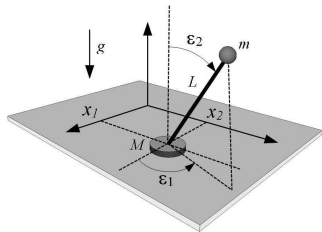


Homework 7



The system has four generalized coordinates: (x_1, x_2) are variables for representing the position of the puck on a plane; $(\varepsilon_1, \varepsilon_2)$ are two angles (precession and nutation) for representing the status of the pendulum.

The dynamics of the system are

$$\begin{aligned} \frac{d}{dt} \left[\frac{\partial \mathcal{L}}{\partial \dot{\varepsilon}_1} \right] - \frac{\partial \mathcal{L}}{\partial \varepsilon_1} &= 0 & \frac{d}{dt} \left[\frac{\partial \mathcal{L}}{\partial \dot{\varepsilon}_2} \right] - \frac{\partial \mathcal{L}}{\partial \varepsilon_2} &= 0 \\ \frac{d}{dt} \left[\frac{\partial \mathcal{L}}{\partial \dot{x}_1} \right] - \frac{\partial \mathcal{L}}{\partial x_1} &= F_1 & \frac{d}{dt} \left[\frac{\partial \mathcal{L}}{\partial \dot{x}_2} \right] - \frac{\partial \mathcal{L}}{\partial x_2} &= F_2 \end{aligned}$$

with F_1, F_2 being external forces acting on the puck along x_1, x_2 axes

The task: to find a behavior of the system when the puck is forced to move along of a circle of a radius R while the pendulum stays above the horizontal for all time moments.