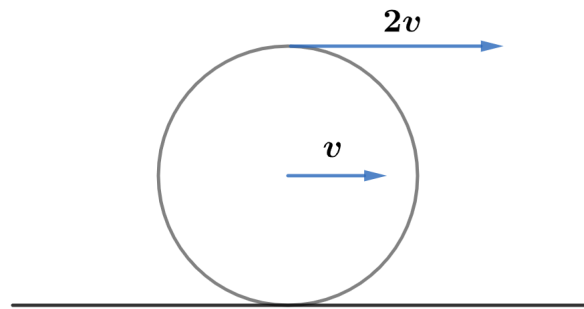
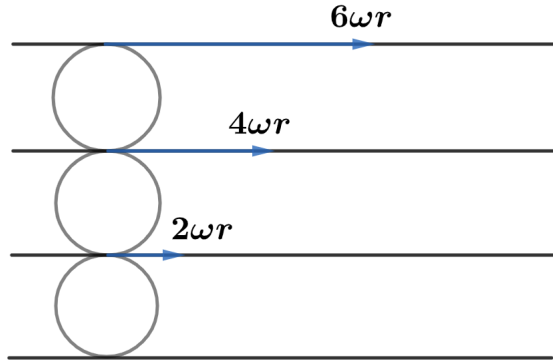


2020A F=ma Exam: Problem 19

Kevin S. Huang



Recall rolling without slipping is the superposition of translational motion at velocity v and rotational motion at angular velocity $\omega = v/R$. The bottom point is instantaneously at rest with respect to the ground so the top point moves at velocity $2v = 2\omega R$.



This means the first plate moves at velocity $2\omega R$ and the same argument by going to the frame of the second cylinder shows the velocity of the next plate increases by $2\omega r$. Thus,

$$v_{\text{top}} = 6\omega r$$