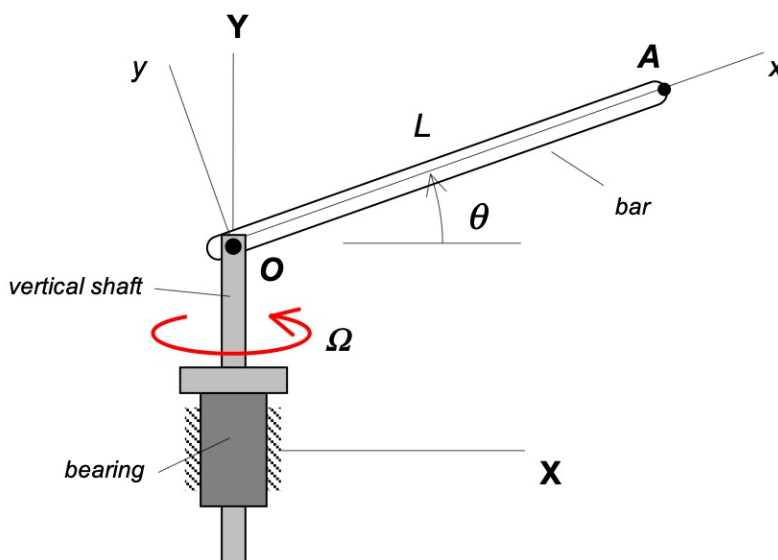


**Homework H.3.E**

**Given:** A shaft rotates about a fixed vertical axis at a constant rate of  $\Omega$ , as shown below. A straight bar OA, having a length of  $L$ , is pinned to point O on the shaft, with O being on the rotation axis of the shaft. At the instant when  $\theta = 0^\circ$ , bar OA is being raised at a rate of  $\dot{\theta}$  from the horizontal plane, with this rate changing at a rate of  $\ddot{\theta}$ . A set of  $xyz$  coordinate axes is attached to bar OA with its origin at O. A second set of coordinate axes,  $XYZ$ , are fixed to ground. At the instant when  $\theta = 0^\circ$ , the  $xyz$  and  $XYZ$  axes are aligned with each other.

**Find:** For the instant when  $\theta = 0^\circ$ , determine the angular velocity and angular acceleration of bar OA.



Use the following parameters in your analysis:  $\Omega = 5 \text{ rad/s}$ ,  $\dot{\theta} = 4 \text{ rad/s}$ ,  $\ddot{\theta} = -3 \text{ rad/s}^2$  and  $L = 2 \text{ m}$ .