Cvičenie 7.10.2022

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?
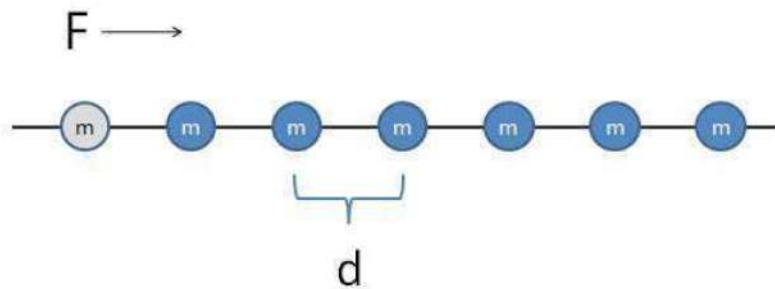
Príklad 2

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.
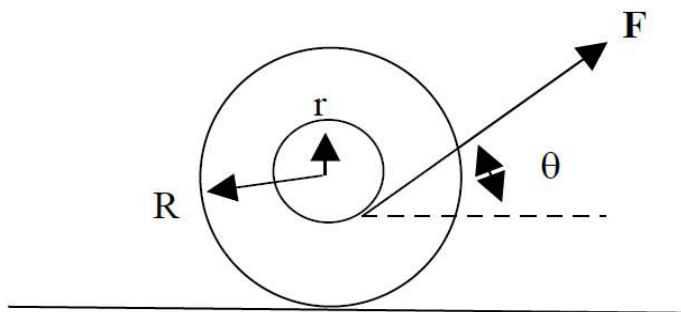
a. Draw the free body diagram.
b. Calculate the angular acceleration.
c. Prove that there exists a critical angle θ_c, where if $\theta < \theta_c$ the cylinder rolls away from the direction it is pulled, and if $\theta > \theta_c$ the cylinder rolls toward the direction it is pulled.
d. Determine θ_c