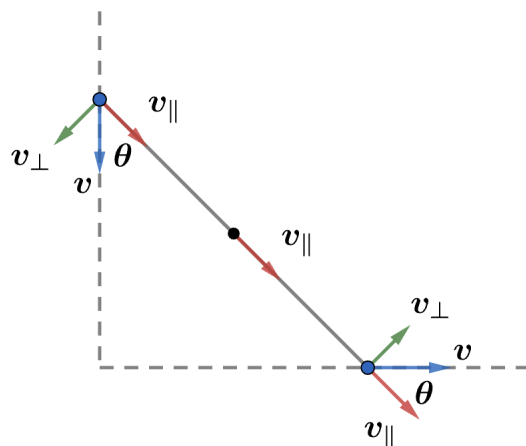


2024 F=ma Exam: Problem 8

Kevin S. Huang

The top of the rod is moving downward because it is sliding along the wall. The speed of the top is also v since the component of velocity v_{\parallel} parallel to the rod must be the same at both ends. We have

$$v_{\parallel} = v \cos \theta$$



The component of velocity v_{\perp} perpendicular to the rod has the same magnitude but opposite directions at the two ends, which means the instantaneous axis of rotation is at the middle of the rod. Thus,

$$v_{\text{mid}} = v_{\parallel} = v \cos(\pi/4) = \frac{v}{\sqrt{2}}$$

so the answer is B.