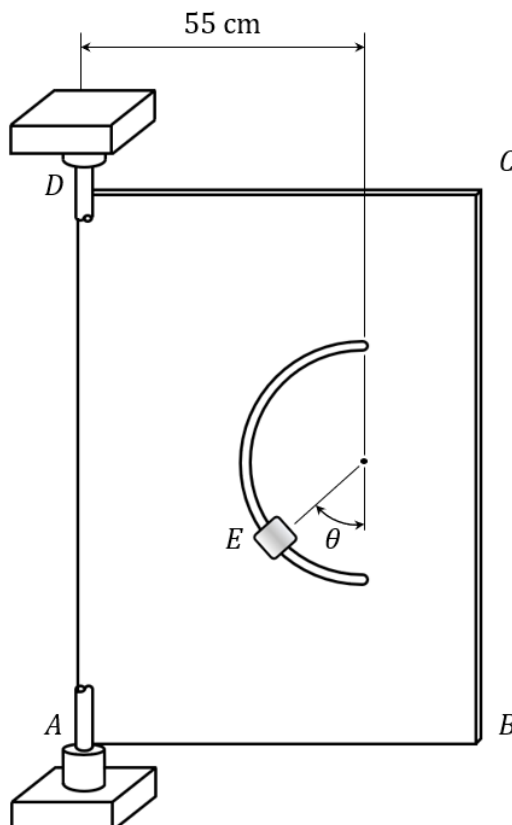


23-2 Dynamics

Mid-term Test

1. A semicircular slot of **25 cm** radius is cut in a flat plate which rotates about the vertical AD at a constant rate of **14 rad/sec**. A small, **0.5 kg** block E is designed to slide in the slot as the plate rotates. The coefficients of friction are **$\mu_s = 0.4$, $\mu_k = 0.3$** ,
- a) Determine whether the block will slide in the slot if it is released in the position corresponding to $\theta = 80^\circ$. Also, determine the magnitude and the direction of the friction force exerted on the block immediately after it is released. (25 pts)
- b) Determine whether the block will slide in the slot if it is released in the position corresponding to $\theta = 75^\circ$. Also, determine the magnitude and the direction of the friction force exerted on the block immediately after it is released. (25 pts)



2. When the rope is at an angle of $\alpha = 30^\circ$, the **1 kg** sphere A has a speed $v_0 = 2.4 \text{ m/s}$. The coefficient of restitution between A and the **2 kg** wedge B is **0.8** and the length of rope $l = 1.5 \text{ m}$. The spring constant has a value of **1800N/m**. and $\theta = 20^\circ$.

- Determine the velocity v_1 of the sphere A just before the impact. (20 pts)
- Determine the velocities and directions of A and B immediately after the impact. (20 pts)
- Determine the maximum deflection of the spring. Assume A does not strike B again before this point. (10 pts)

