METÓDY RIEŠENIA FYZIKÁLNYCH ÚLOH 2 zima24 – Príklady 2

Cvičenie 9.10.2024

Príklad 1

PROBLEM: Beads of equal mass m are strung at equal original distances d on a long horizontal wire. The beads are initially at rest but can move along the wire without friction. The leftmost bead is continuously accelerated (towards the right) by a constant force F. The other beads do not feel F, but do undergo collisions with the leftmost bead and each other. As a result of the collisions, a compression wave propagates to the right down the wire. What are the speeds of the leftmost bead and the front of the 'shock wave' after a long time, if the collisions of the beads are:

(a) completely inelastic,

(b) perfectly elastic?
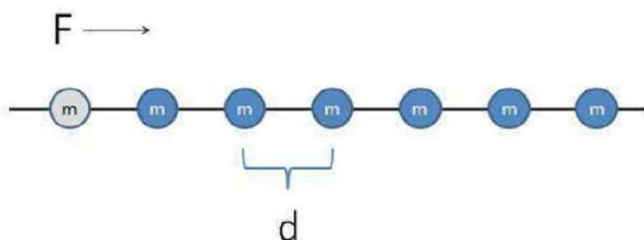
Príklad 2

A toy consists of two concentric cylinders with inner radius r and outer radius R. A string is wound around the inner radius and the outer radius can roll without slipping on a rough floor. The string is pulled at angle θ with respect to the horizontal.
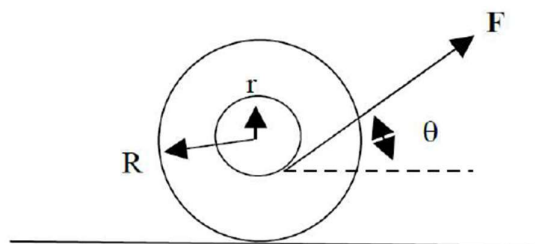
a. Draw the free body diagram.
b. Calculate the angular acceleration.
c. Prove that there exists a critical angle θ_c, where if $\theta < \theta_c$ the cylinder rolls away from the direction it is pulled, and if $\theta > \theta_c$ the cylinder rolls toward the direction it is pulled.
d. Determine θ_c

Príklad 3

Problem. Assume that the water exerts drag force F on the boat, directly proportional to the boat's speed: $F = kv$, where k is a (nonzero) constant. How far from its initial position will the boat end up after the man walks from one end of the boat to the other? Everything starts at rest. The two masses and the length of the boat are given (m, M, L).