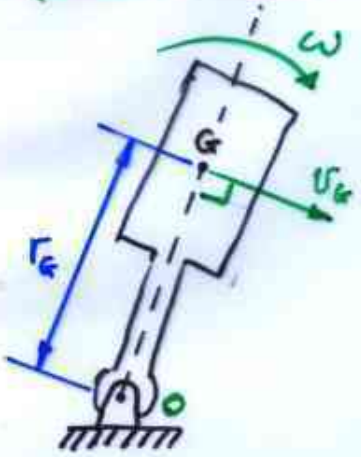
If O is a fixed point

$$H_O = I_O \omega$$

$$\Sigma M_O = I_O \dot{\omega} \equiv I_O \alpha$$

$$\int_{t_1}^{t_2} \Sigma M_O \, dt = I_O (\omega_2 - \omega_1)$$

I_O moment of inertia about point O



note $\vec{v}_G$ must be perpendicular to $\vec{r}_G$ due to kinematics

Conservation of Momentum

IF FOR A BODY OR SYSTEM OF BODIES, NO EXTERNAL NET FORCES ARE ACTING

i.e. $\Sigma \vec{F} = 0$

then $\Delta \vec{G} = 0$ i.e. momentum does not change

Also, if resultant moment about "O" or about G is zero i.e. $\Sigma M_O = 0$ OR $\Sigma M_G = 0$

$\Rightarrow$

$\Delta H_O = 0$ or $\Delta H_G = 0$