Problems 8.75

Disks $A$ and $B$ have identical masses and mass moments of inertia about their respective mass centers. Point $C$ is both the geometric center and center of mass of disk $A$. Points $O$ and $D$ are the geometric center and center of mass of disk $B$, respectively. If, at the instant shown, the two disks are rotating about their centers with the same angular velocity $\omega_0$, determine which of the following statements is true and why:

(a) $|\vec{\omega}_C| < |\vec{\omega}_O|$
(b) $|\vec{\omega}_C| = |\vec{\omega}_O|$
(c) $|\vec{\omega}_C| > |\vec{\omega}_O|$

Disk $A$

$$H_C = H_G = I_C \omega$$

Disk $B$

$$H_O = I_C \omega + m \vec{v} \cdot \vec{d}$$
as $O$ is not at the center of mass

So $H_O = H_C + m \vec{v} \cdot \vec{d}$ and answer a is correct

$|\vec{\omega}_C| < |\vec{\omega}_O|$