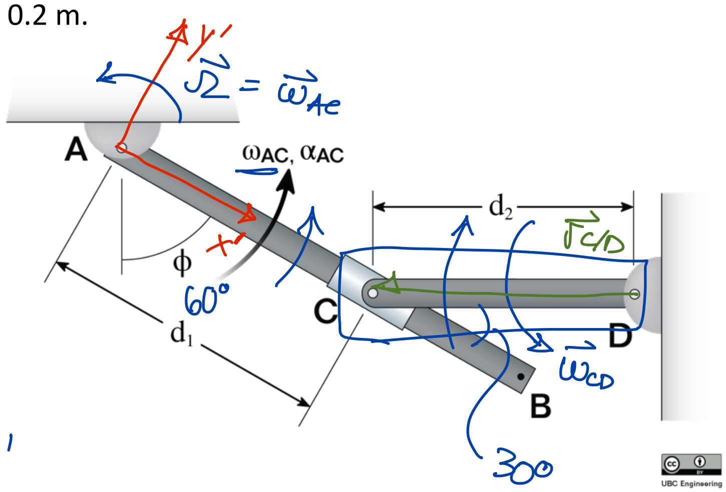
A collar which is pinned to rod *CD* slides along rod *AB*. At the instant shown, when $\phi = 60^o$, the angular velocity of rod *AB* is 2 rads/s in the direction shown. Find the rate at which *C* travels along rod *AB*, and the angular velocity of rod *CD*. Assume d_1 = 0.3 m and d_2 = 0.2 m.



$$\vec{V}_C = \vec{V}_A^{\,\nearrow 0} + \underbrace{\vec{\omega}_{AB}}_{\vec{\Omega}} \times \vec{r}_{C/A} + \underline{(\vec{V}_{C/A})_{rel}}$$

$$\vec{\omega}_{AB} = 2 \text{ rad/s } \hat{k}'$$

$$\vec{r}_{C/A} = 0.3\text{ m } \hat{i}'$$

$$(\vec{V}_{C/A})_{rel} = (V_{C/A})_{rel}\ \hat{i}'$$

$$\Rightarrow \vec{V}_C = \underbrace{2 \cdot 0.3}_{0.6\text{ m/s}} \text{ m/s } \hat{j}' + (V_{C/A})_{rel}\ \hat{i}'$$

$$\vec{V}_C = \vec{V}_D^{\,\nearrow 0} + \vec{\omega}_{CD} \times \vec{r}_{C/D} \qquad \text{Assume } \vec{\omega}_{CD} = \omega_{CD}\hat{k}'$$

$$\vec{r}_{C/D} = 0.2\left(-\cos 30\,\hat{i}' - \sin 30\,\hat{j}'\right)$$

$$\Rightarrow \vec{V}_C = \omega_{CD} \cdot 0.2\left(-\cos 30\,\hat{j}' + \sin 30\,\hat{i}'\right)$$

$$\vec{V}_C = \vec{V}_C$$

components

$$\hat{i}': (V_{C/A})_{rel} = 0.2\,\omega_{CD}\sin 30$$

$$\hat{j}':$$

$$rel = 0.2\left(\frac{-3}{\cos 30}\right)\sin 30$$

$$\boxed{(\vec{V}_{C/A})_{rel} = -0.6\tan 30\ \hat{i}'}$$