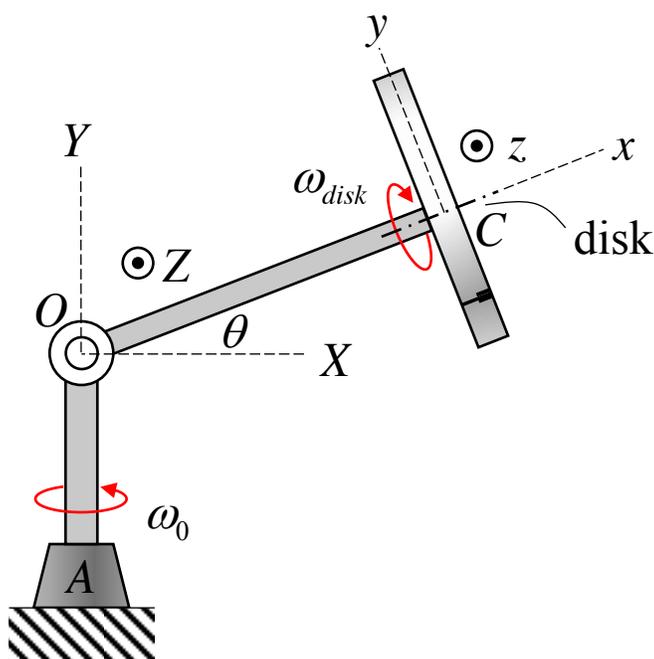


**Homework H3.E**

**Given:** A disk and shaft OC are mounted in a clevis that is attached to a fixed vertical axis such that  $\omega_0 = 0$  rad/s. The shaft and disk rotate with respect to the clevis with a rate of  $\omega_{disk}$  in the direction shown below, with the angle  $\theta$  increasing at a constant rate of  $\dot{\theta}$ . The  $XYZ$  coordinate system is fixed with the  $Y$ -axis aligned with the fixed vertical direction. The  $xyz$  coordinate system is attached to the disk with the  $x$ -axis aligned with OC for all time. For the position shown below, the  $z$ - and  $Z$ -axes are aligned.

**Find:** For the position shown:

- Determine the angular velocity of the disk. Write your answer as a vector in terms of its  $xyz$  components.
- Determine the angular acceleration of the disk. Write your answer as a vector in terms of its  $xyz$  components.



Use the following parameters in your analysis:  $\theta = 0$ ,  $\dot{\theta} = 1.5$  rad/s,  $\omega_{disk} = 2$  rad/s and  $\dot{\omega}_{disk} = 5$  rad/s<sup>2</sup>.