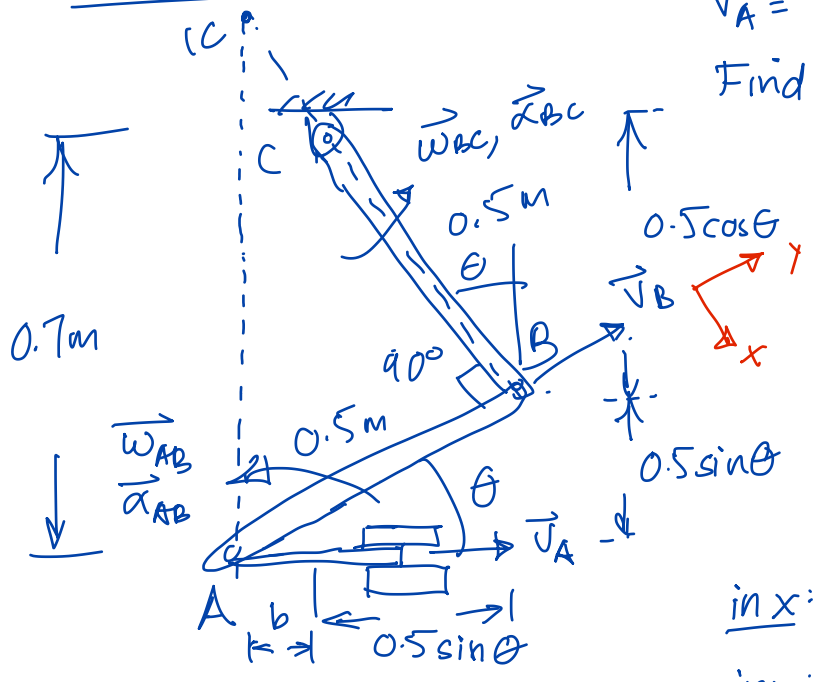
UBC-DYN-18-012

$\vec{v}_A = 7.9\,m/s$ constant ($\vec{a}_A = 0$)

Find $\vec{\alpha}_{BC}$



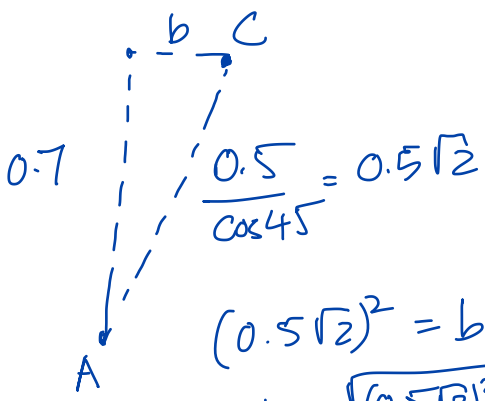
Assume:

$\vec{\omega}_{BC} = \omega_{BC}\hat{k}$

$\vec{\alpha}_{BC} = \alpha_{BC}\hat{k}$

$\vec{\omega}_{AB} = \omega_{AB}\hat{k}$

$\vec{\alpha}_{AB} = \alpha_{AB}\hat{k}$

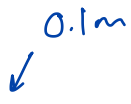


$\frac{0.5}{\cos 45} = 0.5\sqrt{2}$

$(0.5\sqrt{2})^2 = b^2 + 0.7^2$

$b = \sqrt{(0.5\sqrt{2})^2 - 0.7^2}$

$= 0.1\ m$



in x: $0.5\cos\theta = 0.5\sin\theta + b$

in y: $0.7 = 0.5\sin\theta + 0.5\cos\theta$

solve for θ

$0.7 = 0.5\sin\theta + 0.5\sin\theta + 0.1$

$0.6 = \sin\theta$

$\theta = 36.87°$

$\sin\theta = 0.6$

$\cos\theta = 0.8$

$\vec{v}_B = \vec{\omega}_{BC} \times \vec{r}_{B/C}$

$\vec{r}_{B/C} = 0.5\hat{i}$

$v_B\hat{j} = 0.5\,\omega_{BC}\hat{j}$

$\vec{v}_B = \vec{v}_A + \vec{\omega}_{AB} \times \vec{r}_{B/A}$

$\vec{r}_{B/A} = 0.5\hat{j}$

$\vec{v}_A = 7.9\ m/s\,(\sin\theta\,\hat{i} + \cos\theta\,\hat{j})$