

$$\begin{aligned}
& -k_{10}(\chi_4(t) - \chi_5(t)) + k_{10} \chi_5(t) + 2m_0 \left(\cos(\theta(t)) R(t) + \cos(\alpha(t)) \cos(\theta(t) + \psi(t)) \left(\frac{L_0}{10} + \eta_5(t) \right) \right) \\
& \left(\cos(\theta(t)) R'(t) - \cos(\theta(t) + \psi(t)) \sin(\alpha(t)) \left(\frac{L_0}{10} + \eta_5(t) \right) \alpha'(t) - R(t) \sin(\theta(t)) \theta'(t) - \right. \\
& \quad \left. \cos(\alpha(t)) \sin(\theta(t) + \psi(t)) \left(\frac{L_0}{10} + \eta_5(t) \right) (\theta'(t) + \psi'(t)) + \cos(\alpha(t)) \cos(\theta(t) + \psi(t)) \eta_5'(t) \right) \chi_5'(t) + \\
& \left(m_0 \left(\cos(\theta(t)) R(t) + \cos(\alpha(t)) \cos(\theta(t) + \psi(t)) \left(\frac{L_0}{10} + \eta_5(t) \right) \right)^2 + i_{zm5} \right) \chi_5''(t) = \\
& c_{10}(\chi_4'(t) - \chi_5'(t)) - c_{10} \chi_5'(t)
\end{aligned}$$