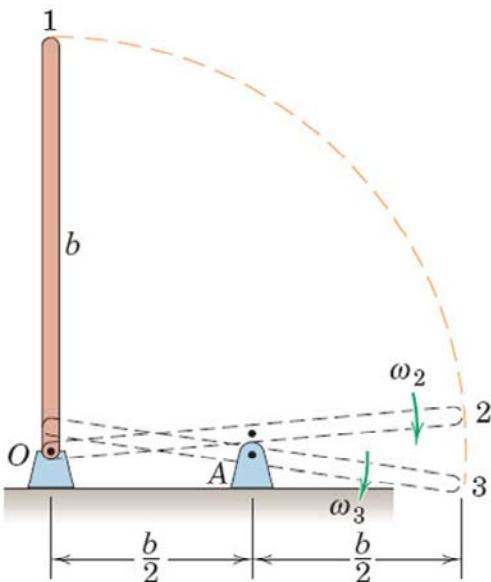


Question of the Day



A slender bar of **mass m** and **length b** is released from rest and pivots at **O** until the bar strikes **A** and then pivots at **A** . The **angular velocity ω_2** = $(3g/b)^{1/2}$ just before it engages the pivot at **A** .

Determine the **angular velocity ω_3** of the bar just after it engages the pivot at **A** .

ME 231: Dynamics

6/189

From 1 to 2, $\Delta T + \Delta V_g = 0$

$$\frac{1}{2}I_0\omega_2^2 - 0 - mg\frac{b}{2} = 0, \quad \frac{1}{3}mb^2\omega_2^2 = mgb$$

$$\omega_2 = \sqrt{3g/6}$$

During impact with A , $\Delta H_A = 0$, $H_{A_2} = H_{A_3}$

$$\begin{aligned} & \text{Diagram showing the impact at pivot } A. \quad \text{Angular velocity } \omega_2 \text{ at impact.} \\ & \text{After impact, the bar pivots at } A \text{ with angular velocity } \omega_3. \quad \text{Angular velocity } \omega_3 \text{ at position 3.} \\ & H_{A_2} = \bar{I}\omega_2 \quad H_{A_3} = \bar{I}\omega_3 \quad \text{so } \omega_3 = \omega_2 \\ & \omega_3 = \sqrt{3g/6} \end{aligned}$$