

Hamiltonian

$$\begin{aligned}
\mathcal{H} = & J_x^2 \left(\frac{2m_1 + m_2 + m_3}{2m_2(2m_1 + m_3)R^2(t)\tan^2(\theta(t))} - \frac{1}{m_1 r_0^2 \sin^2(\theta(t))} \right) \\
& - \frac{J_x J_y (2m_1 + m_2 + m_3)}{m_2(2m_1 + m_3)R^2(t)\tan(\theta(t))} + \frac{J_y^2 (2m_1 + m_2 + m_3)}{2m_2(2m_1 + m_3)R^2(t)} \\
& + \frac{J_z^2 (2m_1 + m_2 + m_3)}{2m_2(2m_1 + m_3)R^2(t)} + \frac{J_z (2m_1 + m_2 + m_3) p_\theta(t)}{m_2(2m_1 + m_3)R^2(t)} \\
& + \left(\frac{2m_1 + m_2 + m_3}{2m_2(2m_1 + m_3)R^2(t)} - \frac{1}{m_1 r_0^2} \right) p_\theta^2(t) - \frac{(2m_1 + m_2 + m_3) p^2(t)}{2m_2(2m_1 + m_3)}
\end{aligned} \tag{1}$$