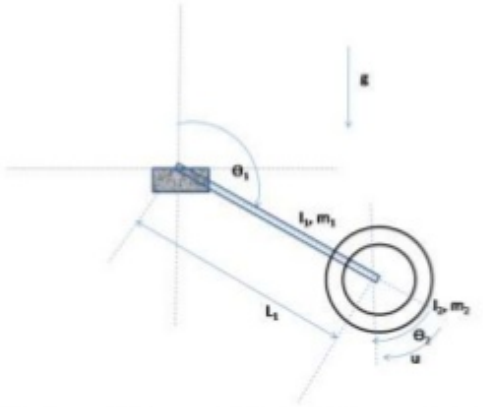
NONLINEAR CONTROL THEORY

Homework 6 → for Tuesday 05 May 2020, 23:59

Inertia wheel pendulum

A Few Words on Inertia Wheel Pendulum



Degree of Freedom: 2

No of Control Input: 1

➢ State Model of Inertia Wheel System

$$\dot{q}_1 = p_1$$

$$\dot{p}_1 = -\frac{m_{22}}{|M|} m_0 g \sin q_1 - \frac{m_{12}}{|M|} u$$

$$\dot{q}_2 = p_2$$

$$\dot{p}_2 = \frac{m_{21}}{|M|} m_0 g \sin q_1 + \frac{m_{11}}{|M|} u$$

g is the constant gravity, m_0 is a mass and M a constant inertia matrix $[m_{ij}]$.

➔ u denotes the torque that actuates the inertia wheel

1. Compute the missing basis vector * in: $H_2 = span\{ dq_1, dq_2 , * \}$
2. Compute H_3