

PHY422/820: Classical Mechanics

FS 2020

Exam Preparation

December 1, 2020

Problem P17 – Suspended Rod

A very thin uniform rod of length l and mass m ($I = ml^2/12$) hangs from two ideal springs with constants k . The coordinate η is the vertical displacement of the rod's center from its equilibrium position. The displacement of the rod ends are $\eta_1 = -l/2 \sin \theta$ and $\eta_2 = l/2 \sin \theta$. Consider only the vertical motion of the rod-spring system and assume small displacements.

Construct the Lagrangian in terms of η and θ and determine the normal modes.

