac{3}{2}\omega_3\omega_4c_s^2u - \frac{3}{8}v\omega_4\omega_2 - \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \\
& \frac{3}{2}v^2\omega_1\omega_2 + \frac{1}{4}v\omega_3\omega_2u + \frac{1}{4}\omega_4\omega_1u^3\omega_2 + \frac{1}{2}\omega_1u^2\omega_2 + v^2\omega_2^2 + \frac{1}{2}v\omega_3\omega_1u^2 - \frac{3}{4}\omega_4 + \frac{1}{2}v^3\omega_4\omega_2 + \frac{1}{8}\omega_4\omega_1u + \frac{1}{4}v^2\omega_3\omega_1u - \\
& \frac{1}{2}v\omega_3\omega_4c_s^2\omega_1u - \frac{3}{8}\omega_4^2u - v^2\omega_3\omega_4u\omega_2 - v^3\omega_4\omega_2\omega_2^2 - \frac{1}{4}v^2\omega_3\omega_4\omega_2 - \frac{1}{8}\omega_3\omega_4\omega_1u^2 + 2v^3\omega_3\omega_4u\omega_2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 + \\
& \frac{1}{4}\omega_1\omega_2 + v\omega_1^2u\omega_2 - \frac{3}{8}v^3\omega_3^2\omega_2 - \frac{1}{2}\omega_3\omega_4^2c_s^2u^2 + \frac{1}{2}v^3\omega_3^2\omega_2u\omega_2 - \frac{1}{4}\omega_3^2c_s^2\omega_1 + \frac{1}{8}v^2\omega_4^2u - \frac{1}{2}\omega_3^2u^2 - \frac{1}{2}v^2\omega_4^2u\omega_2 + \frac{1}{4}\omega_3\omega_1u^3 - \\
& \frac{1}{2}\omega_1 + \frac{1}{2}v\omega_3\omega_4u\omega_2 + \frac{1}{8}\omega_3^2\omega_1u^2 - \frac{1}{8}\omega_3\omega_4u^2 + \frac{7}{4}v^3\omega_3\omega_2 + \frac{1}{4}v^2\omega_3\omega_4u + \frac{9}{4}v^2\omega_3\omega_4u\omega_2 + \frac{1}{4}v^2\omega_3\omega_2\omega_1u - \frac{1}{2}v\omega_3\omega_4c_s^2\omega_1u - \\
& \frac{1}{2}\omega_1u + \frac{1}{8}v\omega_4^2 - \frac{1}{4}v^2\omega_4^2\omega_2 - \frac{5}{8}v^2\omega_3\omega_1 + \frac{1}{2}v\omega_3^2u^2\omega_2 + \frac{1}{8}\omega_4^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1u - \frac{1}{4}v^3\omega_3^2\omega_2 - \frac{1}{2}v\omega_3\omega_4c_s^2\omega_1 - \\
& \frac{1}{2}v\omega_3\omega_4\omega_2 - \frac{1}{4}v^2\omega_4^2\omega_1u^2 + v\omega_3\omega_4^2\omega_1u\omega_2 - \frac{1}{4}v\omega_3\omega_4\omega_1u^2 + \frac{3}{4}v\omega_3\omega_1u^3 + \frac{3}{4}v^2\omega_4^2u\omega_2 + \frac{1}{2}v\omega_1^2u\omega_2 - \\
& \frac{3}{8}v\omega_3^2u^2 - \omega_3c_s^2\omega_1u^2 - \frac{1}{8}\omega_3\omega_4^2u^2 + v^3\omega_1\omega_2^2 + \frac{1}{4}v^3\omega_4^2\omega_1u - \frac{3}{4}v^2\omega_3\omega_4u^2 - \frac{1}{2}\omega_3\omega_1u^4 - \frac{1}{4}v\omega_3\omega_4u^2 + \frac{13}{8}v^2\omega_4\omega_2 + \\
& \frac{1}{8}v^2\omega_3^2\omega_1 - \frac{1}{2}v\omega_3^2c_s^2\omega_1 - \frac{1}{2}v\omega_3^2u\omega_2 - \frac{3}{4}v\omega_1\omega_2 - \frac{1}{2}\omega_3c_s^2\omega_1u + \frac{1}{8}\omega_3\omega_1u^2 + \frac{1}{2}v\omega_3^2\omega_4c_s^2u + \frac{1}{2}v\omega_4\omega_1u^2 - v\omega_1u^2\omega_2 -
\end{aligned}$$

$$\begin{aligned}
& \frac{1}{4}\omega_3 u w_2 + \frac{5}{4}\omega_3 c_s^2 \omega_1 - \frac{1}{4}v\omega_4^2 u - \frac{1}{2}v\omega_3 - v^2\omega_1 u \omega_2^2 - \frac{1}{2}v^3\omega_3 \omega_4 + \frac{1}{8}\omega_4 \omega_2 - \frac{1}{4}v^2\omega_3 \omega_2^2 - \frac{1}{4}v^2\omega_3 \omega_1 \omega_2 + \frac{1}{2}v\omega_3 \omega_1 u^3 \omega_2 + \\
& \frac{1}{4}v\omega_4 \omega_1 u + \frac{1}{4}v^3\omega_3 \omega_4 \omega_1 + \frac{1}{4}\omega_1 u \omega_2 - \frac{1}{4}v\omega_3^2 \omega_1 u^3 + \frac{1}{4}v\omega_3 \omega_1 + \frac{3}{4}v\omega_3 u^2 \omega_2 + v^2\omega_3 \omega_4 u \omega_2 - \frac{1}{2}\omega_2 + \omega_4 u + \frac{1}{2}v^2\omega_3 \omega_2^2 - \\
& \frac{3}{4}v^2\omega_3^2 \omega_4 u + \frac{1}{4}\omega_3^2 \omega_1 u^4 - \frac{5}{4}v^2\omega_3 \omega_1 u - \frac{3}{2}v^2\omega_3 \omega_4 \omega_1 u^2 - \frac{1}{2}v\omega_4 \omega_1 u^3 \omega_2 - v^3\omega_3 \omega_1 \omega_2 + \frac{3}{2}v\omega_2 + \frac{3}{8}v^2\omega_3 \omega_4 \omega_1 + \\
& 2v^2\omega_3 \omega_1 u^2 \omega_2 + 2v^3\omega_1 u \omega_2^2 - \frac{1}{2}\omega_3 \omega_4 c_s^2 \omega_2 - \frac{1}{2}\omega_4 u^2 + \frac{1}{2}\omega_3^2 c_s^2 + \frac{1}{2}\omega_4^2 \omega_1 u^3 - \frac{5}{2}v^2\omega_3 \omega_2 + \frac{1}{8}\omega_4 u^2 \omega_2 - \frac{1}{8}v^3\omega_4^2 - \\
& \frac{1}{4}v^3\omega_4^2 \omega_2 + \frac{1}{2}v^2\omega_3 \omega_4 \omega_1 u + \frac{1}{2}v^2\omega_3^2 \omega_4 u^2 + \frac{3}{2}v\omega_3 \omega_4 c_s^2 - \frac{1}{4}\omega_4 \omega_1^2 u^2 + \frac{1}{4}v\omega_3 \omega_4 - \frac{1}{2}v^3\omega_3^2 \omega_4 u + \frac{1}{4}v^2\omega_4 \omega_1^2 u - \frac{3}{8}\omega_3 \omega_1 u + \\
& \frac{1}{4}v\omega_3^2 + \frac{1}{8}v\omega_4^2 u^2 - v^3\omega_3 \omega_2^2 + 2v^2\omega_4 \omega_1 u^2 \omega_2 - \frac{9}{4}\omega_3 \omega_4 c_s^2 u - \frac{1}{4}\omega_3^2 c_s^2 u + \frac{3}{4}v\omega_4 u \omega_2 + \frac{11}{8}v^2\omega_3 \omega_2 + \frac{1}{4}v^3\omega_3 \omega_4^2 + \\
& 5v^2\omega_1 u \omega_2 + \frac{1}{2}v\omega_4 \omega_1 u^2 - \frac{1}{4}v\omega_3 \omega_4^2 c_s^2 + \frac{1}{2}v^3\omega_4^2 u \omega_2 - \frac{1}{2}v^2\omega_3^2 u^2 \omega_2 - \frac{1}{4}\omega_4 \omega_1^2 u^3 - \frac{1}{4}v\omega_3^2 u + \frac{1}{2}v^2\omega_4 - \frac{1}{2}\omega_3 c_s^2 \omega_1^2 u - \\
& \frac{1}{4}\omega_4^2 \omega_1^2 u^2 + \frac{1}{2}v^2\omega_3 \omega_4^2 u^2 + \frac{1}{4}v\omega_3^2 \omega_1 u - \frac{1}{2}v\omega_3 \omega_4 u - \frac{3}{2}v^3\omega_4 \omega_1 u \omega_2 + \frac{1}{2}\omega_3^2 c_s^2 \omega_1 u^2 - \frac{1}{4}v^2\omega_4 \omega_2^2 + \frac{1}{8}\omega_3 \omega_2 - 2v^2\omega_1^2 u^2 \omega_2 + \\
& \frac{1}{8}v\omega_3^2 \omega_2 + \frac{1}{4}v\omega_4 \omega_1 + \frac{3}{2}\omega_3 \omega_4 c_s^2 \omega_1 u^2 - \frac{3}{2}v\omega_3 c_s^2 \omega_2 - \frac{1}{4}v\omega_3^2 \omega_4 c_s^2 + \frac{1}{2}v\omega_3 \omega_4 c_s^2 u + \frac{1}{2}\omega_3 \omega_4 c_s^2 u \omega_2 - \frac{3}{2}v\omega_3 \omega_1 u^2 \omega_2 + \\
& \frac{1}{4}v^2\omega_4^2 \omega_1 u + \frac{1}{8}v\omega_3 \omega_4 \omega_2 - \frac{3}{2}v^3\omega_3 \omega_1 u \omega_2 + v\omega_3 c_s^2 \omega_1 \omega_2 + \frac{1}{4}v^2\omega_3^2 \omega_4 u + \frac{1}{2}v^3\omega_3 \omega_4^2 u + \frac{1}{4}v\omega_3 \omega_4 \omega_1 u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_i, y+\delta_i}^{[5], t-2\delta_t} = & -2 - v\omega_4 \omega_1 u \omega_2 + \frac{1}{2}v^2 \omega_3^2 u \omega_2 + \frac{3}{2}v\omega_4 + \frac{1}{8}\omega_3^2 \omega_2 - \frac{3}{8}\omega_4 \omega_1 + \frac{5}{2}\omega_3 - \frac{1}{2}\omega_4 \omega_1 u^2 \omega_2 + \frac{3}{8}\omega_3 \omega_4 \omega_2 - 2v\omega_3 \omega_4^2 u - v\omega_3 \omega_1 u \omega_2 + \\
& \frac{1}{2}\omega_3 \omega_4 \omega_1 u - \frac{1}{2}v\omega_4^2 \omega_1 u^2 + \frac{3}{2}v\omega_4^2 u \omega_2 + 2v\omega_3 \omega_2 - \frac{3}{2}\omega_3 \omega_1 u^2 \omega_2 + \omega_3^2 u - v^2 \omega_3 \omega_4 + \frac{7}{2}\omega_3 \omega_4 u + \frac{1}{4}\omega_3^2 \omega_1 u + v^2 \omega_1 \omega_2^2 - \\
& 2v^2 \omega_3 \omega_1 u \omega_2 + \frac{1}{2}v\omega_3 \omega_2 - \frac{1}{4}v\omega_4 \omega_2^2 - 3v\omega_3 \omega_1 u - \frac{1}{2}v^2 \omega_4 \omega_1 \omega_2 - 2v\omega_3^2 \omega_4 u + \frac{3}{2}\omega_4 \omega_1 u^2 - \frac{7}{4}\omega_3 \omega_4 - \frac{1}{4}\omega_4^2 u^2 + \frac{1}{2}\omega_4 \omega_2 - \\
& 2v^2 \omega_4 \omega_1 u \omega_2 - v\omega_1 \omega_2 - v^2 \omega_4 \omega_2 - \frac{3}{4}v^2 \omega_3^2 \omega_2 - \frac{1}{2}v\omega_3 \omega_1 \omega_2 + \frac{1}{4}\omega_3 \omega_1^2 u + \frac{3}{4}v\omega_3^2 \omega_4 + v\omega_4 \omega_1 u^2 - \frac{1}{4}v^2 \omega_3^2 \omega_2 + 6v\omega_1 \omega_2 + \\
& \frac{1}{2}\omega_3 \omega_1^2 u^2 + \frac{1}{2}v\omega_4 \omega_1^2 u - \frac{9}{8}\omega_3 \omega_1 + \frac{1}{2}v\omega_3^2 \omega_1 + 2v\omega_4 \omega_2 - 3v\omega_3 \omega_2 - 2v\omega_2^2 \omega_2^2 + \frac{1}{4}\omega_3 \omega_4^2 + \frac{3}{2}\omega_4 \omega_2 - 2\omega_1 \omega_1 u + \\
& v\omega_3 \omega_4 \omega_1 + \frac{1}{2}\omega_4^2 u - \frac{3}{2}v^2 \omega_3 \omega_4 \omega_2 + \frac{3}{4}v\omega_4^2 \omega_1 u - \frac{3}{2}\omega_3 \omega_4 \omega_1 u^2 - \frac{1}{2}\omega_1 \omega_2 - \frac{1}{4}v\omega_3 \omega_2^2 - 2v\omega_1^2 u^2 \omega_2 - \frac{1}{2}\omega_3^2 u \omega_2 - \\
& \frac{3}{4}\omega_3^2 u^2 + \omega_1 - v\omega_3 \omega_4 \omega_2 - \frac{1}{4}\omega_3^2 \omega_1 u^2 - \omega_3 \omega_4 u^2 + \frac{1}{2}v^2 \omega_3 \omega_4^2 + \frac{1}{2}v^2 \omega_3^2 \omega_1 u + 4\omega_1 u - \frac{1}{2}v\omega_4^2 + \frac{1}{2}\omega_1^2 \omega_2 - \frac{1}{4}v^2 \omega_4^2 \omega_2 - \\
& \frac{1}{2}\omega_3 \omega_3^2 \omega_2^2 + v\omega_3 \omega_2^2 u^2 - \frac{1}{2}\omega_2^2 + \frac{1}{2}\omega_3 \omega_4 u^2 \omega_2 + \frac{3}{2}v\omega_3 \omega_4 \omega_2 - \frac{1}{2}\omega_3 \omega_4^2 u^2 - 3v\omega_3 \omega_4 \omega_1 u^2 + \frac{1}{2}\omega_3 \omega_2^2 \omega_2 + \frac{1}{2}v^2 \omega_4^2 \omega_2 - \\
& v\omega_1^2 \omega_2 - \omega_2^2 u - \frac{1}{4}v\omega_4^2 + \frac{1}{4}\omega_4^2 \omega_1 u - v^2 \omega_3 \omega_4 u - \frac{1}{2}\omega_1 \omega_2 - \frac{1}{4}v\omega_3 \omega_2^2 u - \frac{1}{2}\omega_1 \omega_2 + 2v\omega_1 \omega_2 + \omega_2^2 u + \\
& \frac{5}{2}\omega_3 \omega_1 u^2 + \frac{1}{2}\omega_3^2 \omega_4 u^2 + \frac{3}{4}v\omega_3 \omega_4^2 + \frac{3}{2}\omega_3 \omega_1 u \omega_2 + \frac{1}{2}v\omega_4^2 u + \frac{5}{2}\omega_3 \omega_1 u \omega_2 + \frac{1}{8}\omega_3^2 \omega_1 - \frac{3}{4}\omega_4 \omega_2 + \frac{1}{2}v\omega_4 \omega_2^2 + \frac{1}{2}v^2 \omega_3 \omega_2^2 + \\
& \frac{3}{8}\omega_3 \omega_4 \omega_1 - \frac{3}{2}v^2 \omega_3 \omega_1 \omega_2 - 3v\omega_4 \omega_1 u + v\omega_3 \omega_1 u^2 + v\omega_2^2 - 2\omega_1 \omega_2 - \frac{3}{2}v\omega_3 \omega_1 - \frac{1}{4}v\omega_4^2 \omega_2 + 3v^2 \omega_3 \omega_4 \omega_2 + \omega_2 - \frac{3}{2}\omega_4 \omega_1 - \\
& v^2 \omega_3 \omega_2 - v^2 \omega_3^2 \omega_4 u + \frac{1}{4}\omega_4 \omega_1^2 u - \frac{1}{2}v\omega_4 \omega_1 \omega_2 - 4v\omega_2 + \frac{1}{2}v^2 \omega_3 \omega_4 \omega_1 + \frac{1}{2}v\omega_3 \omega_1^2 u + \frac{1}{2}\omega_3 \omega_1 \omega_2 + v^2 \omega_3 \omega_4 \omega_1 u + \frac{1}{4}\omega_3 \omega_4 + \\
& \frac{1}{2}\omega_4 \omega_1^2 u^2 - \frac{7}{2}v\omega_3 \omega_4 - \frac{3}{4}\omega_3^2 \omega_4 u - 2\omega_3 \omega_1 u - v\omega_2^2 - 3v\omega_4 \omega_2 + \frac{5}{2}v^2 \omega_3 \omega_2 - \frac{1}{2}\omega_3^2 + \frac{1}{2}v\omega_3^2 u - 2\omega_1^2 u^2 + 2v\omega_4 \omega_1 u^2 \omega_2 - \\
& \frac{1}{4}\omega_4^2 \omega_1 u^2 + \frac{3}{4}v\omega_3^2 \omega_1 u + 5v\omega_3 \omega_4 u + \frac{1}{2}\omega_4 \omega_1 \omega_2 - \frac{1}{2}v\omega_1 \omega_2 + \frac{1}{2}v^2 \omega_4 \omega_2^2 - \frac{9}{8}\omega_3 \omega_2 - \frac{1}{4}v\omega_3^2 \omega_2 - \frac{1}{2}v\omega_4 \omega_1 - \\
& \frac{1}{2}v\omega_1^2 \omega_2 + 2v\omega_3 \omega_1 u^2 \omega_2 + \frac{1}{2}v^2 \omega_4^2 \omega_1 u - \frac{3}{4}\omega_3 \omega_4^2 u - \frac{1}{2}v\omega_3 \omega_4 \omega_2 + \frac{1}{2}v^2 \omega_3^2 \omega_4 + \frac{1}{2}\omega_3 \omega_1 \omega_2 + \frac{3}{2}v\omega_3 \omega_4 \omega_1 u - \frac{5}{2}\omega_3 u,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y+\delta_i}^{[1], t-2\delta_t} = & 1 + \frac{1}{2}v^2 \omega_3^2 \omega_1 u^2 - \frac{1}{2}\omega_3 c_s^2 \omega_2 - \frac{1}{2}v\omega_4 + 2\omega_1 u^2 + \frac{1}{4}v^2 \omega_3 \omega_2^2 + \frac{3}{2}\omega_4 \omega_1 - \frac{1}{4}\omega_3 + \frac{1}{4}\omega_4 \omega_1 u^2 \omega_2 + \frac{1}{4}v\omega_4^2 \omega_1 u^2 - \\
& \frac{1}{2}v\omega_3 \omega_2 - \frac{1}{4}v\omega_4^2 \omega_1 + \frac{1}{2}\omega_3 c_s^2 \omega_1 \omega_2 + \frac{1}{4}\omega_3 \omega_1 u^2 \omega_2 + \frac{1}{4}v^2 \omega_3 \omega_4 - \omega_4 \omega_1^2 u^4 + \frac{1}{4}v^2 \omega_4 \omega_1 \omega_2 - v^2 \omega_2 - v^2 \omega_3 \omega_2^2 u^2 - \\
& \frac{5}{2}\omega_4 \omega_1 u^2 - \frac{1}{4}v^3 \omega_3^2 \omega_1 + \frac{1}{2}v^3 \omega_4 \omega_2 + \frac{1}{4}\omega_3 \omega_4 + \frac{3}{4}v\omega_4^2 u^2 + \frac{1}{2}\omega_3 c_s^2 - \frac{1}{2}v\omega_3^2 c_s^2 + \frac{1}{2}\omega_4^2 \omega_1 u^4 + \frac{1}{2}v\omega_3 \omega_1 \omega_2 - \\
& \frac{1}{2}v\omega_3 \omega_4 c_s^2 + \omega_3^2 \omega_4 c_s^2 u^2 + \frac{1}{4}\omega_3 \omega_1^2 - v^2 \omega_4 \omega_1 - \frac{1}{2}v\omega_4 u^2 \omega_2 - \frac{1}{4}v^2 \omega_3 + \frac{1}{4}\omega_3 \omega_1^2 u^2 - \frac{5}{4}\omega_3 \omega_1^2 u^2 - \frac{1}{2}v^3 \omega_4 \omega_1 \omega_2 - \\
& \frac{1}{4}\omega_4 \omega_1 \omega_2 + \frac{1}{4}v^2 \omega_4 \omega_1^2 - \frac{1}{4}v\omega_3 \omega_1 - \frac{1}{2}v\omega_4 \omega_2 + 2v^2 \omega_1 \omega_2 - \omega_1 u^2 \omega_2 - v\omega_3 \omega_1 u^2 - \frac{5}{4}\omega_4 - \frac{1}{2}v\omega_3 \omega_4 \omega_1 + \\
& 2v^2 \omega_3 \omega_4 u^2 \omega_2 + \frac{1}{4}\omega_3 \omega_4 \omega_1 u^2 + \frac{1}{2}\omega_3 \omega_4 c_s^2 \omega_1 + \frac{1}{2}\omega_1 \omega_2 - 2v\omega_2^2 \omega_2 \omega_2 + \frac{1}{4}v^3 \omega_3^2 + \omega_3^2 \omega_4 c_s^2 u^2 - \frac{1}{2}\omega_3^2 u^2 + \\
& v^2 \omega_4^2 u^2 \omega_2 - \omega_1 - v\omega_3 \omega_4 \omega_2 \omega_2 + \frac{1}{2}\omega_3 \omega_1 u^2 + \frac{1}{4}\omega_3 \omega_4 u^2 - \frac{1}{2}v^3 \omega_3 \omega_2 + \frac{1}{4}v\omega_4^2 \omega_1 + \frac{1}{4}v\omega_4^2 - \frac{1}{4}\omega_4 \omega_1^2 - \frac{1}{2}v\omega_3^2 u^2 \omega_2 + \\
& \frac{1}{2}v\omega_2^2 \omega_2 + \frac{1}{4}\omega_4^2 + \frac{1}{2}v\omega_3 \omega_4 c_s^2 \omega_1 + \frac{1}{2}v^2 \omega_4^2 \omega_1 u^2 + \frac{1}{2}v\omega_3 \omega_4 \omega_1 u^2 - \frac{1}{4}\omega_3 \omega_2^2 + \frac{1}{4}v\omega_3^2 u^2 + 2\omega_3 c_s^2 \omega_1^2 u^2 - \frac{1}{4}v^2 \omega_4^2 + \\
& \omega_3 \omega_1^4 + \frac{1}{2}v\omega_3 \omega_4 u^2 + \frac{1}{4}v\omega_2^2 \omega_2^2 + \frac{1}{4}v\omega_3^2 \omega_1 u^2 - \frac{1}{4}v^2 \omega_4 \omega_2 + \frac{1}{2}\omega_3 \omega_1 u^2 - v^2 \omega_4 \omega_1^2 u^2 + 2v\omega_1 \omega_2 + \frac{1}{2}\omega_3 \omega_1 u^2 - v^2 \omega_4 \omega_1^2 u^2 + 2v\omega_1 \omega_2^2 - \\
& \frac{1}{2}v\omega_3 + \frac{1}{4}\omega_4 \omega_2 - \frac{1}{4}\omega_3 \omega_4 \omega_1 - \frac{1}{2}v^2 \omega_3 \omega_1 \omega_2 + \frac{1}{2}v\omega_3 \omega_1 - v^2 \omega_2^2 \omega_2 - \frac{1}{2}\omega_2 - \frac{1}{2}\omega_3 \omega_1 u^4 + \frac{1}{2}v\omega_4 \omega_1 \omega_2 + \\
& 3v^2 \omega_3 \omega_4 \omega_1 u^2 + \frac{1}{2}v^3 \omega_3 \omega_1 \omega_2 + \frac{3}{2}v\omega_2 - \frac{1}{4}v^2 \omega_3 \omega_4 \omega_1 - \frac{1}{4}\omega_3 \omega_1 \omega_2 - 4v^2 \omega_3 \omega_1 \omega_2^2 - \frac{3}{4}\omega_4 u^2 + \frac{1}{4}\omega_4 u^2 \omega_2 - \frac{1}{4}v^3 \omega_4^2 - \\
& v^2 \omega_3^2 \omega_4 u^2 - \frac{1}{2}\omega_3 \omega_4 c_s^2 + \frac{5}{4}\omega_4 \omega_1^2 u^2 + \frac{1}{2}v\omega_3 \omega_4 - \frac{1}{2}\omega_3 c_s^2 \omega_1^2 + \frac{1}{4}v\omega_3^2 + \frac{1}{4}v\omega_4^2 u^2 - 4v^2 \omega_4 \omega_1 \omega_2^2 + \frac{1}{4}v^2 \omega_4^2 \omega_1 + \\
& \frac{1}{4}\omega_4^2 \omega_3 \omega_2 - v\omega_4 \omega_1 \omega_2 + v^2 \omega_3^2 \omega_2 \omega_2 + \frac{3}{4}v^2 \omega_4 + \frac{3}{2}v\omega_4 \omega_1 \omega_2^2 - \frac{1}{4}\omega_4^2 \omega_1 u^2 - v^2 \omega_3 \omega_4^2 u^2 - \omega_3^2 \omega_1 \omega_2^2 + \frac{1}{4}\omega_3 \omega_2 - \\
& \frac{1}{4}\omega_4 \omega_1 + 4v^2 \omega_1^2 \omega_2^2 + \frac{1}{2}v\omega_4 \omega_1 - \frac{1}{2}v\omega_4^2 \omega_2 - 3\omega_3 \omega_4 c_s^2 \omega_1 \omega_2^2 + v\omega_3 c_s^2 \omega_2 + \frac{3}{2}v\omega_3 \omega_1 \omega_2^2 \omega_2 - v\omega_3 c_s^2 \omega_1 \omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y+\delta_i}^{[5], t-2\delta_t} = & -2 + 2v\omega_4 - \frac{1}{2}\omega_4^2 u^2 \omega_2 - \frac{5}{2}\omega_4 \omega_1 + 2\omega_4 \omega_1 u^2 \omega_2 + v\omega_4^2 \omega_1 u^2 + \frac{1}{2}v\omega_3 \omega_2 + v\omega_4^2 \omega_1 + 2\omega_3 \omega_1 u^2 \omega_2 - \omega_1^2 - \\
& v^2 \omega_4 \omega_1 \omega_2 - 3\omega_4 \omega_1 u^2 + \frac{1}{2}\omega_4^2 u^2 + \frac{1}{2}v^2 \omega_3^2 - \frac{1}{2}v\omega_3 \omega_1 \omega_2 - 2v\omega_4 \omega_1 u^2 + \frac{1}{2}\omega_4 \omega_1 \omega_2 + \frac{1}{2}v\omega_4 \omega_2 - 2v\omega_3 \omega_4 u^2 + \\
& 2\omega_4 + 3\omega_3 \omega_4 \omega_1 u^2 - \frac{3}{2}\omega_1 \omega_2 + 4v\omega_1^2 \omega_2 + \frac{3}{2}\omega_3^2 u^2 + 3\omega_1 + 2v\omega_3 \omega_4 u^2 \omega_2 + 2\omega_3 \omega_4 u^2 - v\omega_4^2 + \frac{1}{2}\omega_4 \omega_1^2 + \\
& v\omega_3^2 u^2 \omega_2 - v\omega_1^2 \omega_2 - 2v\omega_3 \omega_4 u^2 - \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_1 \omega_2 + \frac{1}{2}v\omega_4 \omega_1^2 - \omega_3 \omega_4 u^2 \omega_2 - \omega_3 \omega_4^2 u^2 + 6v\omega_3 \omega_4 \omega_1 \omega_2^2 - \\
& \frac{1}{2}\omega_3^2 u^2 \omega_2 - \frac{1}{2}v^2 \omega_4^2 + v\omega_3^2 \omega_1 u^2 + v\omega_4 \omega_2 - \frac{1}{2}v^2 \omega_3 \omega_1 \omega_2 + 3v\omega_1 \omega_2 - 2\omega_1 u^2 \omega_2 - 5\omega_3 \omega_1 \omega_2^2 - \omega_3^2 \omega_4 u^2 - \frac{1}{2}\omega_4 \omega_2 + \\
& v^2 \omega_3 \omega_1 \omega_2 - 2v\omega_3 \omega_4 u^2 - \frac{1}{2}v\omega_3 \omega_1 + \omega_2 - \frac{1}{2}v\omega_4 \omega_1 \omega_2 - 2v\omega_2 + \frac{1}{2}v\omega_3 \omega_1^2 - 2\omega_4 \omega_1^2 u^2 + \frac{1}{2}v^2 \omega_4^2 \omega_1 - v^2 \omega_3 \omega_2 + \\
& 4\omega_1^2 u^2 - 4v\omega_4 \omega_1 u^2 \omega_2 + \omega_4^2 \omega_1 u^2 + \frac{1}{2}\omega_4^2 \omega_1 - \frac{5}{2}\omega_4 \omega_1 + v\omega_4^2 u^2 \omega_2 - 4v\omega_3 \omega_1 u^2 \omega_2,
\end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_l, y+\delta_l}^{[\mu_1], t-2\delta_t} = & 1 - \frac{1}{4}v^2\omega_3^2\omega_1u^2 - \frac{1}{4}vw_4\omega_1uw_2 - \frac{1}{4}\omega_3^2\omega_4c_s^2 + \frac{1}{8}\omega_4^2u^3 + \frac{3}{4}\omega_4\omega_1u^3 - \frac{3}{4}v^2\omega_3^2uw_2 + \frac{3}{4}\omega_3c_s^2\omega_2 - \frac{5}{2}\omega_3c_s^2\omega_1u - \\ & \frac{1}{2}vw_4 - \omega_1u^2 + \frac{1}{4}\omega_4\omega_1 - \frac{1}{4}\omega_3 - \frac{1}{4}\omega_4\omega_1u^2\omega_2 - v^3\omega_3\omega_4\omega_2 - 2v^3\omega_2^2 + \frac{1}{4}vw_3\omega_1uw_2 - \frac{1}{8}\omega_3\omega_4\omega_1u - \frac{1}{4}v\omega_4^2\omega_1u^2 - \\ & \frac{7}{8}vw_3\omega_2 - \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}v^3\omega_3\omega_4\omega_1u + v^2\omega_1^2uw_2 - \frac{1}{8}\omega_3^2u - \frac{3}{4}\omega_3\omega_4c_s^2u - \frac{1}{4}v^3\omega_3^2\omega_1u - \frac{11}{8}v^2\omega_3\omega_4 + \frac{1}{2}v^3\omega_3\omega_2^2 + \\ & \frac{1}{2}\omega_4\omega_1^2u^4 + \frac{1}{4}\omega_3\omega_4u - \frac{1}{8}\omega_3^2\omega_1u - \frac{1}{2}v^2\omega_1\omega_2^2 + \frac{3}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{4}vw_3\omega_1u - \frac{1}{2}v^2\omega_4\omega_1\omega_2 - 3v^2\omega_2 + vw_3\omega_4c_s^2\omega_2 + \\ & \frac{1}{2}v^2\omega_3\omega_1^2u^2 + \frac{1}{2}vw_3\omega_4c_s^2\omega_2 + \frac{7}{8}\omega_4\omega_1u^2 - \frac{1}{4}\omega_3\omega_4^2c_s^2 + \frac{1}{4}v^3\omega_3^2\omega_1 + \frac{5}{4}v^3\omega_4\omega_2 + \frac{1}{8}\omega_3\omega_4 + \frac{3}{8}\omega_4^2u^2 - \frac{1}{8}v^2\omega_3^2u - 2\omega_3c_s^2 + \\ & \frac{1}{4}\omega_4\omega_1\omega_2 + \frac{3}{4}v^2\omega_4\omega_1\omega_2 - \frac{1}{2}v^2\omega_4\omega_2^2 + \frac{3}{4}\omega_3c_s^2 - \frac{1}{4}v^2\omega_3^2 - \frac{1}{4}\omega_4^2\omega_1u^4 + \frac{5}{4}v^2\omega_4\omega_1u + \frac{1}{4}vw_3\omega_1\omega_2 + \frac{3}{4}vw_3\omega_4c_s^2 - \\ & \frac{1}{2}\omega_3^2\omega_4c_s^2u^2 - \frac{1}{8}v^2\omega_4\omega_1 - \frac{1}{4}v^2\omega_3^2\omega_2 - \frac{1}{4}vw_4u^2\omega_2 - \frac{1}{4}vw_4^2\omega_1u^3 + v^2\omega_3 - \frac{3}{8}\omega_3u^2\omega_2 + \frac{1}{2}\omega_3^2\omega_1u^3 + \frac{5}{2}v^2\omega_4\omega_1\omega_2 + \\ & 2vw_1\omega_2 + \frac{1}{4}\omega_3\omega_1u^3\omega_2 + \frac{1}{4}\omega_3\omega_1^2u^2 - \frac{1}{8}\omega_3^2u^3 - \frac{1}{2}v^3\omega_4\omega_1\omega_2 + \frac{1}{4}v^3\omega_3^2\omega_4 - \frac{3}{4}\omega_3^2\omega_4c_s^2u - \frac{3}{8}vw_4\omega_2 + \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 + \\ & \frac{3}{2}v^2\omega_1\omega_2 - \frac{1}{4}vw_3\omega_2 - \frac{1}{4}\omega_4\omega_1u^3\omega_2 + \frac{1}{2}\omega_1u^2\omega_2 + v^2\omega_2^2 + \frac{1}{2}vw_3\omega_1u^2 - \frac{3}{4}\omega_4 + \frac{1}{2}v^3\omega_4\omega_2^2 - \frac{1}{8}\omega_4\omega_1u - \frac{1}{4}v^2\omega_3\omega_1^2u + \\ & \frac{1}{2}vw_3\omega_4c_s^2\omega_1u + \frac{3}{8}\omega_4^2u - v^2\omega_3\omega_4u^2\omega_2 + v^3\omega_4\omega_1\omega_2^2 - \frac{1}{4}v^2\omega_3\omega_4\omega_2 - \frac{1}{8}\omega_3\omega_4\omega_1u^2 - 2v^3\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 + \\ & \frac{1}{2}\omega_1\omega_2 + vw_1^2\omega_2 - \frac{3}{2}v^3\omega_2^2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2^2 - \frac{1}{2}v^3\omega_3^2\omega_2^2 - \frac{1}{2}\omega_3^2c_s^2\omega_1 - \frac{1}{8}v^2\omega_4^2u - \frac{1}{2}\omega_3^2u^2 - \frac{1}{2}v^2\omega_4^2u^2\omega_2 - \frac{1}{4}\omega_3\omega_1^2u^3 - \\ & \frac{1}{2}\omega_1 + \frac{1}{2}vw_3\omega_4\omega_2^2 + \frac{1}{8}\omega_3^2\omega_1u^2 - \frac{1}{8}\omega_3\omega_4u^2 + \frac{7}{4}v^3\omega_3\omega_2^2 - \frac{9}{4}v^2\omega_3\omega_4u - \frac{1}{4}v^2\omega_3^2\omega_1u + \frac{1}{2}vw_3^2c_s^2\omega_1u + \\ & \frac{1}{2}\omega_1u + \frac{1}{8}vw_4^2\omega_2^2 - \frac{1}{4}v^2\omega_4\omega_2^2 - \frac{5}{8}v^2\omega_3\omega_1 + \frac{1}{2}vw_3^2u^2\omega_2 + \frac{1}{8}\omega_4^2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_1u - \frac{1}{4}v^3\omega_3^2\omega_2 - \frac{1}{2}vw_3\omega_4c_s^2\omega_1 + \\ & \frac{1}{2}vw_3\omega_4c_s^2\omega_1u + \frac{3}{8}\omega_4^2u - v^2\omega_3\omega_4u^2\omega_2 + v^3\omega_4\omega_1\omega_2^2 - \frac{1}{4}v^2\omega_3\omega_4\omega_2 - \frac{1}{8}\omega_3\omega_4\omega_1u^2 - 2v^3\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_1 + \\ & \frac{1}{2}vw_3\omega_4c_s^2\omega_1u^2 - \frac{1}{4}v^2\omega_4\omega_1u^2 - vw_3c_s^2\omega_1\omega_2 - \frac{1}{4}vw_3u^2\omega_2 - \frac{3}{4}\omega_3\omega_1u^3 + \frac{3}{4}v^2\omega_4^2\omega_1\omega_2 - \frac{1}{2}vw_1^2\omega_2 - \\ & \frac{3}{8}vw_3^2u^2 - \omega_3c_s^2\omega_1u^2 - \frac{1}{8}v^2\omega_4^2u + v^3\omega_1\omega_2^2 - \frac{1}{4}v^3\omega_4^2\omega_1u + \frac{3}{4}v^2\omega_3\omega_4u^2 - \frac{1}{2}\omega_3\omega_1u^4 - \frac{1}{4}v^2\omega_4^2u^2\omega_2 - \frac{1}{4}\omega_3\omega_1^2u^3 - \\ & \frac{1}{2}\omega_1 + \frac{1}{2}vw_3\omega_4\omega_2^2 + \frac{1}{8}\omega_3^2\omega_1u^2 - \frac{1}{8}\omega_3\omega_4u^2 + \frac{7}{4}v^3\omega_3\omega_2^2 - \frac{9}{4}v^2\omega_3\omega_4u - \frac{1}{4}v^2\omega_3^2\omega_1u + \frac{1}{2}vw_3^2c_s^2\omega_1u + \\ & \frac{1}{2}\omega_1u + \frac{1}{8}vw_4\omega_2^2 - \frac{1}{4}v^2\omega_4\omega_2^2 - \frac{5}{8}v^2\omega_3\omega_1 + \frac{1}{2}vw_3^2u^2\omega_2 + \frac{1}{8}\omega_4^2u^3 + \frac{3}{4}vw_2 + \frac{3}{8}v^2\omega_3\omega_4\omega_1 + \\ & 2v^2\omega_3\omega_1u^2\omega_2 - 2v^3\omega_1\omega_2^2 - \frac{1}{4}\omega_3\omega_4c_s^2\omega_2 - \frac{1}{2}\omega_4u^2 + \frac{1}{2}vw_3^2c_s^2 - \frac{1}{2}\omega_4^2u^3 + \frac{5}{2}v^2\omega_3\omega_1\omega_2 + \frac{1}{8}\omega_4u^2\omega_2 - \frac{1}{8}v^3\omega_4^2 - \\ & \frac{1}{4}v^3\omega_4^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1u + \frac{1}{2}v^3\omega_3\omega_4u^2 + \frac{3}{2}\omega_3\omega_4c_s^2 - \frac{1}{4}\omega_4\omega_1^2u^2 + \frac{1}{4}vw_3\omega_4 + \frac{1}{2}v^3\omega_3\omega_4u - \frac{1}{4}v^2\omega_4\omega_1^2u + \frac{3}{8}\omega_3\omega_1u + \\ & \frac{1}{8}vw_3^2 + \frac{1}{8}vw_4^2u^2 + v^3\omega_3\omega_2^2 + 2v^2\omega_4\omega_1u^2\omega_2 + \frac{9}{4}\omega_3\omega_4c_s^2u + \frac{1}{4}\omega_3^2c_s^2u - \frac{3}{4}vw_4\omega_1\omega_2 + \frac{11}{8}v^2\omega_3\omega_2 + \frac{1}{4}v^3\omega_3\omega_4^2 - \\ & 5v^2\omega_1\omega_2 + \frac{1}{2}vw_4\omega_1u^2 - \frac{1}{4}vw_3\omega_4c_s^2\omega_2 - \frac{1}{2}v^3\omega_4^2\omega_2\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_2^2\omega_2 + \frac{1}{4}\omega_4\omega_1^2u^3 + \frac{1}{4}v^2\omega_3^2u + \frac{1}{2}v^2\omega_4 + \frac{1}{2}\omega_3c_s^2\omega_1u - \\ & \frac{1}{4}\omega_4^2\omega_1u^2 + \frac{1}{2}v^2\omega_3\omega_4\omega_2^2 - \frac{1}{4}vw_3^2\omega_1u + \frac{1}{2}vw_3\omega_4u + \frac{3}{2}v^3\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_3^2c_s^2\omega_1u^2 - \frac{1}{4}v^2\omega_4\omega_2^2 + \frac{1}{8}\omega_3\omega_2 - 2v^2\omega_1^2\omega_2 + \\ & \frac{1}{2}vw_3^2\omega_2 + \frac{1}{2}vw_4\omega_1 + \frac{3}{2}\omega_3\omega_4c_s^2\omega_1u^2 - \frac{3}{2}vw_3c_s^2\omega_2 - \frac{1}{4}vw_3^2\omega_4c_s^2\omega_2 - \frac{1}{2}vw_3\omega_4c_s^2\omega_2\omega_2 - \frac{3}{2}\omega_3\omega_4c_s^2\omega_1\omega_2 - \\ & \frac{1}{4}v^2\omega_4^2\omega_1u + \frac{1}{8}vw_3\omega_4\omega_2 + \frac{3}{2}v^3\omega_3\omega_1\omega_2 + vw_3c_s^2\omega_1\omega_2 + \frac{1}{4}v^2\omega_3^2\omega_4u + \frac{1}{2}v^2\omega_3\omega_4\omega_2 - \frac{1}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{4}vw_3\omega_4\omega_1u, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_l, y+\delta_l}^{[\mu_5], t-2\delta_t} = & -2 + vw_4\omega_1\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_2 + \frac{3}{8}vw_4 + \frac{1}{8}\omega_3^2\omega_2 - \frac{3}{8}\omega_4\omega_1 + \frac{5}{2}\omega_3 - \frac{1}{2}\omega_4\omega_1u^2\omega_2 + \frac{3}{8}\omega_3\omega_4\omega_2 + 2vw_3\omega_4^2u + vw_3\omega_1\omega_2 - \\ & \frac{1}{2}\omega_3\omega_4\omega_1u - \frac{1}{2}vw_4^2\omega_1u^2 - \frac{3}{4}vw_4^2\omega_2 + 2vw_3\omega_2 - \frac{3}{2}\omega_3\omega_1u^2\omega_2 - \omega_3^2u - v^2\omega_3\omega_4 - \frac{7}{4}\omega_3\omega_4u - \frac{1}{4}\omega_3^2\omega_1u + v^2\omega_1\omega_2^2 + \\ & 2v^2\omega_3\omega_1\omega_2 - \frac{1}{2}vw_3\omega_2^2 - \frac{1}{4}vw_4\omega_2^2 + 3vw_3\omega_1u - \frac{1}{2}v^2\omega_4\omega_1\omega_2 + 2vw_3^2\omega_4u + \frac{3}{2}\omega_4\omega_1u^2 - \frac{7}{4}\omega_3\omega_4 - \frac{1}{4}\omega_4^2u^2 - \frac{1}{2}\omega_4\omega_1\omega_2 + \\ & 2v^2\omega_4\omega_1\omega_2 + vw_1\omega_2^2 + v^2\omega_4\omega_2^2 - \frac{3}{4}v^2\omega_3^2 - \frac{1}{2}vw_3\omega_1\omega_2 - \frac{1}{4}\omega_3\omega_1u^2 + \frac{3}{4}vw_3^2\omega_4 + vw_4\omega_1^2u^2 - \frac{1}{4}v^2\omega_3^2\omega_2 - 6vw_1\omega_2 + \\ & \frac{1}{2}\omega_3\omega_1^2u^2 - \frac{1}{2}vw_4\omega_1^2u - \frac{9}{8}\omega_3\omega_1 + \frac{1}{2}vw_3^2\omega_1 + 2vw_4\omega_2 + 3vw_3\omega_1\omega_2 - 2v^2\omega_2^2 + vw_3^2\omega_4u^2 + \frac{1}{4}\omega_3\omega_4^2 + \frac{3}{2}\omega_4 + 2\omega_4\omega_1u + \\ & vw_3\omega_4\omega_1 - \frac{1}{2}\omega_4^2u - \frac{3}{2}v^2\omega_3\omega_4\omega_2 - \frac{3}{4}vw_2^2\omega_1u - \frac{3}{2}\omega_3\omega_4\omega_1u^2 + \omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_1\omega_2 - \frac{1}{4}vw_3\omega_2^2 - 2vw_2^2\omega_2 + \frac{1}{2}\omega_3^2\omega_1\omega_2 - \\ & \frac{3}{2}\omega_3^2u^2 + w_1 - vw_3\omega_4\omega_2 - \frac{1}{4}\omega_3^2\omega_1u^2 - \omega_3\omega_4u^2 + \frac{1}{2}v^2\omega_3\omega_2^2 - \frac{1}{2}v^2\omega_3^2\omega_1u - 4w_1u - \frac{1}{2}v^2\omega_4^2 - \frac{1}{2}\omega_1^2\omega_2 - \frac{1}{4}v^2\omega_4^2\omega_2 - \\ & \frac{1}{4}vw_3^2\omega_2^2 + vw_3\omega_2^2 - \frac{1}{4}\omega_4^2 + \frac{1}{2}\omega_3\omega_4\omega_2^2 - \frac{3}{2}vw_3\omega_4\omega_2 + \frac{1}{2}\omega_3\omega_4\omega_1u^2 + \frac{1}{2}vw_3^2\omega_2^2 - \frac{1}{2}\omega_3^2\omega_2^2\omega_2 - \frac{1}{2}v^2\omega_4\omega_2^2 + \\ & vw_1^2\omega_2 + \omega_1u - \frac{1}{4}v^2\omega_4^2 - \frac{1}{4}\omega_4^2\omega_1u + v^2\omega_3\omega_4\omega_2 - \frac{1}{2}vw_3^2\omega_1u^2 + \frac{3}{2}v^2\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_1 - \frac{3}{4}vw_3^2\omega_2\omega_2 + 2vw_1\omega_2 + \omega_1^2\omega_2 + \\ & \frac{5}{2}\omega_3\omega_1u^2 + \frac{1}{2}\omega_3^2\omega_4\omega_2^2 + \frac{3}{2}vw_3\omega_2^2 - \frac{3}{2}\omega_3\omega_2\omega_2 - \frac{1}{2}vw_4^2\omega_2 + \frac{5}{2}vw_3\omega_2 + \frac{1}{2}\omega_3\omega_2^2\omega_2 + \frac{1}{2}vw_4\omega_2^2 + \frac{1}{2}v^2\omega_3\omega_2^2 + \\ & \frac{3}{8}\omega_3\omega_4\omega_1 - \frac{3}{2}v^2\omega_3\omega_1\omega_2 + 3vw_4\omega_1u + vw_3\omega_1^2u + v^2\omega_2^2 + 2w_1\omega_2 - \frac{3}{2}vw_3\omega_1 - \frac{1}{4}vw_4\omega_2^2 - 3v^2\omega_3\omega_4\omega_2 + \omega_2 + \frac{3}{2}\omega_4u + \\ & v^2\omega_3\omega_2^2 + v^2\omega_3\omega_4\omega_2 - \frac{1}{4}\omega_4\omega_1^2u - \frac{1}{2}vw_4\omega_1\omega_2 - 4vw_2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1 - \frac{1}{2}vw_3\omega_1^2u + \frac{1}{2}\omega_3\omega_1\omega_2 - v^2\omega_3\omega_4\omega_1u + \frac{1}{4}\omega_3\omega_4^2 + \\ & \frac{1}{2}\omega_4\omega_1^2u^2 - \frac{7}{2}vw_3\omega_4 + \frac{3}{4}\omega_3\omega_4\omega_2 + 2\omega_3\omega_1u - v\omega_3^2 + 3vw_4\omega_1\omega_2 + \frac{5}{2}v^2\omega_3\omega_2 - \frac{1}{2}\omega_3^2 - \frac{1}{2}vw_3^2\omega_2 - 2w_1^2u^2 + 2vw_4\omega_1^2\omega_2 - \\ & \frac{1}{4}\omega_4^2\omega_1u^2 - \frac{3}{2}vw_3\omega_2\omega_1 - 5vw_3\omega_4u - \frac{1}{2}\omega_4\omega_1\omega_2 - \frac{1}{2}vw_1\omega_2^2 + \frac{1}{2}v^2\omega_4\omega_2^2 - \frac{9}{8}\omega_3\omega_2 - \frac{1}{4}vw_3\omega_2^2 - \frac{1}{2}vw_4\omega_1 - \\ & \frac{1}{2}vw_4^2\omega_2^2 + 2vw_3\omega_1\omega_2^2 - \frac{1}{2}v^2\omega_4\omega_2\omega_2 + \frac{3}{4}\omega_3\omega_2^2u - \frac{1}{2}vw_3\omega_4\omega_2 + \frac{1}{2}v^2\omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_1\omega_2\omega_2 - \frac{3}{2}vw_3\omega_4\omega_1u + \frac{5}{2}\omega_3u, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_l, y-\delta_l}^{[\mu_1], t-3\delta_t} = & -1 + \frac{1}{2}\omega_3^2\omega_4c_s^2 - \frac{1}{2}\omega_3c_s^2\omega_2 - \frac{1}{2}vw_4 + 2v^3\omega_3\omega_4\omega_1\omega_2 - \frac{1}{4}v^2\omega_3\omega_2^2 - \frac{3}{2}\omega_4\omega_1 + \frac{1}{4}\omega_3 + \frac{1}{4}\omega_4\omega_1u^2\omega_2 + \\ & \frac{1}{2}v^3\omega_3^2\omega_1\omega_2 - 2v^3\omega_3\omega_4\omega_2 + \frac{1}{2}v^2\omega_3^2\omega_4\omega_1 - 2v^3\omega_2^2 - \frac{1}{4}vw_4^2\omega_1u^2 + \frac{1}{2}vw_3^2\omega_4c_s^2\omega_1 - \frac{7}{4}vw_3\omega_2 - \frac{1}{4}vw_4^2\omega_1 + \\ & \frac{1}{2}\omega_3c_s^2\omega_1\omega_2 - \frac{1}{2}vw_3\omega_4c_s^2\omega_1^2 - \frac{1}{4}\omega_3\omega_1u^2\omega_2 + \frac{5}{2}v^2\omega_3\omega_4 + v^3\omega_3\omega_2^2 + v^2\omega_1\omega_2^2 + \frac{1}{2}v^2\omega_3\omega_4\omega_1 + \frac{13}{4}v^2\omega_4\omega_1\omega_2 + \\ & 4v^2\omega_2 - vw_4\omega_1^2\omega_2 + vw_3\omega_4c_s^2\omega_2 - \frac{1}{4}\omega_4\omega_1u^2 + \frac{1}{2}vw_3\omega_4^2c_s^2 + \frac{1}{4}v^3\omega_3\omega_2^2 + \frac{3}{2}v^3\omega_4\omega_2 - \frac{1}{4}\omega_3\omega_4 - \frac{3}{4}\omega_4^2u^2 + \\ & 2\omega_3c_s^2 + \frac{1}{2}vw_3^2c_s^2 + \frac{1}{4}v^2\omega_3^2 + \frac{9}{4}vw_3\omega_1\omega_2 + \frac{1}{2}vw_3\omega_4c_s^2 - v^3\omega_4\omega_1\omega_2^2 + vw_3\omega_1^2\omega_2 - \frac{1}{4}vw_3\omega_1^2 + \frac{5}{4}v^2\omega_4\omega_1 + \end{aligned}$$

$$\begin{aligned}
& \frac{1}{2}v^2\omega_3^2\omega_2 - \frac{1}{2}vw_4u^2\omega_2 - v^2\omega_3 + \frac{1}{4}\omega_3u^2\omega_2 + \frac{1}{2}vw_3\omega_4^2c_s^2\omega_1 + \frac{3}{4}\omega_3\omega_1^2u^2 - \frac{3}{2}v^3\omega_4\omega_1\omega_2 - \frac{1}{2}v^3\omega_3\omega_4^2\omega_1 + \\
& \frac{1}{4}\omega_4\omega_1\omega_2 - \frac{1}{2}v^2\omega_3\omega_1^2\omega_2 + \frac{1}{2}v^3\omega_3^2\omega_4 - vw_3\omega_4c_s^2\omega_1\omega_2 - \frac{1}{4}v^2\omega_4\omega_1^2 - \frac{1}{4}vw_3^2\omega_1 - \frac{3}{4}vw_4\omega_2 - 5v^2\omega_1\omega_2 - v^2\omega_2^2 - \\
& \frac{1}{2}v^2\omega_4\omega_1\omega_2^2 + \frac{5}{4}\omega_4 + v^3\omega_4\omega_2^2 - \frac{1}{2}vw_3\omega_4\omega_1 + \frac{1}{2}v^2\omega_3\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1\omega_2 - \frac{1}{2}v^3\omega_3^2\omega_4\omega_1 + 3\omega_3\omega_4c_s^2\omega_1 - \frac{1}{2}\omega_1\omega_2 - \\
& \frac{1}{4}v^3\omega_3^2 + \frac{1}{2}\omega_3^2c_s^2\omega_1 + \frac{3}{4}\omega_3^2u^2 + \omega_1 - \frac{3}{4}\omega_3^2\omega_1u^2 + \frac{3}{2}v^3\omega_3\omega_2 + \frac{1}{4}v^3\omega_4^2\omega_1 - \frac{1}{2}v^2\omega_3\omega_4^2 - \frac{1}{2}vw_3^2\omega_1u^2\omega_2 + \frac{1}{4}vw_4^2 + \\
& \frac{1}{2}v^2\omega_4^2\omega_2 + \frac{5}{4}v^2\omega_3\omega_1 + \frac{1}{4}\omega_4\omega_1^2 + \frac{1}{2}vw_3^2\omega_1^2\omega_2 + \frac{1}{2}vw_2^2\omega_1\omega_2 - \frac{1}{4}\omega_4^2 + \frac{1}{2}vw_4^2\omega_1u^2\omega_2 + \frac{1}{2}v^3\omega_4^2\omega_1\omega_2 - \frac{1}{2}v^3\omega_3^2\omega_2 - \\
& \frac{1}{2}vw_3\omega_4c_s^2\omega_1 - \omega_3u^2 - \frac{1}{4}vw_3^2u^2 + \frac{1}{4}v^2\omega_4^2 - \frac{1}{2}vw_3\omega_4c_s^2\omega_1\omega_2 + 2v^3\omega_1\omega_2^2 + \frac{1}{4}vw_3^2\omega_1u^2 - \frac{11}{4}v^2\omega_4\omega_2 - \frac{1}{4}v^2\omega_3^2\omega_1 - \\
& \frac{1}{2}vw_3^2c_s^2\omega_1 - \frac{5}{2}vw_1\omega_2 + \frac{1}{4}w_3\omega_1u^2 - \frac{5}{2}w_3c_s^2\omega_1 - \frac{1}{2}vw_3 - \frac{1}{2}vw_3\omega_4c_s^2\omega_1 - \frac{1}{2}v^3\omega_3\omega_4 - \frac{1}{4}\omega_4\omega_2 + \frac{1}{2}v^2\omega_3\omega_2^2 + \\
& \frac{1}{4}w_3\omega_4\omega_1 + \frac{13}{4}v^2\omega_3\omega_1\omega_2 + \frac{1}{2}v^3\omega_3\omega_4\omega_1 + \frac{1}{2}v^2\omega_3\omega_4\omega_1^2 - v^3\omega_3\omega_1\omega_2^2 + \frac{1}{2}vw_3\omega_1 + v^2\omega_1\omega_2 + \frac{1}{2}vw_3\omega_1^2\omega_2 + \frac{1}{2}\omega_2 + \\
& \frac{3}{4}vw_4\omega_1\omega_2 - \frac{3}{2}v^3\omega_3\omega_1\omega_2 + 2vw_2 - 3v^2\omega_3\omega_4\omega_1 - \frac{1}{2}v^2\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1\omega_2 + \frac{1}{2}w_3\omega_4c_s^2\omega_2 + w_4u^2 - \frac{1}{2}\omega_3^2c_s^2 - \\
& \frac{1}{4}\omega_4u^2\omega_2 - \frac{1}{4}v^3\omega_4^2 - \frac{1}{2}v^3\omega_4^2\omega_2 - \frac{5}{2}w_3\omega_4c_s^2 - \frac{3}{4}\omega_4\omega_1^2u^2 + \frac{1}{2}vw_3\omega_4 - \frac{1}{2}vw_3\omega_1\omega_2 + \frac{1}{2}w_3\omega_4c_s^2\omega_1^2 + \frac{1}{4}vw_3^2 + \frac{1}{4}vw_4^2u^2 - \\
& \frac{1}{4}v^2\omega_4^2\omega_1 - \frac{11}{4}v^2\omega_3\omega_2 + \frac{1}{2}v^3\omega_3\omega_4^2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}v^2\omega_3\omega_1\omega_2^2 - \frac{1}{2}vw_3\omega_4c_s^2 - v^2\omega_4 + \frac{3}{2}vw_4\omega_1u^2\omega_2 + \\
& \frac{3}{4}\omega_4^2\omega_1\omega_2^2 - \frac{1}{2}v^2\omega_4^2\omega_1\omega_2 - \frac{1}{2}vw_3\omega_4\omega_1\omega_2 + \frac{1}{2}v^2\omega_4\omega_2^2 - \frac{1}{4}\omega_3\omega_2 + \frac{1}{4}vw_3^2\omega_2 + \frac{1}{2}vw_4\omega_1 - \frac{1}{2}v^2\omega_4^2u^2\omega_2 - \\
& vw_3c_s^2\omega_2 - \frac{1}{2}vw_3^2\omega_4c_s^2 - \frac{3}{4}vw_3\omega_1u^2\omega_2 - \frac{1}{4}vw_3^2\omega_1\omega_2 + \frac{1}{4}vw_3\omega_4\omega_2 + vw_3c_s^2\omega_1\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_4 - \frac{1}{2}w_3\omega_4c_s^2\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y-\delta_l}^{[\mu_5],t-3\delta_t} = & 3 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 + \frac{5}{2}vw_4 + \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{1}{4}\omega_3^2\omega_2 + \frac{13}{4}\omega_4\omega_1 - \frac{15}{4}\omega_3 - \omega_4\omega_1u^2\omega_2 + v^2\omega_3^2\omega_4\omega_1 - \frac{3}{4}w_3\omega_4\omega_2 + \\
& \frac{1}{4}w_3^2\omega_1\omega_2 + \frac{7}{2}vw_3\omega_2 + vw_4^2\omega_1 + \omega_3\omega_1u^2\omega_2 + \omega_1^2 + v^2\omega_3\omega_4 - 2v^2\omega_1\omega_2^2 - \frac{1}{2}vw_4\omega_2^2 + v^2\omega_3\omega_4^2\omega_1 + 2v^2\omega_4\omega_1\omega_2 + \\
& \frac{1}{2}w_3\omega_1^2\omega_2 - vw_3\omega_4\omega_1^2 + \omega_4\omega_1u^2 + \frac{13}{4}w_3\omega_4 - \frac{1}{2}\omega_4\omega_1^2 + \frac{1}{2}v^2\omega_3^2 - 4vw_3\omega_1\omega_2 + \frac{3}{2}vw_3^2\omega_4 - \omega_3\omega_1^2 + \frac{1}{2}v^2\omega_3^2\omega_2 + \\
& \omega_3\omega_1^2u^2 + \frac{1}{2}vw_3\omega_1\omega_2^2 + \frac{1}{2}w_3\omega_4^2\omega_1 - \frac{3}{4}\omega_4\omega_1\omega_2 + \frac{19}{4}\omega_3\omega_1 + vw_3^2\omega_1 + \frac{7}{2}vw_4\omega_2 + 2v^2\omega_2^2 + v^2\omega_4\omega_1\omega_2^2 - \frac{1}{2}w_3\omega_4^2 - \\
& \frac{11}{4}\omega_4 + 7vw_3\omega_4\omega_1 + \frac{1}{2}vw_4\omega_1\omega_2 + \frac{1}{2}w_3^2\omega_4\omega_1 + 3v^2\omega_3\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1\omega_2 + 2\omega_1\omega_2 - \frac{1}{2}vw_3\omega_2 + \frac{1}{2}w_3^2u^2 - 4\omega_1 - \\
& \frac{1}{5}\omega_3^2\omega_1\omega_2^2 - v^2\omega_3\omega_4^2 + \frac{1}{2}vw_4^2\omega_1\omega_2 - vw_3^2 + \frac{1}{2}v^2\omega_4^2\omega_2 - \frac{1}{2}\omega_4\omega_1^2 - vw_1^2\omega_2 + \frac{1}{2}\omega_4^2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{2}vw_4\omega_1^2 + \frac{1}{2}\omega_3^2\omega_1\omega_2^2 - \\
& \frac{1}{5}w_3^2u^2\omega_2 - v^2\omega_3\omega_4^2 + \frac{1}{2}vw_4^2\omega_1\omega_2 - vw_3^2 + \frac{1}{2}v^2\omega_4^2\omega_2 - \frac{1}{2}\omega_4\omega_1^2 - vw_1^2\omega_2 + \frac{1}{2}\omega_4^2 - \frac{1}{2}\omega_1\omega_2 + \frac{1}{2}vw_4\omega_1^2 + \frac{1}{2}\omega_3^2\omega_1\omega_2^2 - \\
& \frac{1}{5}w_3^2u^2\omega_2 + \frac{1}{2}v^2\omega_4^2 - \frac{1}{2}\omega_4\omega_1u^2\omega_2 - \frac{3}{2}vw_3^2\omega_4\omega_1 - 2v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1 + 6vw_1\omega_2 - \omega_3\omega_1u^2 + \frac{3}{2}vw_3\omega_4^2 + \frac{5}{2}vw_3 - \\
& \frac{3}{4}w_3^2\omega_1 + \frac{3}{4}\omega_4\omega_2 - v^2\omega_3\omega_2^2 - \frac{15}{4}w_3\omega_4\omega_1 + 2v^2\omega_3\omega_1\omega_2 + vw_2^2 - 3vw_3\omega_1 - \frac{1}{2}vw_4\omega_2 - \frac{3}{2}\omega_2 - \frac{3}{2}vw_3\omega_4^2\omega_1 - 4vw_4\omega_1\omega_2 - \\
& 5vw_2 - v^2\omega_3\omega_4\omega_1 - \frac{9}{4}w_3\omega_1\omega_2 + \frac{1}{2}vw_3\omega_1^2 + \omega_4\omega_1u^2\omega_2 - \frac{1}{2}w_3^2\omega_4 + \frac{1}{2}vw_4\omega_1\omega_2^2 - \omega_4\omega_1^2u^2 - 6vw_3\omega_4 + \frac{1}{2}vw_3\omega_1\omega_2 - \\
& w_3\omega_1^2u^2\omega_2 - vw_3^2 - \frac{1}{2}v^2\omega_4^2\omega_1 - 2v^2\omega_3\omega_2 - 3v^2\omega_3\omega_4\omega_1\omega_2 + v^2\omega_3\omega_1\omega_2^2 + \frac{3}{4}\omega_3^2 + \frac{1}{2}w_3\omega_4\omega_1^2 + \frac{1}{2}\omega_4^2\omega_1u^2 - \frac{1}{2}v^2\omega_4^2\omega_1\omega_2 - \\
& vw_1\omega_2^2 + vw_3\omega_4\omega_1\omega_2 - v^2\omega_4\omega_2^2 + \frac{7}{4}w_3\omega_2 - \frac{1}{2}w_4^2\omega_1 - \frac{1}{2}vw_3\omega_2 - 3vw_4\omega_1 + \frac{1}{2}vw_3\omega_1\omega_2 - vw_3\omega_4\omega_2 - v^2\omega_3\omega_4^2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x-\delta_l,y}^{[\mu_1],t-3\delta_t} = & -2 - v^2\omega_3\omega_4^2\omega_1u - \frac{1}{2}v^2\omega_3^2\omega_1\omega_2^2 + \frac{1}{2}\omega_3^2\omega_4c_s^2 + \frac{1}{4}\omega_4^2u^3 + \frac{3}{2}\omega_4\omega_1u^3 - \frac{11}{4}v^2\omega_3^2\omega_2 - \frac{11}{2}\omega_3c_s^2\omega_2 - \\
& 5\omega_3c_s^2\omega_1u + 2\omega_1\omega_2^2 + \frac{3}{4}\omega_4^2u^2\omega_2 - v^2\omega_3\omega_1^2\omega_2^2 - \frac{1}{2}\omega_4\omega_1 + \frac{1}{2}\omega_3 - \frac{1}{2}w_3\omega_4c_s^2\omega_2 + \frac{9}{4}\omega_4\omega_1u^2\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_2 - \\
& \frac{1}{4}w_3\omega_4\omega_1u - \frac{1}{2}v^2\omega_3\omega_4\omega_2^2 + \frac{7}{2}w_3c_s^2\omega_1\omega_2 + \frac{1}{2}\omega_1\omega_2^2 + 2v^2\omega_1^2\omega_2 + \frac{1}{2}w_3\omega_1u^2\omega_2 - 2v^2\omega_3c_s^2\omega_2^2 - \frac{1}{4}\omega_3^2u - \\
& \frac{3}{4}w_3\omega_4c_s^2u + 3v^2\omega_3\omega_4c_s^2\omega_2 - v^2\omega_4\omega_1^2\omega_2^2 + \frac{19}{4}v^2\omega_3\omega_4 - \omega_4\omega_1^2u^4 + \frac{1}{2}w_3\omega_4u - \frac{1}{4}\omega_3^2\omega_1u - \omega_3^2\omega_4c_s^2\omega_2 + \\
& \omega_1u^2\omega_2^2 + v^2\omega_3^2\omega_4c_s^2\omega_1 + \frac{3}{2}v^2\omega_3^2\omega_4\omega_2 - v^2\omega_1\omega_2^2 + 6v^2\omega_3\omega_1\omega_2u + \frac{1}{2}w_4\omega_1u^3\omega_2^2 + \frac{1}{2}w_3^2\omega_1u^4\omega_2 - \omega_3c_s^2\omega_1\omega_2^2 + \\
& \frac{13}{4}v^2\omega_4\omega_1\omega_2 + 6v^2\omega_2 + v^2\omega_3^2\omega_4\omega_1u^2 - v^2\omega_3\omega_1\omega_2^2 - 3v^2\omega_3\omega_4c_s^2\omega_1\omega_2 - \frac{7}{4}w_4\omega_1u^2 + \frac{1}{2}w_3\omega_4c_s^2 - \frac{1}{4}\omega_3\omega_4 - \frac{3}{4}\omega_4^2u^2 - \\
& \frac{1}{4}v^2\omega_3^2u + 4w_3c_s^2 + \frac{5}{2}\omega_4\omega_1\omega_2 + 6v^2\omega_4\omega_1\omega_2 - \frac{1}{2}w_3\omega_1u^3\omega_2^2 - \frac{1}{2}\omega_4^2\omega_1u^4\omega_2 + v^2\omega_4\omega_1\omega_2^2 + \frac{3}{2}v^2\omega_3^2 - \frac{3}{4}\omega_3u^2\omega_2^2 + \\
& \frac{1}{2}\omega_4^2\omega_1u^4 + \frac{5}{2}v^2\omega_4\omega_1\omega_2 + w_3^2\omega_4c_s^2\omega_2 + \frac{1}{4}v^2\omega_4\omega_1 + \frac{3}{2}v^2\omega_3^2\omega_2 - \frac{1}{2}\omega_4^2\omega_2 - 2v^2\omega_3 + \frac{11}{4}\omega_3u^2\omega_2 + w_3^2\omega_1u^3 + \\
& 5v^2\omega_4\omega_1\omega_2 - \frac{3}{2}v^2\omega_4\omega_1\omega_2^2 + 2w_3\omega_1u^3\omega_2 - \frac{1}{2}w_3\omega_1\omega_2^2 - \frac{1}{4}\omega_3u^3 - v^2\omega_3\omega_4c_s^2 + \frac{1}{2}w_4\omega_1\omega_2 + \frac{1}{4}\omega_4^2\omega_2 - 4v^2\omega_1\omega_2^2 - \\
& \frac{3}{2}w_3^2\omega_4c_s^2u + 6w_3c_s^2\omega_1\omega_2 - 3v^2\omega_1\omega_2 - v^2\omega_3^2\omega_1\omega_2 - \frac{3}{2}v^2\omega_3\omega_1\omega_2^2 - 2w_4\omega_1u^3\omega_2 - 3\omega_1\omega_2^2 - v^2\omega_3^2\omega_4\omega_1u + \\
& v^4\omega_3\omega_1\omega_2^2 + 2v^2\omega_2^2 + \frac{3}{2}\omega_4 - \frac{1}{4}\omega_4\omega_1u - \omega_3\omega_4c_s^2\omega_1\omega_2 - \frac{1}{2}v^2\omega_3\omega_1\omega_2^2 - \frac{1}{2}\omega_4\omega_1\omega_2^2 + \frac{3}{4}\omega_3^2u + v^2\omega_3u^2\omega_2^2 - \frac{1}{4}\omega_4^2u^3 - \\
& v^2\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}w_3\omega_4c_s^2\omega_2 + \frac{25}{4}v^2\omega_3\omega_4\omega_2 - \frac{1}{4}v^2\omega_3\omega_1\omega_2^2 + \frac{1}{4}w_3\omega_4\omega_1\omega_2^2 - \frac{1}{2}w_3\omega_1\omega_2 + \frac{1}{2}v^4\omega_4\omega_1\omega_2 - \\
& \frac{1}{2}w_3\omega_4\omega_1\omega_2 - \frac{1}{2}w_3\omega_4c_s^2\omega_1 + \omega_4\omega_1u^4\omega_2 - \frac{3}{2}\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1\omega_2^2 + w_3\omega_4c_s^2\omega_1\omega_2^2 + \frac{1}{4}\omega_3^2\omega_1\omega_2 - \\
& \frac{1}{4}v^2\omega_4^2u + w_3^2\omega_2^2 + \frac{1}{2}v^2\omega_4^2\omega_2 - \frac{1}{2}w_3\omega_1u^3 + \omega_1 - \frac{1}{4}\omega_3\omega_1\omega_2^2 - v^2\omega_3^2\omega_4c_s^2 + \frac{3}{2}w_3\omega_4c_s^2\omega_1\omega_2 + \frac{4}{3}w_3\omega_4u^2 - \frac{3}{2}v^2\omega_3\omega_2^2 - \\
& \frac{3}{2}v^2\omega_3\omega_4\omega_1u - v^2\omega_3^2\omega_1\omega_2 + v^2\omega_3\omega_4\omega_1\omega_2^2 + v^2\omega_3\omega_4c_s^2\omega_1\omega_2 + \frac{3}{2}v^2\omega_3\omega_4\omega_1\omega_2^2 + w_1u - \omega_3\omega_1\omega_2^4\omega_2 + \frac{3}{2}\omega_3c_s^2\omega_2^2 - \\
& \frac{1}{2}\omega_4\omega_1\omega_2^2 + \frac{5}{4}v^2\omega_3\omega_1 - 2w_3c_s^2\omega_1\omega_2^2 + \frac{1}{2}v^4\omega_3\omega_2^2 + \frac{1}{4}\omega_3\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_4^2 + w_3\omega_4c_s^2\omega_1\omega_2 + \\
& \frac{1}{4}w_3\omega_4\omega_1\omega_2 + \frac{1}{2}w_3\omega_4c_s^2\omega_1 + \omega_4\omega_1u^4\omega_2 - \frac{3}{2}\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1\omega_2^2 + w_3\omega_4c_s^2\omega_1\omega_2^2 + \frac{1}{4}\omega_3^2\omega_1\omega_2 - \\
& \frac{1}{4}v^2\omega_4^2u + w_3^2\omega_2^2 + \frac{1}{2}v^2\omega_4^2\omega_2 - \frac{1}{2}w_3\omega_1u^3 + \omega_1 - \frac{1}{4}\omega_3\omega_1\omega_2^2 - v^2\omega_3^2\omega_4c_s^2 + \frac{3}{2}w_3\omega_4c_s^2\omega_1\omega_2 + \frac{4}{3}w_3\omega_4u^2 - \frac{3}{2}v^2\omega_3\omega_2^2 - \\
& \frac{3}{2}v^2\omega_3\omega_4\omega_1u - v^2\omega_3^2\omega_1\omega_2 + v^2\omega_3\omega_4\omega_1\omega_2^2 + v^2\omega_3\omega_4c_s^2\omega_1\omega_2 + \frac{3}{2}v^2\omega_3\omega_4\omega_1\omega_2^2 + w_1u - \omega_3\omega_1\omega_2^4\omega_2 + \frac{3}{2}\omega_3c_s^2\omega_2^2 - \\
& \frac{1}{2}\omega_4\omega_1\omega_2^2 + \frac{5}{4}v^2\omega_3\omega_1 - 2w_3c_s^2\omega_1\omega_2^2 + \frac{1}{2}v^4\omega_3\omega_2^2 + \frac{1}{4}\omega_3\omega_4\omega_1\omega_2 - \frac{1}{4}\omega_4^2 + w_3\omega_4c_s^2\omega_1\omega_2 + \\
& \frac{1}{4}w_3\omega_4\omega_1\omega_2^2 - \frac{1}{4}w_3\omega_4c_s^2\omega_1 + \omega_4\omega_1u^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_4\omega_2 + w_3\omega_4c_s^2\omega_1\omega_2^2 - \frac{1}{2}v^2\omega_4^2\omega_1\omega_2^2 - w_3\omega_4c_s^2\omega_1\omega_2^2 - \\
& w_3^2\omega_2^2 - 2w_3\omega_1u^3 - \frac{3}{2}w_3\omega_1\omega_2^3 - \frac{11}{4}v^2\omega_4^2\omega_1\omega_2^2 - \frac{1}{2}w_3^2\omega_1\omega_2^2 + \frac{1}{2}w_3\omega_1\omega_2^3 + 2w_3c_s^2\omega_1\omega_2^2 + \frac{5}{4}v^2\omega_4^2\omega_1\omega_2^2 - \\
& w_3\omega_4c_s^2\omega_1\omega_2^2 - v^2\omega_3\omega_4\omega_1\omega_2^2 - \frac{1}{2}w_4^2\omega_1\omega_2^2 + \frac{7}{2}v^2\omega_3\omega_4\omega_1\omega_2^2 + w_3\omega_4\omega_1\omega_2^2 + w_3\omega_4c_s^2\omega_1\omega_2^2 - \frac{33}{4}v^2\omega_4\omega_1\omega_2^2 - \frac{3}{4}v^2\omega_3\omega_1 - \\
& \frac{1}{4}\omega_3\omega_2^2 - \frac{1}{2}\omega_4\omega_1\omega_2^3 - \frac{1}{4}\omega_3\omega_4\omega_1\omega_2^2 + w_3^2\omega_1\omega_2^2 - \frac{1}{4}\omega_3\omega_1\omega_2^2 - v^2\omega_4\omega_1\omega_2^2 + v^2\omega_4\omega_1\omega_2^2 + v^2\omega_3\omega_2^2 + \\
& \frac{1}{2}\omega_3\omega_2^2 - \frac{5}{2}\omega_3c_s^2\omega_1 + v^4\omega_4\omega_2^2 - \frac{7}{4}\omega_4\omega_2 + \frac{1}{4}v^2\omega_3\omega_2^2 - \frac{1}{2}v^2\omega_3\omega_4\omega_2 + \frac{15}{4}v^2\omega_3\omega_1\omega_2^2 - \frac{3}{2}\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4c_s^2\omega_2^2 + \\
& v^2\omega_3\omega_1\omega_2^2 - \frac{25}{2}v^2\omega_3\omega_4\omega_1\omega_2^2 - \omega_2^2 + 3\omega_2 + \frac{1}{4}\omega_4\omega_1\omega_2^2 - 2\omega_4\omega_1\omega_2 + 2v^2\omega_3c_s^2\omega_1\omega_2^2 + v^2\omega_3\omega_2^2 + \frac{7}{2}v^2\omega_3\omega_4\omega_1\omega_2^2 + \\
& 3\omega_3\omega_4c_s^2\omega_1\omega_2^2 - \frac{1}{2}\omega_3\omega_1\omega_4^2 + \frac{5}{2}v^2\omega_3\omega_1\omega_2 + v^2\omega_3\omega_4\omega_1\omega_2^2 - \frac{7}{4}v^2\omega_3\omega_4\omega_1\omega_2^2 + 2v^2\omega_3\omega_4\omega_1\omega_2^2 + \frac{1}{2}\omega_1\omega_2^2 +
\end{aligned}$$

$$\begin{aligned} & \frac{3}{2}\omega_3^2\omega_4c_s^2uw_2 - \frac{1}{2}\omega_4\omega_1^2u^2w_2 + \frac{7}{2}\omega_3\omega_4c_s^2\omega_2 - v^2\omega_3^2\omega_4u^2\omega_2 + \omega_4u^2 - \omega_3^2c_s^2 - \omega_4^2\omega_1u^3 + \omega_3^2c_s^2\omega_2 + \omega_4^2\omega_1u^3\omega_2 + \\ & 5v^2\omega_3uw_2 - \frac{5}{4}\omega_4u^2w_2 + v^2\omega_3\omega_4uw_2^2 - 2v^2\omega_3\omega_4\omega_1u - 3\omega_3\omega_4c_s^2 + \frac{1}{2}\omega_4\omega_1^2u^2 - \frac{1}{2}v^2\omega_4\omega_1u + \frac{3}{4}\omega_3\omega_1u + \frac{1}{2}\omega_3\omega_1^2u^2w_2 + \\ & v^2\omega_4u^2w_2^2 - \frac{1}{2}\omega_3uw_2^2 + \frac{9}{2}\omega_3\omega_4c_s^2u + \frac{1}{4}\omega_3^2u^3\omega_2 + \frac{1}{4}\omega_4\omega_2^2 + \frac{1}{2}\omega_3^2c_s^2u - \frac{1}{2}v^2\omega_4\omega_1u - \frac{35}{4}v^2\omega_3\omega_2 - \omega_3^2\omega_1u^3\omega_2 - \\ & 10v^2\omega_1uw_2 - v^4\omega_4\omega_1\omega_2^2 - \frac{3}{4}v^2\omega_3\omega_4\omega_1\omega_2^2 - \frac{1}{2}v^2\omega_3\omega_1\omega_2^2 + \frac{1}{2}v^2\omega_3^2\omega_2^2 + \frac{1}{2}\omega_4\omega_1^2u^3 - v^2\omega_4 + \omega_3c_s^2\omega_1^2u - \frac{3}{4}\omega_4^2\omega_1\omega_2 + \\ & \frac{1}{2}\omega_4^2\omega_1u^2 - \frac{1}{2}\omega_3^2c_s^2uw_2 - \frac{1}{2}v^4\omega_3^2\omega_1\omega_2 + \frac{1}{4}\omega_4\omega_1uw_2 - v^4\omega_3\omega_2^2 - \frac{1}{2}v^2\omega_3\omega_1^2uw_2 - \omega_3^2c_s^2\omega_1u^2 - \frac{1}{4}v^2\omega_4\omega_2^2 - \\ & \frac{3}{4}\omega_3\omega_2 + 4v^2\omega_1^2u^2w_2 - 3\omega_3\omega_4c_s^2\omega_1u^2 - \frac{11}{2}\omega_3\omega_4c_s^2uw_2 - v^2\omega_4\omega_1u - \frac{3}{2}v^2\omega_3^2\omega_4 - \frac{1}{2}v^2\omega_4\omega_1^2uw_2 - \frac{5}{4}\omega_3\omega_1\omega_2, \end{aligned}$$

$$\begin{aligned} \alpha_{x-\delta_i,y}^{[\mu_5],t-3\delta_t} = & 3 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_4^2u^2w_2 - \frac{3}{4}\omega_3^2\omega_2 + \frac{3}{4}\omega_4\omega_1 - \frac{15}{4}\omega_3 + 2\omega_4\omega_1u^2w_2 - \frac{15}{4}\omega_3\omega_4\omega_2 + \frac{1}{4}\omega_3^2\omega_1\omega_2 - \omega_3\omega_4\omega_1u - \\ & \frac{1}{2}\omega_1\omega_2^2 - \omega_3\omega_4uw_2^2 + 2\omega_3\omega_1u^2\omega_2 - \omega_3^2u + \omega_3^2\omega_4u^2\omega_2 - 6\omega_3\omega_4u - \frac{1}{2}\omega_3^2\omega_1u + \frac{1}{2}\omega_4\omega_1^2uw_2 - v^2\omega_4\omega_1\omega_2 - 2\omega_4\omega_1u^2 + \\ & \frac{13}{4}\omega_3\omega_4 + \frac{1}{2}\omega_4^2u^2 - 3\omega_4\omega_1u + \frac{1}{2}\omega_3\omega_1^2uw_2 + \frac{1}{2}v^2\omega_3^2 - \frac{1}{2}\omega_3\omega_1^2u - \frac{1}{2}v^2\omega_3^2\omega_2 - \omega_3\omega_1^2u^2 - \frac{3}{4}\omega_4\omega_1\omega_2 + \frac{7}{4}\omega_3\omega_1 - \\ & \frac{1}{2}\omega_4^2\omega_2 + \omega_3\omega_4^2u^2w_2 + v^2\omega_4\omega_1\omega_2^2 - \frac{1}{2}\omega_3\omega_4^2 - \frac{11}{4}\omega_4 + \frac{7}{2}\omega_4\omega_1u + \frac{1}{2}\omega_4\omega_1^2u^2 - \omega_4^2u + \frac{1}{2}v^2\omega_3^2\omega_1\omega_2 + 3\omega_3\omega_4\omega_1u^2 + \\ & 7\omega_3\omega_4\omega_1\omega_2 + 2\omega_1\omega_2 + \frac{1}{2}\omega_3^2\omega_1\omega_2 + \omega_3^2\omega_2 + \frac{1}{2}\omega_3^2u^2 - \frac{3}{2}\omega_1 + \frac{1}{2}\omega_3^2\omega_1u^2 + \omega_3\omega_4u^2 + \frac{1}{2}\omega_4\omega_1\omega_2 - 5\omega_1u - \omega_1^2\omega_2 + \\ & \frac{1}{2}v^2\omega_4^2\omega_2 + \omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_4^2 + \frac{1}{2}\omega_3\omega_4\omega_2^2 - \frac{1}{2}\omega_3^2\omega_1u^2\omega_2 - \omega_3\omega_4u^2\omega_2 - \omega_3\omega_4^2u^2 - \frac{1}{2}\omega_3^2u^2\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2^2 + \\ & \omega_1^2u - \frac{1}{2}v^2\omega_4^2 - \frac{1}{2}\omega_4^2\omega_1u^2\omega_2 - \frac{1}{2}\omega_4^2\omega_1u + v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1 - \omega_3\omega_2^2 - 3\omega_3\omega_4\omega_1u^2\omega_2 - 2\omega_1^2u^2\omega_2 + \frac{1}{2}\omega_4\omega_1\omega_2^2 - \\ & 2\omega_3\omega_1u^2 - \omega_3^2\omega_4u^2 - 3\omega_3\omega_2^2 - \frac{3}{2}\omega_3\omega_4^2\omega_2 - \frac{1}{4}\omega_3\omega_1 + \frac{13}{4}\omega_4\omega_2 + v^2\omega_3\omega_2^2 - \frac{3}{4}\omega_3\omega_4\omega_1 + v^2\omega_3\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1\omega_2^2 + \\ & 6\omega_1\omega_2 + \omega_2^2 - 4\omega_2 + \frac{5}{2}\omega_4u - \frac{1}{2}\omega_4\omega_1^2u + \frac{1}{2}\omega_3^2\omega_4\omega_2 - \frac{9}{4}\omega_3\omega_1\omega_2 - \omega_1\omega_2^2 + \omega_4\omega_1^2u^2\omega_2 - \frac{1}{2}\omega_3^2\omega_4 - \omega_4\omega_1^2u^2 + \\ & \frac{3}{2}\omega_3^2\omega_4u + \frac{7}{2}\omega_3\omega_1\omega_2 + \omega_3\omega_1^2u^2\omega_2 + \frac{1}{2}\omega_3\omega_2^2 - \frac{1}{2}\omega_4\omega_2^2 + \frac{1}{2}v^2\omega_4^2\omega_1 - v^2\omega_3\omega_2 - v^2\omega_3\omega_1\omega_2^2 + \frac{3}{4}\omega_3^2 + 2\omega_1^2u^2 + \omega_4^2\omega_1\omega_2 + \\ & \frac{1}{2}\omega_4^2\omega_1u^2 - \frac{1}{2}v^2\omega_4^2\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4^2\omega_2 - 4\omega_4\omega_1\omega_2 - v^2\omega_4\omega_2^2 + \frac{19}{4}\omega_3\omega_2 + \frac{3}{2}\omega_3\omega_4^2u - \frac{3}{2}\omega_3^2\omega_4\omega_1\omega_2 - 4\omega_3\omega_1\omega_2 + \frac{5}{2}\omega_3\omega_1, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_1],t-3\delta_t} = & -2 - \frac{1}{2}\omega_3\omega_4\omega_1\omega_2 + v^2\omega_3^2\omega_1u^2 + 2\omega_3c_s^2\omega_2 - 4\omega_1u^2 + \frac{3}{2}\omega_4^2u^2w_2 + 2v^2\omega_3\omega_1^2u^2\omega_2 - \frac{1}{2}v^2\omega_3\omega_1^2 - \\ & 3\omega_4\omega_1 + \frac{1}{2}\omega_3 - \frac{11}{2}\omega_4\omega_1u^2\omega_2 + 2v^2\omega_3^2\omega_4\omega_1 + \frac{1}{2}\omega_3\omega_4\omega_2 - \omega_3c_s^2\omega_1\omega_2 + \omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_1u^2\omega_2 + 4v^2\omega_3c_s^2\omega_2^2 - \\ & 6v^2\omega_3\omega_4c_s^2\omega_2 + 2v^2\omega_4\omega_1^2u^2\omega_2 + \frac{3}{2}v^2\omega_3\omega_4 + 2\omega_4\omega_1^2u^4 + 2\omega_3^2\omega_4c_s^2u^2\omega_2 - 2\omega_1u^2\omega_2^2 - 2v^2\omega_3^2\omega_4c_s^2\omega_1 - 4v^2\omega_1\omega_2^2 - \\ & \omega_3\omega_1u^4\omega_2 + 2v^2\omega_3\omega_4^2\omega_1 + \frac{11}{2}v^2\omega_4\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_1^2\omega_2 + 2v^2\omega_2 - 2v^2\omega_3^2\omega_4\omega_1\omega_2^2 + 2v^2\omega_3\omega_1^2u^2 + 6v^2\omega_3\omega_4c_s^2\omega_1\omega_2 + \\ & 5\omega_4\omega_1u^2 - \frac{1}{2}\omega_3\omega_4 - \frac{3}{2}\omega_4^2\omega_2^2 - \omega_3c_s^2 + \omega_3^2\omega_1u^4\omega_2 + v^2\omega_3^2 + \frac{1}{2}\omega_3\omega_1u^2\omega_2^2 - \omega_4^2\omega_1u^4 - \frac{1}{2}\omega_4\omega_1\omega_2^2 - 2\omega_3^2\omega_4c_s^2\omega_2^2 - \\ & \frac{1}{2}\omega_3\omega_1^2 + 2v^2\omega_4\omega_1 + v^2\omega_3^2\omega_2 + v^4\omega_4^2\omega_2 + \frac{1}{2}v^2\omega_3 - \omega_3u^2\omega_2 + \frac{5}{2}\omega_3\omega_1^2u^2 + 2v^2\omega_3\omega_4c_s^2 + \frac{7}{2}\omega_4\omega_1\omega_2 - \frac{1}{2}v^2\omega_3\omega_1\omega_2 + \\ & \frac{1}{2}\omega_4^2\omega_2 - \frac{1}{2}v^2\omega_4\omega_1^2 + 8v^2\omega_1u^2\omega_2^2 - 4v^2\omega_1\omega_2 + 2v^2\omega_3^2c_s^2\omega_1\omega_2 + 6\omega_1u^2\omega_2^2 - 2v^4\omega_3\omega_1\omega_2^2 + 4v^2\omega_2^2 + \frac{3}{2}v^2\omega_4\omega_1\omega_2^2 + \\ & \frac{5}{2}\omega_4 - 2v^2\omega_3u^2\omega_2^2 + 2v^2\omega_3\omega_4u^2\omega_2 + \frac{11}{2}v^2\omega_3^2\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1u^2 - v^4\omega_4^2\omega_1\omega_2 - \omega_3\omega_4c_s^2\omega_1 - \\ & 2\omega_4\omega_1^2u^4\omega_2 - 3\omega_1\omega_2 + \omega_3c_s^2\omega_1\omega_2^2 - 2\omega_3\omega_4c_s^2u^2 + \omega_3^2u^2 - v^2\omega_4^2\omega_2^2 + 2\omega_1 + \frac{1}{2}\omega_3\omega_1u^2\omega_2^2 - \omega_3^2\omega_1u^2 + \\ & 2v^2\omega_3^2\omega_4c_s^2 - \frac{1}{2}\omega_3\omega_4u^2 - 2v^2\omega_3\omega_4^2 - 2v^2\omega_3\omega_4^2\omega_1u^2 - 2v^2\omega_3\omega_4c_s^2\omega_1 + 2\omega_3\omega_1^2u^4\omega_2 - \omega_3c_s^2\omega_2^2 + \frac{1}{2}\omega_4\omega_1u^2\omega_2^2 + \\ & \frac{3}{2}v^2\omega_4^2\omega_2 + 4\omega_3c_s^2\omega_1^2u^2\omega_2 + \frac{1}{2}\omega_4\omega_1^2 - v^4\omega_3^2\omega_2^2 - \frac{1}{2}\omega_4^2 + \omega_3\omega_1u^2\omega_2 + \frac{1}{2}\omega_3\omega_4u^2\omega_2^2 - 2\omega_3^2c_s^2\omega_1u^2\omega_2 - \frac{1}{2}\omega_4^2\omega_1\omega_2 + \\ & v^2\omega_4^2\omega_1u^2 + 2\omega_3\omega_4c_s^2u^2\omega_2 - \omega_3^2u^2\omega_2 + \frac{1}{2}\omega_3\omega_1u^2 - 4\omega_3c_s^2\omega_1^2u^2 + \frac{3}{2}v^2\omega_4^2 + \omega_3\omega_4c_s^2\omega_1\omega_2 + 2v^2\omega_3\omega_4^2\omega_2\omega_2 - \\ & \frac{1}{2}\omega_4^2\omega_1u^2\omega_2 - 2\omega_3\omega_1^2u^4 - 5v^2\omega_4\omega_2 - v^2\omega_3^2\omega_1 + \frac{1}{2}\omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_1u^2\omega_2 - \omega_3\omega_1u^2 + 2v^2\omega_4\omega_1^2u^2 - \\ & 2v^2\omega_4\omega_1u^2\omega_2^2 - 2v^2\omega_3^2c_s^2\omega_2 - 2v^4\omega_4\omega_2^2 - 3\omega_4\omega_2 - \frac{5}{2}v^2\omega_3\omega_2^2 + \frac{1}{2}\omega_3\omega_4\omega_1 - \frac{1}{2}\omega_4\omega_1\omega_2^2 + \frac{9}{2}v^2\omega_3\omega_1\omega_2 - \\ & \frac{1}{2}\omega_3\omega_1\omega_2^2 - 2v^2\omega_3\omega_1u^2\omega_2^2 + 2v^2\omega_3^2\omega_1\omega_2 - \omega_2^2 + 3\omega_2 + \frac{1}{2}\omega_4\omega_1^2\omega_2^2 - 4v^2\omega_3c_s^2\omega_1\omega_2^2 - 6\omega_3\omega_4c_s^2\omega_1\omega_2^2 + \omega_3\omega_1u^4 - \\ & 2v^2\omega_3\omega_4\omega_1u^2 - \frac{3}{2}v^2\omega_3\omega_4\omega_1 - \frac{1}{2}v^2\omega_4\omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_1\omega_2 + \frac{5}{2}\omega_4\omega_1^2\omega_2^2 - \omega_3\omega_4c_s^2\omega_2 + 2v^2\omega_3\omega_4u^2\omega_2 + \frac{3}{2}\omega_4\omega_1^2 - \\ & 2\omega_4\omega_1^2\omega_2 + \omega_3\omega_4c_s^2 - \frac{5}{2}\omega_4\omega_1^2u^2 - \frac{5}{2}\omega_3\omega_1^2u^2\omega_2 - 2v^2\omega_4\omega_1^2u^2 + \omega_3c_s^2\omega_1^2 + \frac{1}{2}\omega_4\omega_1^2 - \frac{3}{2}v^2\omega_4^2\omega_1 - 4v^2\omega_3\omega_2 + \\ & 2v^4\omega_4\omega_1\omega_2^2 - \frac{11}{2}v^2\omega_3\omega_4\omega_1\omega_2 + \frac{5}{2}v^2\omega_3\omega_1\omega_2^2 - v^2\omega_3^2\omega_2^2 - \frac{3}{2}v^2\omega_4 + \frac{1}{2}\omega_4\omega_1\omega_2^2 - \frac{3}{2}v^2\omega_4^2\omega_1\omega_2 + v^4\omega_3\omega_1\omega_2 + \\ & 2v^4\omega_3\omega_2^2 + 2\omega_3^2c_s^2\omega_1\omega_2^2 - \frac{3}{2}v^2\omega_4\omega_2^2 - \omega_3\omega_2 + \frac{1}{2}\omega_4\omega_1 - 8v^2\omega_1^2u^2\omega_2 - \omega_3c_s^2\omega_1^2\omega_2 + 6\omega_3\omega_4c_s^2\omega_1\omega_2^2 - 2v^2\omega_3^2\omega_4, \end{aligned}$$

$$\begin{aligned} \alpha_{x,y}^{[\mu_5],t-3\delta_t} = & 3 + 5\omega_4\omega_1 - 2\omega_4\omega_1u^2\omega_2 - 2v^2\omega_3^2\omega_4\omega_1 - \omega_1\omega_2^2 - 6\omega_3\omega_1u^2\omega_2 - 2\omega_3^2\omega_4u^2\omega_2 + \omega_1^2 - 2v^2\omega_3\omega_4 + 4v^2\omega_1\omega_2^2 - \\ & 2v^2\omega_3\omega_4^2\omega_1 - 2v^2\omega_4\omega_1\omega_2 + 2\omega_4\omega_1u^2 - 2v^2\omega_3^2 + \omega_4\omega_1\omega_2^2 - 6\omega_4\omega_1\omega_2 - \omega_1^2\omega_2^2 - 2\omega_3\omega_4^2\omega_2^2 - 4v^2\omega_2^2 - 4v^2\omega_4\omega_1\omega_2^2 - \\ & 4\omega_4 - 6v^2\omega_3\omega_4\omega_2 - 6\omega_3\omega_4\omega_1u^2 + 5\omega_1\omega_2 - 2\omega_3^2\omega_2^2 - 4\omega_1 - 2\omega_3\omega_4u^2 + 2v^2\omega_3\omega_4^2 - 2v^2\omega_4\omega_2 - \omega_4\omega_1^2 + \omega_4^2 - \\ & \omega_1\omega_2 + 2\omega_3\omega_4u^2\omega_2 + \omega_4\omega_1\omega_2 + 2\omega_3\omega_4^2u^2 + 2\omega_3^2u^2\omega_2 + 2\omega_4\omega_1u^2\omega_2 + 2v^2\omega_4\omega_2 + 2v^2\omega_3\omega_1u^2\omega_2 + \\ & 4\omega_1^2\omega_2 + 6\omega_3\omega_1u^2 + 2\omega_3^2\omega_4u^2 + 5\omega_4\omega_2 + \omega_4\omega_1\omega_2^2 - 6v^2\omega_3\omega_1\omega_2 + \omega_2^2 - 4\omega_2 + 2v^2\omega_3\omega_4\omega_1 - 4\omega_4\omega_1^2\omega_2 + \\ & 4\omega_4\omega_1^2\omega_2^2 - \omega_4\omega_2^2 + 6v^2\omega_3\omega_2 + 6v^2\omega_3\omega_4\omega_1\omega_2 - 4\omega_1^2\omega_2^2 - 2\omega_4\omega_1u^2 + 2v^2\omega_4\omega_2^2 - \omega_4^2\omega_1 + 2v^2\omega_3\omega_4\omega_1, \end{aligned}$$

$$\begin{aligned} \alpha_{x+\delta_i,y}^{[\mu_1],t-3\delta_t} = & -2 + v^2\omega_3\omega_4^2\omega_1u - \frac{1}{2}v^2\omega_3^2\omega_1\omega_2^2 + \frac{1}{2}\omega_3^2\omega_4c_s^2 - \frac{1}{4}\omega_4^2\omega_3^3 + \frac{11}{2}v^2\omega_3^2\omega_2 + \frac{11}{2}\omega_3c_s^2\omega_2 + \\ & 5\omega_3c_s^2\omega_1u + 2\omega_1u^2 + \frac{3}{4}\omega_4^2\omega_2^2\omega_2 - v^2\omega_3\omega_1^2u^2\omega_2 - \frac{1}{2}\omega_4\omega_1 + \frac{1}{2}\omega_3 - \frac{1}{2}\omega_3\omega_4^2c_s^2\omega_2 + \frac{9}{4}\omega_4\omega_1u^2\omega_2 + \frac{1}{4}\omega_3\omega_4\omega_2 + \\ & \frac{1}{4}\omega_3\omega_4\omega_1u - \frac{1}{2}v^2\omega_3\omega_4\omega_2^2 + \frac{7}{2}\omega_3c_s^2\omega_1\omega_2 + \frac{1}{2}\omega_1\omega_2^2 - 2v^2\omega_1^2\omega_2 + \frac{1}{2}\omega_3\omega_1u^2\omega_2 - 2v^2\omega_3c_s^2\omega_2 + \frac{1}{4}\omega_3^2u + \\ & \frac{3}{2}\omega_3\omega_4^2c_s^2u + 3v^2\omega_3\omega_4c_s^2\omega_2 - v^2\omega_4\omega_1^2u^2\omega_2 + \frac{19}{4}v^2\omega_3\omega_4 - \omega_4\omega_1^2u^4 - \frac{1}{2}\omega_3\omega_4u + \frac{1}{4}\omega_3^2\omega_1u - \omega_3\omega_4c_s^2u^2\omega_2 + \end{aligned}$$

$$\begin{aligned}
& w_1 u^2 \omega_2^2 + v^2 \omega_3^2 \omega_4 c_s^2 \omega_1 - \frac{3}{2} v^2 \omega_3^2 \omega_4 u \omega_2 - v^2 \omega_1 \omega_2^2 - 6 v^2 \omega_3 \omega_1 u \omega_2 - \frac{1}{2} \omega_4 \omega_1 u^3 \omega_2^2 + \frac{1}{2} \omega_3^2 \omega_1 u^4 \omega_2 + \omega_3 c_s^2 \omega_1 u \omega_2^2 + \\
& \frac{13}{4} v^2 \omega_4 \omega_1 \omega_2 + 6 v^2 \omega_2 + v^2 \omega_3^2 \omega_4 \omega_1 u^2 - v^2 \omega_3 \omega_1^2 u^2 - 3 v^2 \omega_3 \omega_4 c_s^2 \omega_1 \omega_2 - \frac{7}{4} \omega_4 \omega_1 u^2 + \frac{1}{2} \omega_3 \omega_4^2 c_s^2 - \frac{1}{4} \omega_3 \omega_4 - \frac{3}{4} \omega_4^2 u^2 + \\
& \frac{1}{4} v^2 \omega_3^2 u + 4 \omega_3 c_s^2 - \frac{5}{2} \omega_4 u \omega_2 - 6 v^2 \omega_4 \omega_1 u \omega_2 + \frac{1}{2} \omega_3 \omega_1 u^3 \omega_2^2 - \frac{1}{2} \omega_4^2 \omega_1 u^4 \omega_2 - v^2 \omega_4 u \omega_2^2 + \frac{3}{2} v^2 \omega_3^2 - \frac{3}{4} \omega_3 u^2 \omega_2^2 + \\
& \frac{1}{2} \omega_4^2 \omega_1 u^4 - \frac{5}{2} v^2 \omega_4 \omega_1 u + \omega_3^2 \omega_4 c_s^2 u^2 + \frac{1}{4} v^2 \omega_4 \omega_1 + \frac{3}{2} v^2 \omega_3^2 \omega_2 - \frac{1}{2} v^4 \omega_4^2 \omega_2 - 2 v^2 \omega_3 + \frac{11}{4} \omega_3 u^2 \omega_2 - \omega_3^2 \omega_1 u^3 - \\
& 5 v^2 \omega_4 u \omega_2 + \frac{3}{2} v^2 \omega_4 \omega_1 u \omega_2^2 - 2 \omega_3 \omega_1 u^3 \omega_2 - \frac{1}{2} \omega_3 \omega_1^2 u^2 + \frac{1}{4} \omega_3^2 u^3 - v^2 \omega_3 \omega_4^2 c_s^2 + \frac{1}{2} \omega_4 \omega_1 \omega_2 + \frac{1}{4} \omega_4^2 \omega_2 - 4 v^2 \omega_1 u^2 \omega_2^2 + \\
& \frac{3}{2} \omega_3^2 \omega_4 c_s^2 u - 6 \omega_3 c_s^2 \omega_1 u \omega_2 - 3 v^2 \omega_1 \omega_2 - v^2 \omega_3^2 c_s^2 \omega_1 \omega_2 + \frac{3}{2} v^2 \omega_3 \omega_1 u \omega_2^2 + 2 \omega_4 \omega_1 u^3 \omega_2 - 3 \omega_1 u^2 \omega_2 + v^2 \omega_3^2 \omega_4 \omega_1 u + \\
& v^4 \omega_3 \omega_1 \omega_2^2 + 2 v^2 \omega_2^2 + \frac{3}{2} \omega_4 + \frac{1}{4} \omega_4 \omega_1 u + \omega_3 \omega_4 c_s^2 \omega_1 \omega_2 + \frac{1}{2} v^2 \omega_3 \omega_1^2 u + \frac{1}{2} \omega_4 u \omega_2^2 - \frac{3}{4} \omega_4^2 u + v^2 \omega_3 u^2 \omega_2^2 + \frac{1}{4} \omega_4^2 u^3 \omega_2 - \\
& v^2 \omega_3 \omega_4 u^2 \omega_2 - \frac{1}{2} \omega_3^2 \omega_4 c_s^2 \omega_2 + \frac{25}{4} v^2 \omega_3 \omega_4 \omega_2 - \frac{1}{4} v^2 \omega_3^2 \omega_1 \omega_2 + \frac{1}{4} \omega_3 \omega_4 \omega_1 u^2 + \omega_3^2 c_s^2 \omega_1 u \omega_2 + \frac{1}{2} v^4 \omega_4^2 \omega_1 \omega_2 + \\
& \frac{1}{2} \omega_3 \omega_4 \omega_1 \omega_2 + \omega_3 \omega_4 c_s^2 \omega_1 + \omega_4 \omega_1^2 u^4 \omega_2 - \frac{3}{2} \omega_1 \omega_2 - \frac{1}{4} \omega_3^2 \omega_1 u \omega_2 - \omega_3 c_s^2 \omega_1 \omega_2^2 + \omega_3 \omega_4^2 c_s^2 u^2 - \frac{1}{4} \omega_3^2 u \omega_2 + \frac{1}{2} \omega_3^2 c_s^2 \omega_1 + \\
& \frac{1}{4} v^2 \omega_4^2 u + \omega_3^2 u^2 + \frac{1}{2} v^2 \omega_4^2 u^2 \omega_2 + \frac{1}{2} \omega_3 \omega_1^2 u^3 + \omega_1 - \frac{1}{4} \omega_3^2 \omega_1 u^2 - v^2 \omega_3^2 \omega_4 c_s^2 - \frac{3}{2} \omega_3 \omega_4^2 c_s^2 u \omega_2 + \frac{1}{4} \omega_3 \omega_4 u^2 - \frac{3}{2} v^2 \omega_3 \omega_4^2 + \\
& \frac{9}{5} v^2 \omega_3 \omega_4 u + v^2 \omega_3^2 \omega_1 u + v^2 \omega_3 \omega_4^2 \omega_1 u^2 + v^2 \omega_3 \omega_4^2 c_s^2 \omega_1 - \frac{3}{2} v^2 \omega_3 \omega_4^2 u \omega_2 - \omega_1 u - \omega_3 \omega_1^2 u^4 \omega_2 + \frac{3}{2} \omega_3 c_s^2 \omega_2^2 - \\
& \frac{1}{2} \omega_4 \omega_1 u^2 \omega_2^2 + \frac{5}{4} v^2 \omega_4^2 \omega_2 + \frac{5}{4} v^2 \omega_3 \omega_1 - 2 \omega_3 \omega_1^2 \omega_2^2 + \frac{1}{2} v^4 \omega_3^2 \omega_2 - \frac{1}{4} \omega_3 \omega_4 \omega_1 u \omega_2 - \frac{1}{4} \omega_4^2 - \omega_3 \omega_4 c_s^2 \omega_1 u + \\
& \frac{1}{2} \omega_3^2 \omega_1 u^2 \omega_2 - \frac{1}{4} \omega_3 \omega_4 u^2 \omega_2 + \omega_3^2 c_s^2 \omega_1 u^2 \omega_2 - \frac{1}{2} v^2 \omega_3 \omega_4^2 \omega_2 - \omega_3 \omega_4 c_s^2 u \omega_2^2 - \frac{1}{2} v^2 \omega_3^2 \omega_4 u^2 - \omega_3 \omega_4^2 c_s^2 u^2 \omega_2 - \\
& \omega_3^2 u^2 \omega_2 - 2 \omega_3 u^2 + \frac{3}{2} \omega_3 \omega_1 u^3 + \frac{11}{4} v^2 \omega_4^2 u \omega_2 - \frac{1}{2} \omega_3^2 c_s^2 \omega_1 \omega_2 - \frac{1}{2} \omega_3 \omega_1 u \omega_2^2 - \frac{1}{2} \omega_3 \omega_1^2 u^3 \omega_2 + 2 \omega_3 c_s^2 \omega_1^2 u^2 - \frac{33}{4} v^2 \omega_4 \omega_2 - \frac{3}{4} v^2 \omega_3^2 \omega_1 + \\
& \omega_3 \omega_4 c_s^2 \omega_1 \omega_2 - v^2 \omega_3 \omega_4^2 u^2 \omega_2 - \frac{1}{2} \omega_4^2 \omega_1 u^2 \omega_2 - \frac{7}{2} v^2 \omega_3 \omega_4^2 u - \omega_3 c_s^2 \omega_1^2 \omega_2 - \frac{3}{4} v^2 \omega_4 \omega_2 - \frac{3}{4} v^2 \omega_3^2 \omega_1 + \\
& \frac{1}{4} \omega_3 \omega_2^2 + \frac{1}{2} \omega_4 \omega_1^2 u^3 \omega_2 - \frac{1}{4} \omega_3 \omega_4 \omega_1 u^2 \omega_2 - \omega_3^2 c_s^2 \omega_1 u - \frac{1}{4} \omega_3 \omega_1 u^2 - v^2 \omega_4 \omega_1^2 u^2 + v^2 \omega_4 \omega_1 u^2 \omega_2^2 + v^2 \omega_3^2 c_s^2 \omega_2 - \\
& \frac{1}{2} \omega_3 \omega_1 u \omega_2 - \frac{5}{2} \omega_3 c_s^2 \omega_1 + v^4 \omega_4 \omega_2 - \frac{7}{4} \omega_4 \omega_2 + \frac{1}{4} v^2 \omega_3 \omega_2^2 - \frac{1}{2} v^2 \omega_3 \omega_4^2 \omega_2 + \frac{3}{4} \omega_1 u \omega_2 - \frac{1}{2} \omega_3 \omega_4 c_s^2 \omega_2^2 + \\
& v^2 \omega_3 \omega_1 u^2 \omega_2^2 + \frac{25}{2} v^2 \omega_3 \omega_4 u \omega_2 - \omega_2^2 + 3 \omega_2 + \frac{1}{4} \omega_4 u^2 \omega_2^2 + 2 \omega_4 u + 2 v^2 \omega_3 c_s^2 \omega_1 \omega_2^2 - v^2 \omega_3 u \omega_2^2 - \frac{7}{2} v^2 \omega_3^2 \omega_4 u + \\
& 3 \omega_3 \omega_4 c_s^2 \omega_1 u^2 \omega_2^2 - \frac{1}{2} \omega_3^2 \omega_1 u^4 - \frac{5}{2} v^2 \omega_3 \omega_1 u + v^2 \omega_3 \omega_4 \omega_1 u^2 - \frac{7}{4} v^2 \omega_3 \omega_4 \omega_1 - 2 v^2 \omega_3 \omega_4 \omega_1 u \omega_2 - \frac{1}{2} \omega_1 u \omega_2^2 - \\
& \frac{3}{2} \omega_3^2 \omega_4 c_s^2 u \omega_2 - \frac{1}{2} \omega_4 \omega_1^2 u^2 \omega_2 + \frac{7}{2} \omega_3 \omega_4 c_s^2 \omega_2 - v^2 \omega_3^2 \omega_4 u^2 \omega_2 + \omega_4 u^2 - \omega_3^2 c_s^2 + \omega_2^2 \omega_1 u^3 + \omega_3^2 c_s^2 \omega_2 - \omega_4^2 \omega_1 u^3 \omega_2 - \\
& 5 v^2 \omega_3 u \omega_2 - \frac{5}{4} \omega_4 u^2 \omega_2 - v^2 \omega_3 \omega_4 u \omega_2^2 + 2 v^2 \omega_3 \omega_4 \omega_1 u - 3 \omega_3 \omega_4 c_s^2 + \frac{1}{2} \omega_4 \omega_1 u^2 + \frac{1}{2} v^2 \omega_4 \omega_1^2 u - \frac{3}{4} \omega_3 \omega_1 u + \frac{1}{2} \omega_3 \omega_1^2 u^2 \omega_2 + \\
& v^2 \omega_4 u^2 \omega_2^2 + \frac{1}{2} \omega_3 \omega_1 \omega_2^2 - \frac{9}{2} \omega_3 \omega_4 c_s^2 u - \frac{1}{4} \omega_3^2 u^3 \omega_2 + \frac{1}{4} \omega_4 \omega_2^2 - \frac{1}{2} \omega_3^2 c_s^2 u - \frac{1}{2} v^2 \omega_4 \omega_1 - \frac{35}{4} v^2 \omega_3 \omega_2 + \omega_3^2 \omega_1 u^3 \omega_2 + \\
& 10 v^2 \omega_1 u \omega_2 - v^4 \omega_4 \omega_1 \omega_2^2 - \frac{3}{4} v^2 \omega_3 \omega_4 \omega_1 \omega_2 - \frac{1}{2} v^2 \omega_3 \omega_1 \omega_2^2 + \frac{1}{2} v^2 \omega_3^2 u \omega_2^2 - \frac{1}{2} \omega_4 \omega_1^2 u^3 - v^2 \omega_4 - \omega_3 c_s^2 \omega_1 u + \frac{3}{4} \omega_4^2 u \omega_2 + \\
& \frac{1}{2} \omega_4^2 \omega_1 u^2 + \frac{1}{2} \omega_3^2 c_s^2 \omega_2 - \frac{1}{2} v^4 \omega_3^2 \omega_1 \omega_2 - \frac{1}{4} \omega_4 \omega_1 u \omega_2 - v^4 \omega_3 \omega_2^2 + \frac{1}{2} v^2 \omega_3 \omega_1^2 u \omega_2 - \omega_3^2 c_s^2 \omega_1 u^2 - \frac{1}{4} v^2 \omega_4 \omega_2^2 - \\
& \frac{3}{4} \omega_3 \omega_2 + 4 v^2 \omega_1^2 u^2 \omega_2 - 3 \omega_3 \omega_4 c_s^2 \omega_1 u^2 + \frac{11}{2} \omega_3 \omega_4 c_s^2 u \omega_2 + v^2 \omega_4 \omega_1 u - \frac{3}{2} v^2 \omega_3^2 \omega_4 + \frac{5}{2} \omega_3 \omega_1 u \omega_2, \\
\end{aligned}$$

$$\begin{aligned}
\alpha_{x+\delta, y}^{[\mu_5], t-3\delta_t} = & 3 + \frac{3}{4} \omega_3 \omega_4 \omega_1 \omega_2 - \frac{1}{2} \omega_4^2 u^2 \omega_2 - \frac{3}{4} \omega_3^2 \omega_2 + \frac{3}{4} \omega_4 \omega_1 - \frac{15}{4} \omega_3 + 2 \omega_4 \omega_1 u^2 \omega_2 - \frac{15}{4} \omega_3 \omega_4 \omega_2 + \frac{1}{4} \omega_3^2 \omega_1 \omega_2 + \omega_3 \omega_4 \omega_1 u - \\
& \frac{1}{2} \omega_1 \omega_2^2 + \omega_3 \omega_4 u \omega_2^2 + 2 \omega_3 \omega_1 u^2 \omega_2 + \omega_3^2 u + \omega_3^2 \omega_4 u^2 \omega_2 + 6 \omega_3 \omega_4 u + \frac{1}{2} \omega_3^2 \omega_1 u - \frac{1}{2} \omega_4 \omega_1^2 u \omega_2 - v^2 \omega_4 \omega_1 \omega_2 - 2 \omega_4 \omega_1 u^2 + \\
& \frac{13}{4} \omega_3 \omega_4 + \frac{1}{2} \omega_4^2 u^2 + 3 \omega_4 u \omega_2 - \frac{1}{2} \omega_3 \omega_1^2 u \omega_2 + \frac{1}{2} v^2 \omega_3^2 + \frac{1}{2} \omega_3 \omega_1^2 u - \frac{1}{2} v^2 \omega_3^2 \omega_2 - \omega_3 \omega_1^2 u^2 - \frac{3}{4} \omega_4 \omega_1 \omega_2 + \frac{7}{4} \omega_3 \omega_1 - \\
& \frac{1}{2} \omega_4^2 \omega_2 + \omega_3 \omega_4^2 u^2 \omega_2 + v^2 \omega_4 \omega_1 \omega_2^2 - \frac{1}{2} \omega_3 \omega_4^2 - \frac{11}{4} \omega_4 - \frac{7}{2} \omega_4 \omega_1 u - \frac{1}{2} \omega_4 \omega_1^2 \omega_2 + \omega_4^2 u + \frac{1}{2} v^2 \omega_3 \omega_1 \omega_2 + 3 \omega_3 \omega_4 \omega_1 u^2 - \\
& 7 \omega_3 \omega_4 u \omega_2 + 2 \omega_1 \omega_2 - \frac{1}{2} \omega_3 \omega_1 u \omega_2 - \omega_3 \omega_2 + \frac{1}{2} \omega_3^2 u^2 - \frac{3}{2} \omega_1 + \frac{1}{2} \omega_3 \omega_1 u^2 + \omega_3 \omega_4 u^2 - \frac{1}{2} \omega_4 \omega_1 u \omega_2 + 5 \omega_1 u + \omega_1^2 \omega_2 + \\
& \frac{1}{2} v^2 \omega_4^2 \omega_2 - \omega_3 \omega_4 \omega_1 u \omega_2 + \frac{1}{2} \omega_4^2 + \frac{1}{2} \omega_3 \omega_4 \omega_2^2 - \frac{1}{2} \omega_3^2 \omega_1 u^2 \omega_2 - \omega_3 \omega_4 u^2 \omega_2 - \omega_3 \omega_4^2 u^2 - \frac{1}{2} \omega_3^2 u^2 \omega_2 - \frac{1}{2} \omega_3 \omega_1 u \omega_2^2 - \\
& \omega_1^2 u - \frac{1}{2} v^2 \omega_4^2 - \frac{1}{2} \omega_4^2 \omega_1 u^2 \omega_2 + \frac{1}{2} \omega_4^2 \omega_1 u + v^2 \omega_4 \omega_2 - \frac{1}{2} v^2 \omega_3^2 \omega_1 - \omega_3 \omega_2^2 - 3 \omega_3 \omega_4 \omega_1 u^2 \omega_2 - 2 \omega_1^2 u^2 \omega_2 - \frac{1}{2} \omega_4 \omega_1 u \omega_2^2 - \\
& 2 \omega_3 \omega_1 u^2 - \omega_3^2 \omega_4 u^2 + 3 \omega_3 \omega_2 + \frac{3}{2} \omega_3 \omega_4^2 \omega_2 - \frac{1}{2} \omega_3^2 \omega_1 + \frac{13}{4} \omega_4 \omega_2 + v^2 \omega_3 \omega_2^2 - \frac{3}{4} \omega_3 \omega_4 \omega_1 + v^2 \omega_3 \omega_1 \omega_2 + \frac{1}{2} \omega_3 \omega_1 \omega_2^2 - \\
& 6 \omega_1 u \omega_2 + \omega_2^2 - 4 \omega_2 - \frac{5}{4} \omega_4 u + \frac{1}{2} \omega_4 \omega_1^2 u + \frac{1}{2} \omega_3 \omega_4 \omega_2 - \frac{9}{4} \omega_3 \omega_1 \omega_2 + \omega_1 \omega_2^2 + \omega_4 \omega_1^2 u^2 \omega_2 - \frac{1}{2} \omega_3^2 \omega_4 - \omega_4 \omega_1^2 u^2 - \\
& \frac{3}{2} \omega_3^2 \omega_4 u - \frac{7}{2} \omega_3 \omega_1 u + \omega_3 \omega_2^2 \omega_2 - \frac{1}{2} \omega_3 \omega_2^2 - \frac{1}{2} \omega_4 \omega_2^2 + \frac{1}{2} v^2 \omega_4 \omega_2 - v^2 \omega_3 \omega_2 - \frac{3}{4} \omega_3^2 + 2 \omega_1^2 u^2 - \omega_4^2 \omega_2 + \\
& \frac{1}{2} \omega_4^2 \omega_1 u^2 - \frac{1}{2} v^2 \omega_4^2 \omega_1 \omega_2 + \frac{1}{2} \omega_3 \omega_4^2 \omega_2 + 4 \omega_4 \omega_1 u \omega_2 - v^2 \omega_4 \omega_2^2 + \frac{19}{4} \omega_3 \omega_2 - \frac{3}{2} \omega_3 \omega_4^2 u + \frac{3}{2} \omega_3^2 \omega_4 u \omega_2 + 4 \omega_3 \omega_1 u \omega_2 - \frac{5}{2} \omega_3 \omega_1 u \omega_2,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x, y+\delta_i}^{[\mu_1], t-3\delta_t} = & -1 + \frac{1}{2} \omega_3^2 \omega_4 c_s^2 - \frac{1}{2} \omega_3 c_s^2 \omega_2 + \frac{1}{2} v \omega_4 - 2 v^3 \omega_3 \omega_4 \omega_1 \omega_2 - \frac{1}{4} v^2 \omega_3 \omega_2^2 - \frac{3}{2} \omega_4 \omega_1 + \frac{1}{4} \omega_3 + \frac{1}{4} \omega_4 \omega_1 u^2 \omega_2 - \\
& \frac{1}{2} v^3 \omega_3^2 \omega_1 \omega_2 + 2 v^3 \omega_3 \omega_4 \omega_2 + \frac{1}{2} v^2 \omega_3^2 \omega_4 \omega_1 + 2 v^3 \omega_2^2 + \frac{1}{4} v \omega_4^2 \omega_1 u^2 - \frac{1}{2} v \omega_3^2 \omega_4 c_s^2 \omega_1 + \frac{7}{4} v \omega_3 \omega_2 + \frac{1}{4} v \omega_4^2 \omega_1 + \\
& \frac{1}{2} \omega_3 c_s^2 \omega_1 \omega_2 - \frac{1}{2} \omega_3 \omega_4 c_s^2 \omega_1^2 - \frac{1}{4} \omega_3 \omega_1 u^2 \omega_2 + \frac{5}{2} v^2 \omega_3 \omega_4 - v^3 \omega_3 \omega_2^2 + v^2 \omega_1 \omega_2^2 + \frac{1}{2} v^2 \omega_3^2 \omega_4^2 \omega_1 + \frac{13}{4} v^2 \omega_4 \omega_1 \omega_2 + \\
& 4 v^2 \omega_2 + v \omega_4 \omega_1 u^2 \omega_2 - v \omega_3 \omega_4 c_s^2 \omega_2 - \frac{1}{4} \omega_4 \omega_1 u^2 + \frac{1}{2} \omega_3 \omega_4^2 c_s^2 - \frac{1}{4} v^3 \omega_3 \omega_1 - \frac{3}{2} v^3 \omega_4 \omega_2 - \frac{1}{4} \omega_3 \omega_4 - \frac{3}{4} \omega_4^2 u^2 + \\
& 2 \omega_3 c_s^2 - \frac{1}{2} v \omega_3^2 c_s^2 + \frac{1}{4} v^2 \omega_3^2 - \frac{9}{4} v \omega_3 \omega_1 \omega_2 - \frac{1}{2} v \omega_3 \omega_4 c_s^2 + v^3 \omega_4 \omega_1 \omega_2^2 - v \omega_3 \omega_1^2 u^2 \omega_2 - \frac{1}{4} \omega_3 \omega_1^2 + \frac{5}{4} v^2 \omega_4 \omega_1 + \\
& \frac{1}{2} v^2 \omega_3^2 \omega_2 + \frac{1}{2} v \omega_4 u^2 \omega_2 - v^2 \omega_3 + \frac{1}{4} \omega_3 u^2 \omega_2 - \frac{1}{2} v \omega_3 \omega_4^2 c_s^2 \omega_1 + \frac{3}{4} \omega_3 \omega_1^2 u^2 + \frac{3}{2} v^3 \omega_4 \omega_1 \omega_2 + \frac{1}{2} v^3 \omega_3 \omega_4^2 \omega_1 + \\
& \frac{1}{2} \omega_4 \omega_1 \omega_2 - \frac{1}{2} v^2 \omega_3 \omega_1^2 \omega_2 - \frac{1}{2} v^3 \omega_3 \omega_4 \omega_2 + v \omega_3 \omega_4 c_s^2 \omega_1 \omega_2 - \frac{1}{4} v^2 \omega_4 \omega_1^2 + \frac{1}{4} v \omega_3 \omega_1^2 + \frac{3}{4} v \omega_4 \omega_2 - 5 v^2 \omega_1 \omega_2 - v^2 \omega_2^2 - \\
& \frac{1}{2} v^2 \omega_4 \omega_1 \omega_2^2 + \frac{5}{4} \omega_4 - v^3 \omega_4 \omega_2^2 + \frac{1}{2} v \omega_3 \omega_4 \omega_1 + \frac{1}{2} v^2 \omega_3 \omega_4 \omega_2 - \frac{1}{2} v^2 \omega_3 \omega_1 \omega_2 + \frac{1}{2} v^3 \omega_3 \omega_4 \omega_1 + 3 \omega_3 \omega_4 c_s^2 \omega_1 - \frac{1}{2} \omega_1 \omega_2 + \\
& \frac{1}{4} v^3 \omega_3^2 + \frac{1}{2} \omega_3^2 c_s^2 \omega_1 + \frac{3}{4} \omega_3^2 u^2 + \omega_1 - \frac{3}{4} \omega_3^2 \omega_1 u^2 - \frac{3}{2} v^3 \omega_3 \omega_2 - \frac{1}{4} v^3 \omega_4 \omega_1^2 - \frac{1}{2} v^2 \omega_3 \omega_4^2 + \frac{1}{2} v \omega_3^2 \omega_1 u^2 \omega_2 - \frac{1}{4} v \omega_4^2 + \\
& \frac{1}{2} v^2 \omega_4^2 \omega_2 + \frac{5}{4} v^2 \omega_3 \omega_1 + \frac{1}{4} \omega_4 \omega_1^2 - \frac{1}{2} v \omega_3^2 \omega_2^2 - \frac{1}{2} v \omega_1 \omega_2^2 - \frac{1}{4} \omega_4^2 - \frac{1}{2} v \omega_4^2 \omega_1 u^2 \omega_2 - \frac{1}{2} v^3 \omega_3 \omega_4 \omega_1 \omega_2 + \frac{1}{2} v^3 \omega_3^2 \omega_2 + \\
& \frac{1}{2} v \omega_3 \omega_4 c_s^2 \omega_1 - \omega_3 \omega_2^2 + \frac{1}{4} v \omega_3^2 u^2 + \frac{1}{4} v^2 \omega_4^2 \omega_2 - \frac{1}{2} v \omega_3 \omega_4 c_s^2 \omega_1 \omega_2 - 2 v^3 \omega_1 \omega_2^2 - \frac{1}{4} v \omega_3^2 \omega_1 \omega_2^2 - \frac{11}{4} v^2 \omega_4 \omega_2 - \frac{1}{4} v^2 \omega_3^2 \omega_1 + 
\end{aligned}$$

$$\begin{aligned}
& \frac{1}{2}vw_3^2c_s^2\omega_1 + \frac{5}{2}vw_1\omega_2 + \frac{1}{4}\omega_3\omega_1u^2 - \frac{5}{2}\omega_3c_s^2\omega_1 + \frac{1}{2}v\omega_3 - \frac{1}{2}\omega_3\omega_4^2c_s^2\omega_1 + \frac{1}{2}v^3\omega_3\omega_4 - \frac{1}{4}\omega_4\omega_2 + \frac{1}{2}v^2\omega_3\omega_2^2 + \\
& \frac{1}{4}\omega_3\omega_4\omega_1 + \frac{13}{4}v^2\omega_3\omega_1\omega_2 - \frac{1}{2}v^3\omega_3\omega_4\omega_1 + \frac{1}{2}v^2\omega_3\omega_4\omega_1^2 + v^3\omega_3\omega_1\omega_2^2 - \frac{1}{2}v\omega_3\omega_1 + v^2\omega_1^2\omega_2 - \frac{1}{2}v\omega_3u^2\omega_2 + \frac{1}{2}\omega_2 - \\
& \frac{3}{4}vw_4\omega_1\omega_2 + \frac{3}{2}v^3\omega_3\omega_1\omega_2 - 2v\omega_2 - 3v^2\omega_3\omega_4\omega_1 - \frac{1}{2}v^2\omega_4\omega_1\omega_2 + \frac{1}{4}\omega_3\omega_1\omega_2 + \frac{1}{2}\omega_3\omega_4c_s^2\omega_2 + \omega_4u^2 - \frac{1}{2}\omega_3^2c_s^2 - \\
& \frac{1}{4}\omega_4u^2\omega_2 + \frac{1}{4}v^3\omega_4^2 + \frac{1}{2}v^3\omega_4^2\omega_2 - \frac{5}{2}\omega_3\omega_4c_s^2 - \frac{3}{4}\omega_4\omega_1^2u^2 - \frac{1}{2}v\omega_3\omega_4 + \frac{1}{2}v\omega_3\omega_1^2\omega_2 + \frac{1}{2}\omega_3c_s^2\omega_1^2 - \frac{1}{4}v\omega_3^2 - \frac{1}{4}v\omega_4^2u^2 - \\
& \frac{1}{4}v^2\omega_4^2\omega_1 - \frac{11}{4}v^2\omega_3\omega_2 - \frac{1}{2}v^3\omega_3\omega_4^2 - \frac{1}{2}v^2\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}v^2\omega_3\omega_1\omega_2^2 + \frac{1}{2}v\omega_3\omega_4^2c_s^2 - v^2\omega_4 - \frac{3}{2}vw_4\omega_1\omega_2 + \\
& \frac{3}{4}\omega_4^2\omega_1u^2 - \frac{1}{2}v^2\omega_4^2\omega_1\omega_2 + \frac{1}{4}v\omega_3\omega_4\omega_1\omega_2 + \frac{1}{2}v^2\omega_4\omega_1^2 - \frac{1}{4}\omega_3\omega_2 + \frac{1}{4}\omega_4^2\omega_1 - \frac{1}{4}v\omega_3^2\omega_2 - \frac{1}{2}v\omega_4\omega_1 + \frac{1}{2}v\omega_4^2u^2\omega_2 + \\
& vw_3c_s^2\omega_2 + \frac{1}{2}vw_3^2\omega_4c_s^2 + \frac{3}{2}vw_3\omega_1u^2\omega_2 + \frac{1}{4}vw_3^2\omega_1\omega_2 - \frac{1}{4}vw_3\omega_4\omega_2 - vw_3c_s^2\omega_1\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_4 - \frac{1}{2}\omega_3^2\omega_4c_s^2\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y+\delta_l}^{[\mu_5],t-3\delta_t} = & 3 + \frac{3}{4}\omega_3\omega_4\omega_1\omega_2 - \frac{5}{2}vw_4 + \frac{1}{2}\omega_4^2u^2\omega_2 - \frac{1}{4}\omega_3^2\omega_2 + \frac{13}{4}\omega_4\omega_1 - \frac{15}{4}\omega_3 - \omega_4\omega_1u^2\omega_2 + v^2\omega_3^2\omega_4\omega_1 - \frac{3}{4}\omega_3\omega_4\omega_2 + \\
& \frac{1}{4}\omega_3^2\omega_1\omega_2 - \frac{7}{2}vw_3\omega_2 - vw_4^2\omega_1 + \omega_3\omega_1u^2\omega_2 + \omega_1^2 + v^2\omega_3\omega_4 - 2v^2\omega_1\omega_2^2 + \frac{1}{2}v\omega_4\omega_2^2 + v^2\omega_3\omega_4^2\omega_1 + 2v^2\omega_4\omega_1\omega_2 + \\
& \frac{1}{2}\omega_3\omega_1^2\omega_2 + vw_3\omega_4\omega_1^2 + \omega_4\omega_1u^2 + \frac{13}{4}\omega_3\omega_4 - \frac{1}{2}\omega_4^2u^2 + \frac{1}{2}v^2\omega_3^2 + 4vw_3\omega_1\omega_2 - \frac{3}{2}vw_3^2\omega_4 - \omega_3\omega_1^2 + \frac{1}{2}v^2\omega_3^2\omega_2 + \\
& \omega_3\omega_1^2u^2 - \frac{1}{2}vw_3\omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_4^2\omega_1 - \frac{3}{4}\omega_4\omega_1\omega_2 + \frac{19}{4}\omega_3\omega_1 - vw_3^2\omega_1 - \frac{7}{2}v\omega_4\omega_2 + 2v^2\omega_2^2 + v^2\omega_4\omega_1\omega_2^2 - \frac{1}{2}\omega_3\omega_4^2 - \\
& \frac{11}{4}\omega_4 - 7vw_3\omega_4\omega_1 - \frac{1}{2}vw_4\omega_1^2\omega_2 + \frac{1}{2}\omega_3^2\omega_4\omega_1 + 3v^2\omega_3\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1\omega_2 + 2\omega_1\omega_2 + \frac{1}{2}vw_3\omega_2^2 + \frac{1}{2}\omega_3^2u^2 - 4\omega_1 - \\
& \frac{1}{2}\omega_3^2\omega_1u^2 - v^2\omega_3\omega_4^2 - \frac{1}{2}vw_4^2\omega_1\omega_2 + vw_4^2 + \frac{1}{2}v^2\omega_4^2\omega_2 - \frac{1}{2}\omega_4\omega_1^2 + vw_1^2\omega_2 + \frac{1}{2}\omega_4^2u^2 - \frac{1}{2}v\omega_4\omega_1^2 + \frac{1}{2}\omega_3^2\omega_1u^2\omega_2 - \\
& \frac{1}{2}\omega_3^2u^2\omega_2 + \frac{1}{2}v^2\omega_4^2 - \frac{1}{2}\omega_4^2\omega_1u^2\omega_2 + \frac{3}{2}vw_3^2\omega_4\omega_1 - 2v^2\omega_4\omega_2 - \frac{1}{2}v^2\omega_3^2\omega_1 - 6vw_1\omega_2 - \omega_3\omega_1u^2 - \frac{3}{2}vw_3\omega_4^2 - \frac{5}{2}v\omega_3 - \\
& \frac{3}{4}\omega_3^2\omega_1 + \frac{3}{4}\omega_4\omega_2 - v^2\omega_3\omega_2^2 - \frac{15}{4}\omega_3\omega_4\omega_1 + 2v^2\omega_3\omega_1\omega_2 - vw_2^2 + 3vw_3\omega_1 + \frac{1}{2}v\omega_4^2\omega_2 - \frac{3}{2}\omega_2 + \frac{3}{2}vw_3\omega_4^2\omega_1 + 4vw_4\omega_1\omega_2 + \\
& 5v\omega_2 - v^2\omega_3\omega_4\omega_1 - \frac{9}{4}\omega_3\omega_1\omega_2 - \frac{1}{2}vw_3\omega_1^2 + \omega_4\omega_1^2u^2\omega_2 - \frac{1}{2}\omega_3^2\omega_4 - \frac{1}{2}v\omega_4\omega_1\omega_2^2 - \omega_4\omega_1^2u^2 + 6vw_3\omega_4 - \frac{1}{2}vw_3\omega_1^2\omega_2 - \\
& \omega_3\omega_1^2u^2\omega_2 + vw_3^2 - \frac{1}{2}v^2\omega_4^2\omega_1 - 2v^2\omega_3\omega_2 - 3v^2\omega_3\omega_4\omega_1\omega_2 + v^2\omega_3\omega_1\omega_2^2 + \frac{3}{4}\omega_3^2 + \frac{1}{2}\omega_3\omega_4\omega_1^2 + \frac{1}{2}\omega_4^2\omega_1u^2 - \frac{1}{2}v^2\omega_4^2\omega_1\omega_2 + \\
& vw_1\omega_2^2 - vw_3\omega_4\omega_1\omega_2 - v^2\omega_4\omega_2^2 + \frac{7}{4}\omega_3\omega_2 - \frac{1}{2}\omega_4^2\omega_1 + \frac{1}{2}v\omega_3^2\omega_1\omega_2 + 3vw_4\omega_1 - \frac{1}{2}v\omega_3^2\omega_4\omega_2 - v^2\omega_3\omega_4\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_1],t-4\delta_t} = & 2 + \frac{1}{2}\omega_3\omega_4\omega_1\omega_2 - \omega_3^2\omega_4c_s^2 + 5\omega_3c_s^2\omega_2 - \frac{3}{2}\omega_4^2u^2\omega_2 - \omega_3\omega_4^2c_s^2\omega_1\omega_2 + \frac{1}{2}v^2\omega_3\omega_1^2 + 3\omega_4\omega_1 - \frac{1}{2}\omega_3 + \\
& \omega_3\omega_4^2c_s^2\omega_2 - \omega_4\omega_1u^2\omega_2 - 3v^2\omega_3^2\omega_4\omega_1 - \frac{1}{2}\omega_3\omega_4\omega_2 - v^2\omega_3\omega_4^2\omega_1\omega_2 + v^2\omega_3\omega_4\omega_2^2 - 6\omega_3c_s^2\omega_1\omega_2 - \omega_1\omega_2^2 + \\
& \omega_3\omega_4c_s^2\omega_1^2 + \omega_3\omega_1u^2\omega_2 - 7v^2\omega_3\omega_4 + 2v^2\omega_1\omega_2^2 - 3v^2\omega_3\omega_4^2\omega_1 - 13v^2\omega_4\omega_1\omega_2 - \frac{1}{2}\omega_3\omega_1^2\omega_2 - 8v^2\omega_2 + \frac{1}{2}\omega_4\omega_1u^2 - \\
& \omega_3\omega_4^2c_s^2 + \frac{1}{2}\omega_3\omega_4 + \frac{3}{2}\omega_4^2u^2 - 4\omega_3c_s^2 - \frac{3}{2}v^2\omega_3^2 + \frac{1}{2}\omega_3\omega_1^2\omega_2^2 + \frac{1}{2}\omega_4\omega_1\omega_2^2 - v^2\omega_3\omega_4\omega_1^2\omega_2 + \frac{1}{2}\omega_3\omega_1^2 - \frac{5}{2}\omega_4\omega_1 - \\
& \frac{5}{2}v^2\omega_3^2\omega_2 + 2v^2\omega_3 - \frac{5}{2}\omega_3u^2\omega_2 - v^2\omega_3^2\omega_4\omega_1\omega_2 - \frac{3}{2}\omega_3\omega_1^2\omega_2^2 - \frac{7}{2}\omega_4\omega_1\omega_2 + \frac{3}{2}v^2\omega_3\omega_1^2\omega_2 - \frac{1}{2}\omega_4^2\omega_2 + \frac{1}{2}v^2\omega_4\omega_1^2 + \\
& 10v^2\omega_1\omega_2 - 2v^2\omega_2^2 - \frac{1}{2}v^2\omega_4\omega_1\omega_2^2 - \frac{5}{2}\omega_4 + \omega_3^2\omega_4c_s^2\omega_2 - 12v^2\omega_3\omega_4\omega_2 + \frac{5}{2}v^2\omega_3^2\omega_1\omega_2 - 6\omega_3\omega_4c_s^2\omega_1 + 3\omega_1\omega_2 + \\
& \omega_3c_s^2\omega_1\omega_2^2 - \omega_3^2c_s^2\omega_1 - \frac{3}{2}\omega_3^2u^2 - 2\omega_1 - \frac{1}{2}\omega_3\omega_1u^2\omega_2^2 + \frac{3}{2}\omega_3^2\omega_1u^2 + 3v^2\omega_3\omega_4^2 - \omega_3c_s^2\omega_2^2 - \omega_3\omega_4c_s^2\omega_1^2\omega_2 + \\
& \frac{1}{2}\omega_4\omega_1u^2\omega_2^2 - \frac{3}{2}v^2\omega_4^2\omega_2 - \frac{5}{2}v^2\omega_3\omega_1 - \frac{1}{2}\omega_4\omega_1^2 + \frac{1}{2}\omega_4^2 - \frac{3}{2}\omega_3\omega_1u^2\omega_2^2 + \frac{1}{2}\omega_4^2\omega_1\omega_2 + v^2\omega_3\omega_4^2\omega_2 + \frac{3}{2}\omega_3^2u^2\omega_2 + \\
& 2\omega_3u^2 + \omega_3^2c_s^2\omega_1\omega_2 - \frac{3}{2}v^2\omega_4^2 + 7\omega_3\omega_4c_s^2\omega_1\omega_2 + \frac{3}{2}\omega_4^2\omega_1u^2\omega_2^2 + \frac{23}{2}v^2\omega_4\omega_2 + \frac{3}{2}v^2\omega_3\omega_1^2 - \frac{1}{2}\omega_3\omega_2^2 - \frac{1}{2}\omega_3\omega_1u^2 - \\
& \omega_3^2\omega_4c_s^2\omega_1\omega_2 + 5\omega_3c_s^2\omega_1 + \omega_3\omega_4^2c_s^2\omega_1 + 3\omega_4\omega_2 + \frac{1}{2}v^2\omega_3\omega_2^2 + v^2\omega_3^2\omega_4\omega_2 - \frac{1}{2}\omega_3\omega_4\omega_1 + \frac{1}{2}\omega_4\omega_1^2\omega_2 - 13v^2\omega_3\omega_1\omega_2 - \\
& v^2\omega_3\omega_4\omega_1\omega_2^2 + \frac{1}{2}\omega_3\omega_1\omega_2^2 - v^2\omega_3\omega_4\omega_1^2 + \omega_3\omega_4c_s^2\omega_2^2 - 2v^2\omega_1^2\omega_2^2 + \omega_2^2 - 3\omega_2 - \frac{1}{2}\omega_4u^2\omega_2^2 + 8v^2\omega_3\omega_4\omega_1 + \frac{3}{2}v^2\omega_4\omega_1^2\omega_2 - \\
& \frac{1}{2}\omega_3\omega_1\omega_2 - \frac{3}{2}\omega_4\omega_1^2u^2\omega_2 - 6\omega_3\omega_4c_s^2\omega_2 - 2\omega_4u^2 + \omega_3^2c_s^2 - \omega_3^2\omega_1\omega_2^2 + \frac{5}{2}\omega_4u^2\omega_2 + 5\omega_3\omega_4c_s^2 + \frac{3}{2}\omega_4\omega_1^2u^2 + \\
& \frac{3}{2}\omega_3\omega_1^2u^2\omega_2 - \omega_3c_s^2\omega_1^2 - \frac{1}{2}\omega_4\omega_2^2 + \frac{23}{2}v^2\omega_3\omega_2 + 13v^2\omega_3\omega_4\omega_1\omega_2 - \frac{1}{2}v^2\omega_3\omega_1\omega_2^2 - \omega_3\omega_4c_s^2\omega_1\omega_2^2 + \\
& 2v^2\omega_4 - \frac{3}{2}\omega_4^2\omega_1u^2 + \frac{5}{2}v^2\omega_4^2\omega_1\omega_2 + \frac{1}{2}v^2\omega_4\omega_2^2 + \omega_3\omega_2 - \frac{1}{2}\omega_4^2\omega_1 + \omega_3c_s^2\omega_1\omega_2^2 + 3v^2\omega_3^2\omega_4 + \omega_3^2\omega_4c_s^2\omega_1,
\end{aligned}$$

$$\begin{aligned}
\alpha_{x,y}^{[\mu_1],t-4\delta_t} = & -4 - 8\omega_3\omega_4\omega_1\omega_2 + \omega_3^2\omega_2 - 6\omega_4\omega_1 + 5\omega_3 + 7\omega_3\omega_4\omega_2 - \omega_3^2\omega_1\omega_2 + \omega_1\omega_2^2 - \omega_1^2 - \omega_3\omega_1^2\omega_2 - 6\omega_3\omega_4 - \omega_4\omega_1\omega_2^2 + \\
& \omega_3\omega_1^2 - \omega_3\omega_4^2\omega_1 + 7\omega_4\omega_1\omega_2 - 6\omega_3\omega_1 + \omega_4^2\omega_2 + \omega_3\omega_4^2 + 5\omega_4 - \omega_3\omega_4\omega_1 - 6\omega_1\omega_2 + 5\omega_1 + \omega_3\omega_4\omega_1\omega_2^2 + \omega_4\omega_1^2 - \\
& \omega_4^2 - \omega_3\omega_4\omega_2^2 + \omega_1^2\omega_2 - \omega_4^2\omega_1\omega_2 + \omega_3^2\omega_4\omega_1\omega_2 + \omega_3\omega_2^2 + \omega_3^2\omega_1 - 6\omega_4\omega_2 + 7\omega_3\omega_4\omega_1 - \omega_4\omega_1^2\omega_2 - \omega_3\omega_1\omega_2^2 - \omega_2^2 + \\
& 5\omega_2 - \omega_3\omega_4\omega_2 + 7\omega_3\omega_1\omega_2 + \omega_3^2\omega_4 + \omega_3\omega_4^2\omega_1\omega_2 + \omega_4\omega_2^2 - \omega_3^2 - \omega_3\omega_4\omega_1^2\omega_2 + \omega_3\omega_4\omega_1^2\omega_2 - 6\omega_3\omega_2 + \omega_4\omega_1^2,
\end{aligned}$$