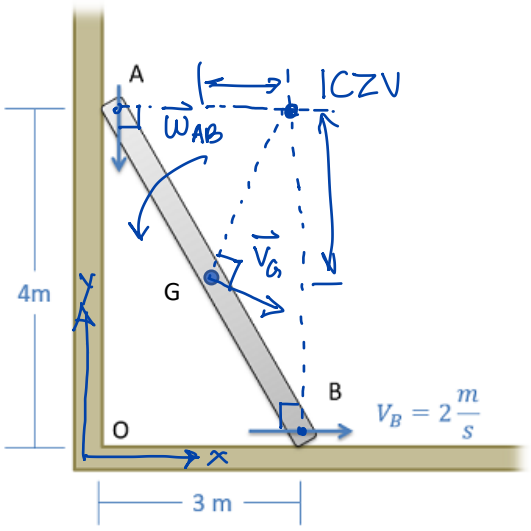
A ladder is propped up against a wall as shown below. If the base of the ladder is sliding out at a speed of 2 m/s, what is the velocity of the COG of the ladder (at the mid-point)?



Find $\vec{v}_G$

Known:

$\vec{v}_B = 2\ m/s\ \hat{\imath}$

$\vec{v}_A = -v_A\hat{\jmath}$

Assume:

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

Find ICZV graphically

$\vec{v}_B = \vec{\omega}_{AB} \times \vec{r}_{B/IC}$ $\quad \vec{r}_{B/IC} = -4\ m\ \hat{\jmath}$

$2\ \hat{\imath}\ m/s = \omega_{AB}\hat{k} \times -4\hat{\jmath}\ m$

$2\ \hat{\imath}\ m/s = 4\omega_{AB}\hat{\imath} \Rightarrow \omega_{AB} = 0.5\ rad/s$

$\vec{v}_G = \vec{\omega}_{AB} \times \vec{r}_{G/IC}$ $\quad \vec{r}_{G/IC} = (-1.5\hat{\imath} - 2\hat{\jmath})m$

$= 0.5\ rad/s\ \hat{k} \times (-1.5\hat{\imath} - 2\hat{\jmath})m$

$\boxed{\vec{v}_G = (1\hat{\imath} - 0.75\hat{\jmath})m/s}$