

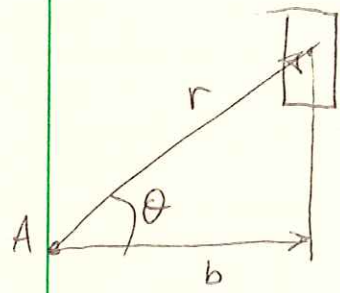
PROB. 11-171 FROM $\theta = 60^\circ$ TO 35° , $t = 0.5^s$

$b = 25^m$, FIND v_{AVE}

AT $\theta_1 = 60^\circ$, $\cos 60 = \frac{r_1}{b}$, $r_1 = b \cos 60$

$$r_1 = \frac{25}{\cos 60^\circ} = 50.0^m$$

$$\text{AT } \theta_2 = 35^\circ, r_2 = \frac{25}{\cos 35} = 30.52^m$$



$$\vec{v} = (\dot{r}) \hat{e}_r + (r\dot{\theta}) \hat{e}_\theta$$

$$|\vec{v}| = \sqrt{(\dot{r})^2 + (r\dot{\theta})^2}$$

$$\dot{r} = \frac{dr}{dt} = \frac{r_2 - r_1}{\Delta t} = \frac{(30.52) - (50)^m}{(0.5^s)} = -38.96 \frac{m}{s}$$

$$\dot{\theta} = \frac{d\theta}{dt} = \frac{\theta_2 - \theta_1}{\Delta t} = \left[\frac{(35^\circ) - (60^\circ)}{(0.5^s)} \right] \cdot \left(\frac{2\pi}{180^\circ} \right) = -0.8727 \frac{1}{s}$$

$$\text{ASSUME } v = v_{ave} = \frac{1}{2} (50 + 30.52^m) = 40.26^m$$

$$|\vec{v}| = \sqrt{\left(-38.96 \frac{m}{s}\right)^2 + \left[(40.26^m) \left(-0.8727 \frac{1}{s}\right) \right]^2}$$

$$|\vec{v}| = \left(52.46 \frac{m}{s} \right) \left(\frac{km}{1000 m} \right) \left(\frac{3600 s}{h} \right) = \boxed{188.9 \frac{km}{h}}$$