

$$\begin{aligned}
& -k_{10} \left( \zeta_3(t) - \zeta_4(t) \right) + k_{10} \left( \zeta_4(t) - \zeta_5(t) \right) + \\
& 2 m_0 \left( \cos(\theta(t)) R(t) + \cos(\alpha(t)) \cos(\theta(t) + \psi(t)) \left( \frac{3 L_0}{10} + \eta_4(t) + \eta_5(t) \right) \right) \zeta_4'(t) \\
& \left( \cos(\theta(t)) R'(t) - \cos(\theta(t) + \psi(t)) \sin(\alpha(t)) \left( \frac{3 L_0}{10} + \eta_4(t) + \eta_5(t) \right) \alpha'(t) - \right. \\
& \quad \left. R(t) \sin(\theta(t)) \theta'(t) - \cos(\alpha(t)) \sin(\theta(t) + \psi(t)) \left( \frac{3 L_0}{10} + \eta_4(t) + \eta_5(t) \right) (\theta'(t) + \psi'(t)) + \right. \\
& \quad \left. \cos(\alpha(t)) \cos(\theta(t) + \psi(t)) (\eta_4'(t) + \eta_5'(t)) \right) + \\
& \left( m_0 \left( \cos(\theta(t)) R(t) + \cos(\alpha(t)) \cos(\theta(t) + \psi(t)) \left( \frac{3 L_0}{10} + \eta_4(t) + \eta_5(t) \right) \right) \right)^2 + i_{xm4} \Big) \zeta_4''(t) = \\
& c_{10} (\zeta_3'(t) - \zeta_4'(t)) - c_{10} (\zeta_4'(t) - \zeta_5'(t))
\end{aligned}$$