

Hamiltonian

$$\begin{aligned}
\mathcal{H} = & \frac{J_x^2 (r_1^2(t) + r_2^2(t)) (-\cos(q(t)) + 1)}{16mr_1^2(t)r_2^2(t)\sin^4(\frac{1}{2}q(t))} + \frac{J_x J_z (r_1^2(t) - r_2^2(t))}{2mr_1^2(t)r_2^2(t)\sin(q(t))} \\
& + J_y^2 \left(\frac{1}{8mr_2^2(t)} + \frac{1}{8mr_1^2(t)} \right) + J_y \left(\frac{1}{2mr_2^2(t)} - \frac{1}{2mr_1^2(t)} \right) p(t) \\
& + \frac{J_z^2 (r_1^2(t) + r_2^2(t)) (-\cos(q(t)) + 1)}{4mr_1^2(t)r_2^2(t)\sin^2(q(t))} \\
& + \left(\frac{1}{2mr_2^2(t)} + \frac{1}{2mr_1^2(t)} \right) p^2(t) - \frac{p_1^2(t)}{2m} - \frac{p_2^2(t)}{2m}
\end{aligned} \tag{1}$$