

$$\begin{aligned}
& k_{10} \chi_1(t) - k_{10} (\chi_{P1}(t) - \chi_1(t)) + 2 m_0 \left(\cos(\theta(t)) R(t) + \cos(\alpha(t)) \cos(\theta(t) + \psi(t)) \left(\frac{L_0}{2} + \eta_1(t) \right) \right) \\
& \left(\cos(\theta(t)) R'(t) - \cos(\theta(t) + \psi(t)) \sin(\alpha(t)) \left(\frac{L_0}{2} + \eta_1(t) \right) \alpha'(t) - R(t) \sin(\theta(t)) \theta'(t) - \right. \\
& \left. \cos(\alpha(t)) \sin(\theta(t) + \psi(t)) \left(\frac{L_0}{2} + \eta_1(t) \right) (\theta'(t) + \psi'(t)) + \cos(\alpha(t)) \cos(\theta(t) + \psi(t)) \eta_1'(t) \right) \chi_1'(t) + \\
& \left(m_0 \left(\cos(\theta(t)) R(t) + \cos(\alpha(t)) \cos(\theta(t) + \psi(t)) \left(\frac{L_0}{2} + \eta_1(t) \right) \right)^2 + i_{zm1} \right) \chi_1''(t) = \\
& c_{10} (\chi_{P1}'(t) - \chi_1'(t)) - c_{10} \chi_1'(t)
\end{aligned}$$