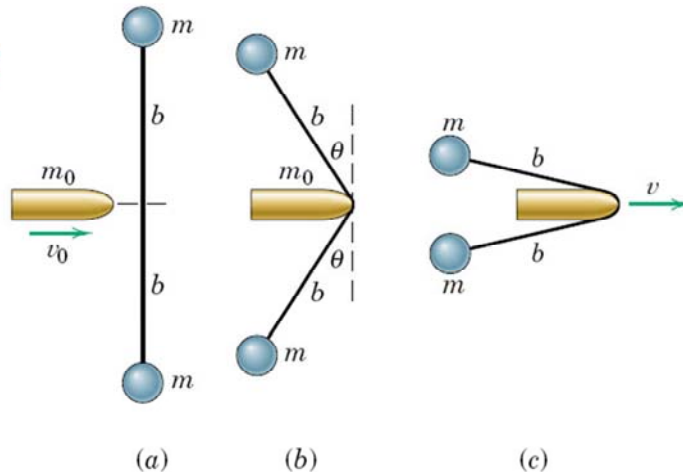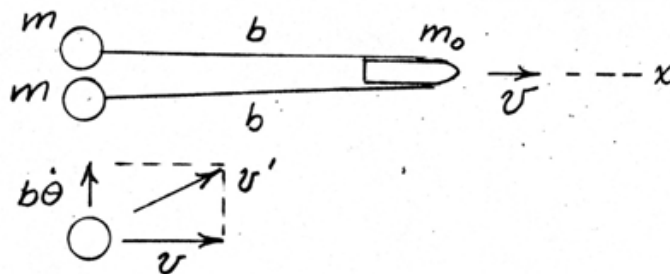Two spheres connected by a cord are initially at rest on a horizontal surface and a projectile hits the middle of the cord.

Determine the **velocity** v when θ approaches **90°**.

ME 231: Dynamics

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For system $\Delta G_x = 0$: $(m_o v + 2m v) - m_o v_o = 0$

$$v = \frac{m_o}{m_o + 2m} v_o$$

$U = \Delta T$: $0 = \frac{1}{2} m_o v^2 + 2\left[\frac{1}{2} m (v^2 + b^2 \dot{\theta}^2)\right] - \frac{1}{2} m_o v_o^2$

$(m_o + 2m) v^2 + 2m b^2 \dot{\theta}^2 = m_o v_o^2$

Substitute v & get $\dfrac{m_o^2 v_o^2}{m_o + 2m} + 2m b^2 \dot{\theta}^2 = m_o v_o^2$

Solve for $\dot{\theta}$ & get $\dot{\theta} = \dfrac{v_o}{b} \sqrt{\dfrac{m_o}{m_o + 2m}}$

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