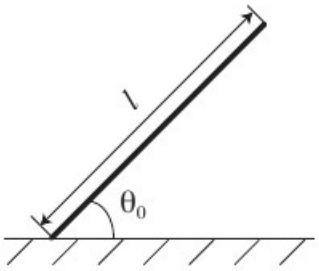
METÓDY RIEŠENIA FYZIKÁLNYCH ÚLOH 2 zima26 – Príklady 3

Cvičenie 29.10.2026

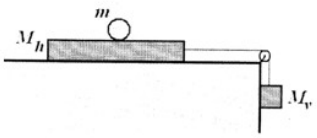
Príklad 1

PROBLEM: A thin rod of length l is supported at one end by a smooth floor (see figure). The rod is released from a configuration where it makes an angle θ_0 relative to the horizontal. Write down the Lagrangian for this system. Determine how long it takes for the rod to fall to the floor (*the answer in terms of a definite integral will be sufficient.*) Also determine how far the lower end moves during this time.

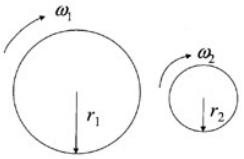


Príklad 2

A block of mass M_h slides without friction on a horizontal table. It is connected by a massless rope passing over a massless frictionless pulley to a second hanging mass M_v pulled downward by gravity. A sphere of mass m and radius R, initially at rest, rolls without sliding on the top surface of the first block. Find the resulting acceleration of the mass M_v and the center of mass of the sphere.

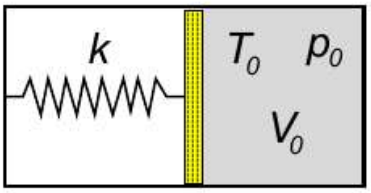


Two uniform cylinders spin independently about their axes (the axes are parallel to each other). The first has radius r_1 and mass m_1, the other has radius r_2 and mass m_2. Initially they rotate in the same sense of rotation with angular speeds ω_1 and ω_2 respectively. They are then brought together so that they touch. After the steady state is achieved, what is the final angular velocity of cylinder 1, ω_1'?



Príklad 3

Find the heat capacity of the system consisting of a container that has two compartments separated by a piston. To the right of the piston is a gas of monoatomic molecules (gas parameters p_0, T_0, V_0), and to the left is vacuum. The piston is held by a spring. If the gas is removed, the piston touches the right wall and the spring is relaxed.



Heat capacities of the materials composing spring, piston and container walls can be neglected.