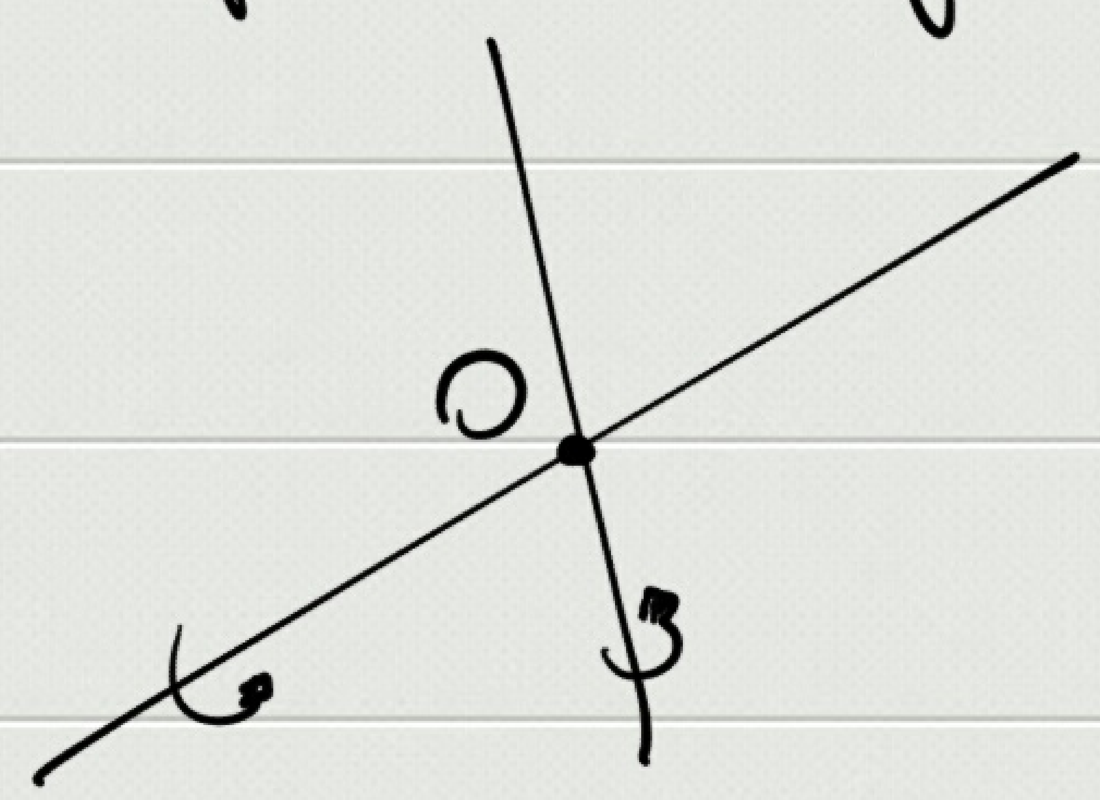
Giroscopio : c.r. un punto è fisso

$\Rightarrow$ moto rotatorio

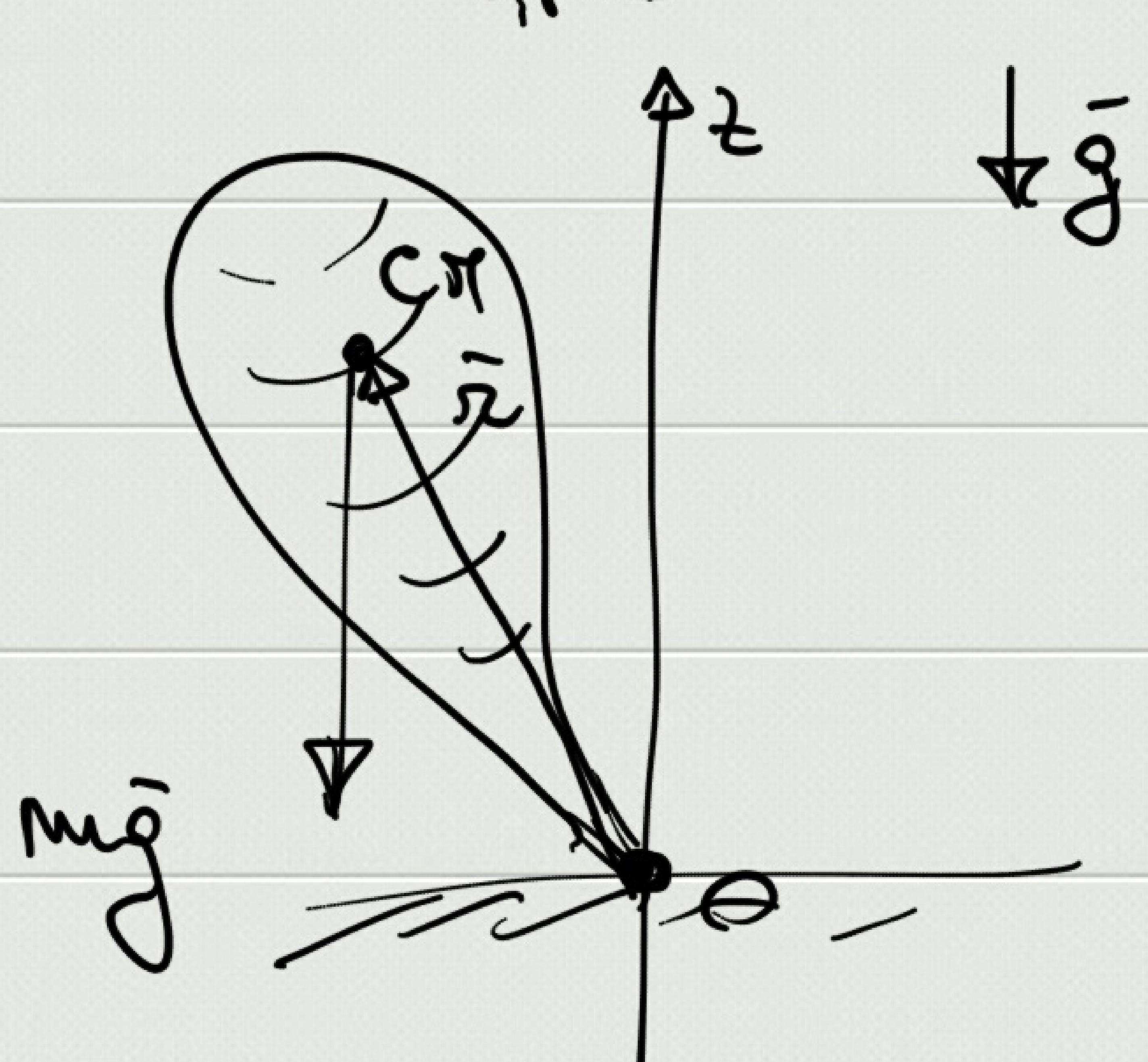


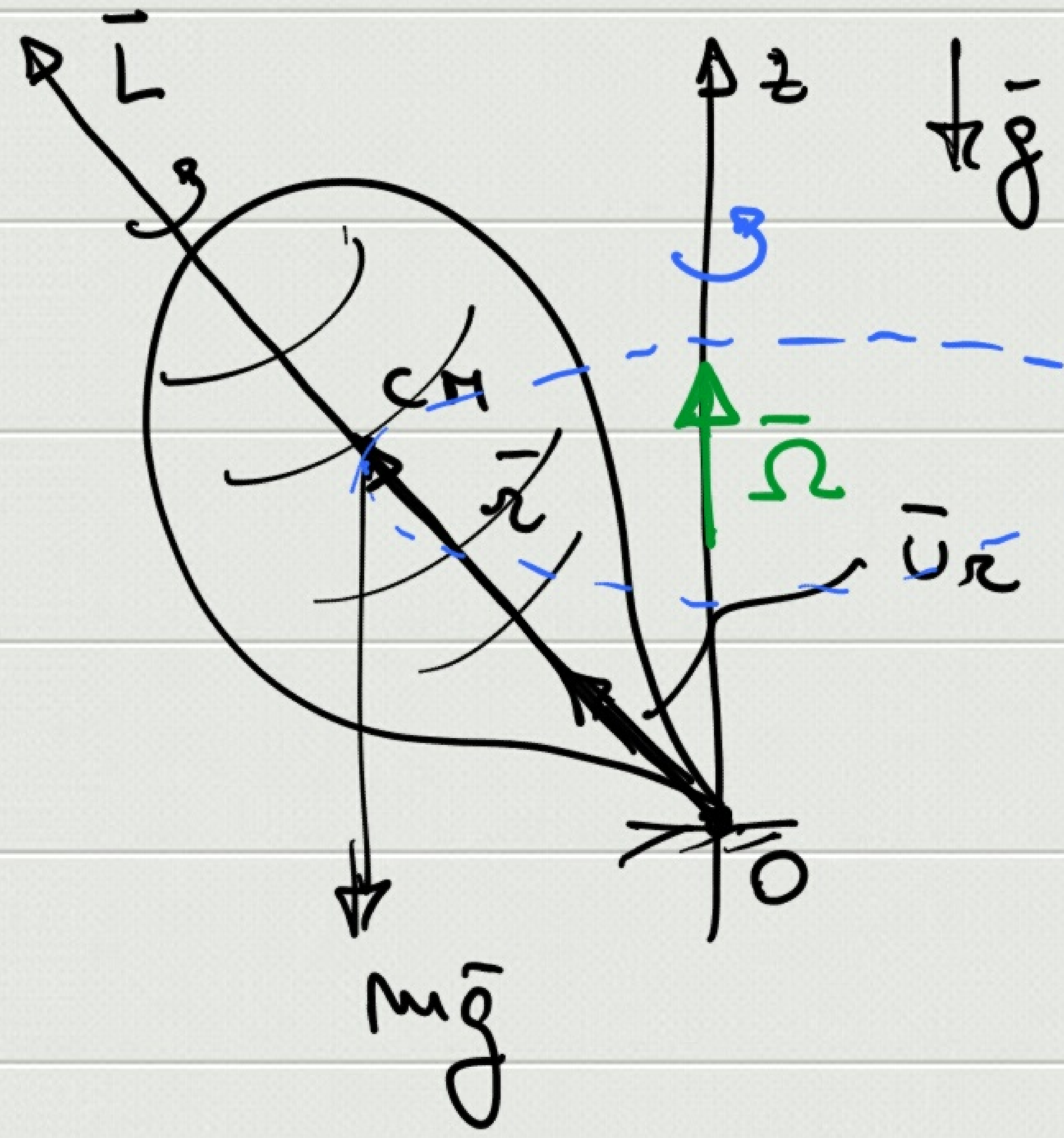
- $O \equiv CM$ $\quad \bar{M}^E_O = 0$ asse principale di inerzia

$\Rightarrow \bar{L}_o = I\bar{\omega}$

$$\bar{M}^E_O = \frac{d\bar{L}_o}{dt} = 0 \Longrightarrow \boxed{\bar{L}_O = \text{cost}}$$

- $O \neq CM$ $\quad \bar{M}_{O,\text{peso}} \neq 0$





$$\bar{\omega} = \omega \bar{u}_r$$

$$\bar{L}_o = I \bar{\omega}$$

$$|\bar{\omega}| = \text{cost} \Rightarrow |\bar{L}_o| = \text{cost}$$

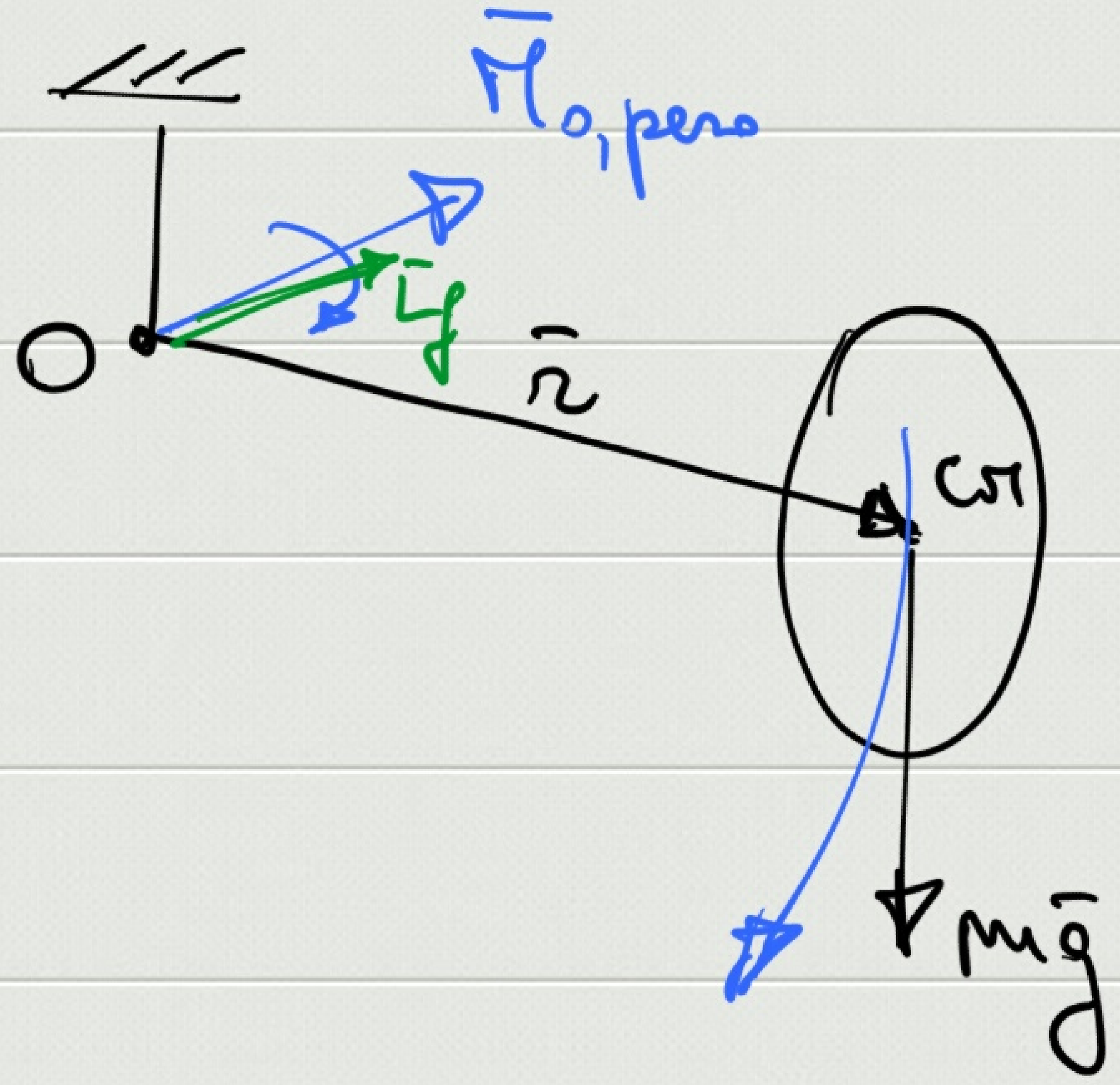
$$\frac{d\bar{L}_o}{dt} = \bar{\Omega} \times \bar{L}_o$$

$$\bar{M}_o^e = \frac{d\bar{L}_o}{dt} \qquad \Rightarrow \bar{r} \times m\bar{g} = \bar{\Omega} \times \bar{L}_o$$

$$-m\bar{g} \times \bar{r} = \bar{\Omega} \times I \bar{\omega} \Rightarrow -m\bar{g} \times r\bar{u}_r = \bar{\Omega} \times I\omega\bar{u}_r$$

$$\Rightarrow -mr\bar{g} \times \bar{u}_r = I\omega\bar{\Omega} \times \bar{u}_r$$

$$\Rightarrow -mr\bar{g} = I\omega\bar{\Omega} \Rightarrow \boxed{\bar{\Omega} = -\frac{mr}{I\omega}\bar{g}}$$



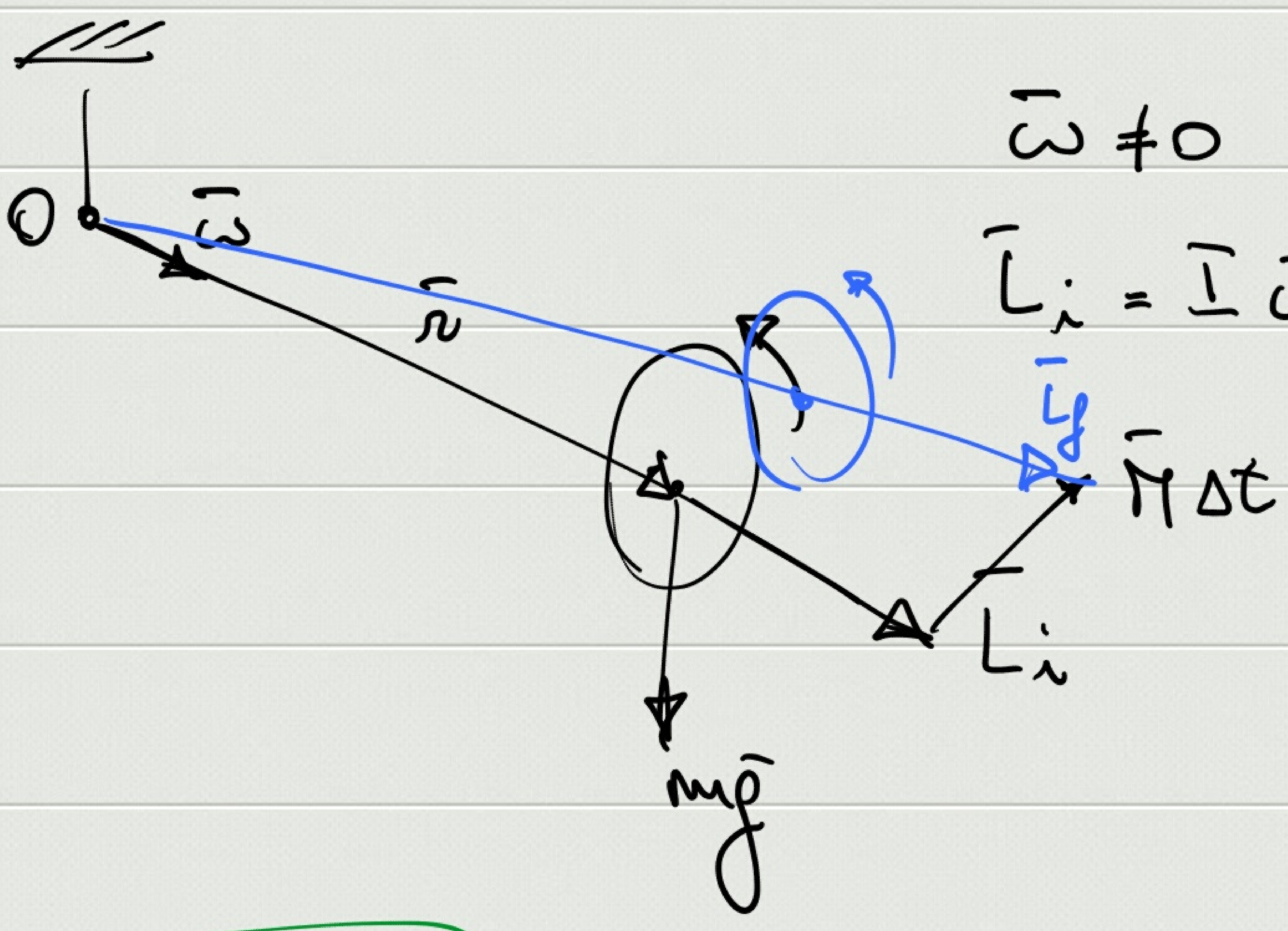
$$\bar{M}_{0,peso} = \bar{r} \times m\bar{g}$$

$$\int \bar{M}\, dt = \Delta \bar{L} = \bar{L}_f - \bar{L}_i$$

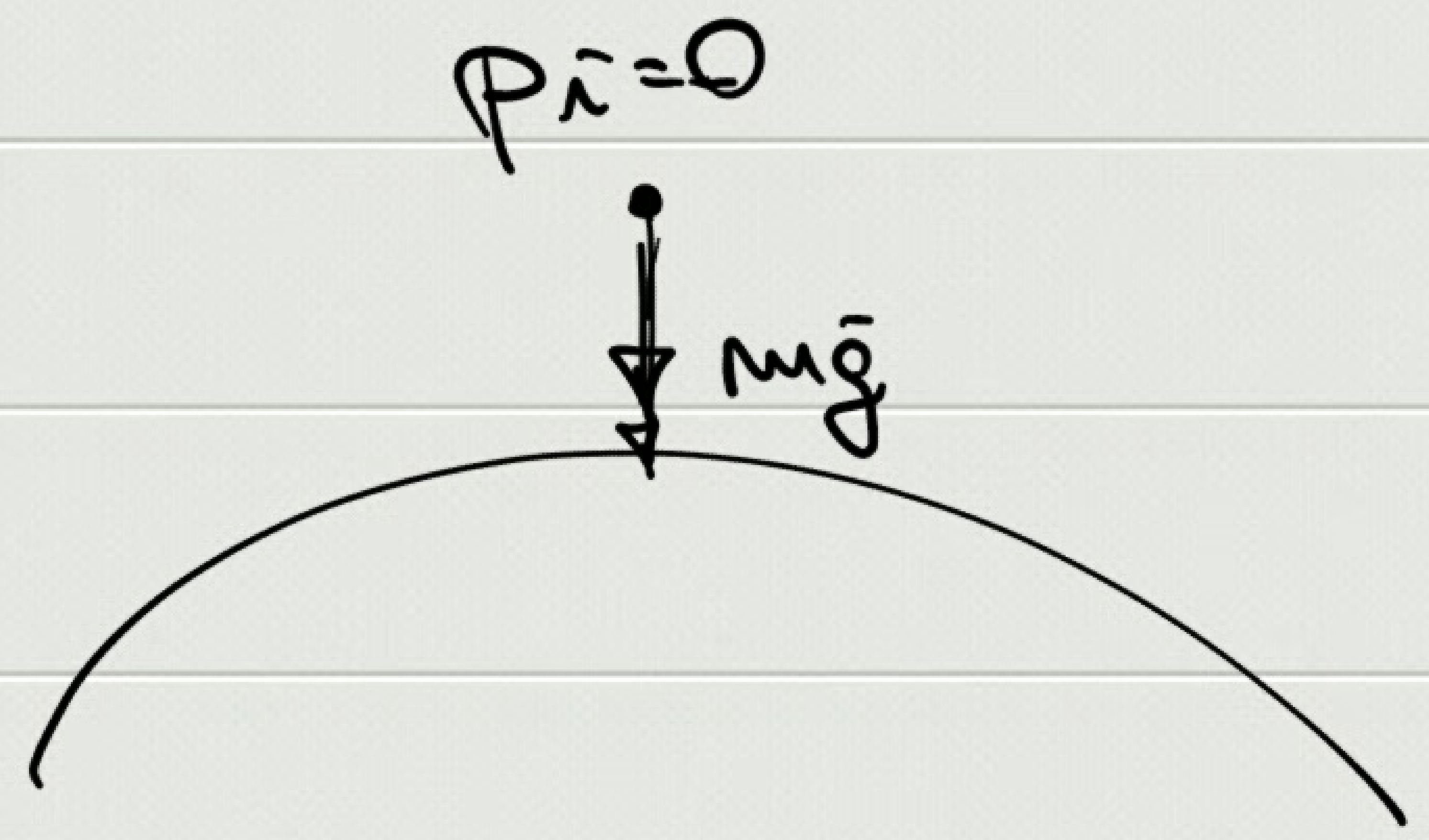
$$\Rightarrow \bar{L}_f = \underset{\substack{\parallel \\ 0}}{\bar{L}_i} + \bar{M}\Delta t = \underbrace{\bar{r} \times m\bar{g}}_{\bar{M}_{0,peso}} \Delta t$$

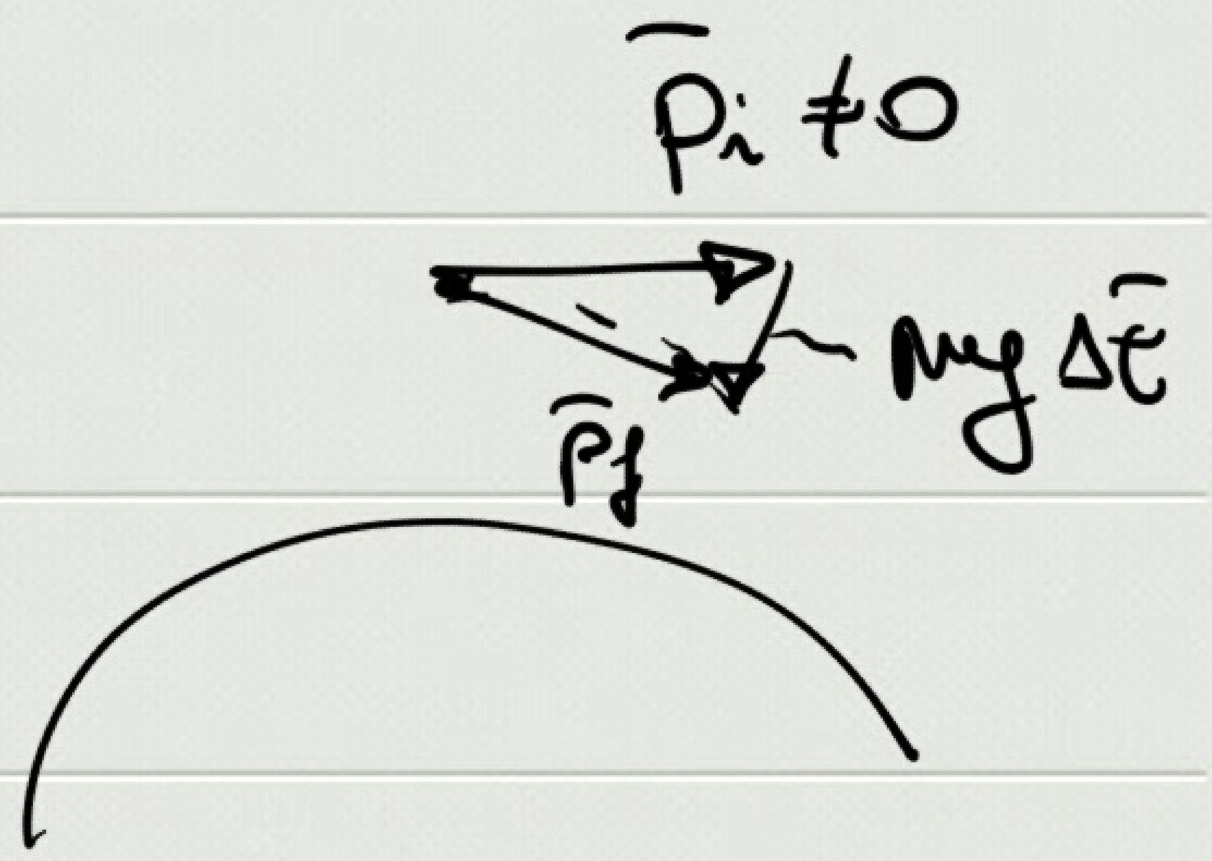
$\bar{\omega} \neq 0$

$\bar{L}_i = I\bar{\omega}$



$$\boxed{\bar{L}_f = \bar{L}_i + \bar{M}\Delta t}$$





$$\bar{F}\,\Delta t = \Delta\bar{p} \quad \Rightarrow \quad \bar{p}_f = \bar{p}_i + m\bar{g}\,\Delta t$$