Chapter 11   Problem 61 [†]

Given
$m = 0.120\ kg$
$r = 0.16\ m$
$\omega = 12\ rev/s = 12\ rev/s\left(\frac{2\pi\ rad}{1\ rev}\right) = 75.4\ rad/s$

Solution
Find the angular momentum of the anemometer.

There are four cups belonging to the anemometer. The mass of each cup is concentrated at the end of the rod. Therefore, the moment of inertia of each cup is

$$I = mr^2$$

The total moment of inertia of the anemometer is

$$I = 4mr^2 = 4(0.120\ kg)(0.16\ m)^2 = 1.23 \times 10^{-2}\ kg \cdot m^2$$

The angular momentum of the anemometer is then

$$L = I\omega = (1.23 \times 10^{-2}\ kg \cdot m^2)(75.4\ rad/s)$$

$$L = 0.927\ kg \cdot m^2/s$$

From figure 11-20 the rotation is clockwise is you were looking down from the top of the anemometer. Therefore, the direction of the angular momentum is downward in the direction of the axis of the anemometer.

[†]Problem from Essential University Physics, Wolfson