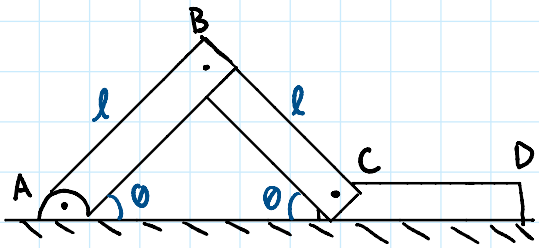
20-R-KM-DK-25

July 31, 2020 11:27 AM

Determine the angular velocities and angular accelerations of links AB and BC if end D has a velocity of ***v = 3m/s*** to the right and an acceleration of ***a = 1 m/s^2*** to the left? Link AB and BC both have a length ***l = 0.5 m*** and the angle is given as ***theta = 60 degrees***.



$$s = 2(0.5)\cos\theta = \cos\theta$$

$$\dot{s} = -\sin\theta \cdot \dot{\theta}$$

$$3 = -\sin 60\,(\omega) \qquad \omega = 2\sqrt{3}$$

$$\omega_{AB} = -2\sqrt{3} \qquad \omega_{BC} = 2\sqrt{3}$$

$$\ddot{s} = -\cos\theta \cdot \dot{\theta}^2 - \sin\theta\,(\ddot{\theta})$$

$$-1 = -\cos 60 \cdot (2\sqrt{3})^2 - \sin 60\,(\ddot{\theta})$$

$$\ddot{\theta} = \frac{10\sqrt{3}}{3}$$

$$\alpha_{AB} = \frac{-10\sqrt{3}}{2} \qquad \alpha_{BC} = \frac{10\sqrt{3}}{3}$$