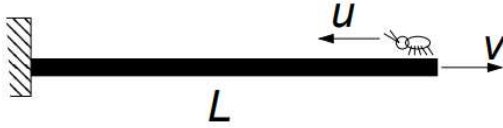


METÓDY RIEŠENIA FYZIKÁLNYCH ÚLOH 1 leto23 – Príklady 6

Cvičenie 24. 4. 2023

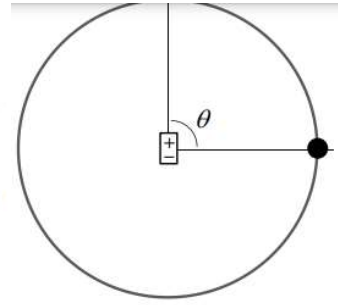
Príklad 1



A rubber band with initial length L has one end tied to a wall. At $t = 0$, the other end is pulled away from the wall at speed V (assume that the rubber band stretches uniformly). At the same time, a bug located at the end not attached to the wall begins to crawl toward the wall, with speed u relative to the band. Will the bug reach the wall, under what conditions and in what time?

Príklad 2

: A small electrically charged bead with the mass m and charge Q can slide on a circular insulating string without friction. The radius of the circle is r . A point-like electric dipole is at the center of the circle with the dipole moment P lying in the plane of the circle. Initially the bead is at the angle $\theta = \pi/2 + \delta$, where δ is infinitely small, as shown schematically on the figure.



- How does the bead move after it is released? Find the bead velocity as a function of the angle θ .
- Find the normal force exerted by the string on the bead.

Príklad 3

PROBLEM: An inextensible massless string of length ℓ passes through a hole in a horizontal table. A point mass m_1 on one end of the string moves frictionlessly along the table (*i.e.* with two degrees of freedom), and another point mass m_2 dangles vertically from the other end. (See the sketch below.)

- Write the Lagrangian for this system.
- Under what conditions will the hanging mass remain stationary?
- Starting from the situation in part (b), the hanging mass is pulled down slightly and then released. State clearly what is conserved during this process.
- Compute the subsequent motion of the hanging mass.

