Hamiltonian

$$\begin{aligned}\mathcal{H} = & \frac{J_x^2}{2\mu_2 {q_2}^2(t)} + \frac{J_x J_z}{\mu_2 {q_2}^2(t)\tan\left(q_1(t)\right)} + \frac{J_y^2}{2\mu_2 {q_2}^2(t)} - \frac{J_y p_1(t)}{\mu_2 {q_2}^2(t)} \\ & + J_z^2\left(\frac{1}{2\mu_2 {q_2}^2(t)\tan^2\left(q_1(t)\right)} - \frac{1}{2l^2\mu_1\sin^2\left(q_1(t)\right)}\right) \\ & + \left(\frac{1}{2\mu_2 {q_2}^2(t)} - \frac{1}{2l^2\mu_1}\right){p_1}^2(t) - \frac{{p_2}^2(t)}{2\mu_2}\end{aligned} \tag{1}$$