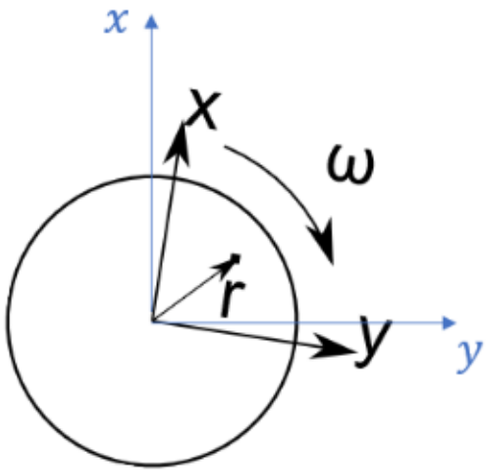
Exemplo 1

Movimento de uma mosca sobre um disco girante

$$\ddot{\vec{r}} = \vec{V} + 2\vec{\omega}^{Gi} \times \vec{V} + \dot{\vec{\omega}}^{Gi} \times \vec{r} + \vec{\omega}^{Gi} \times (\vec{\omega}^{Gi} \times \vec{r})$$

i)

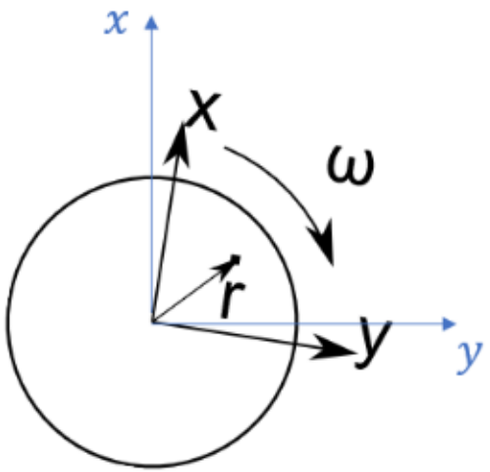


$\vec{V} = \vec{0}$ $\quad \not\Rightarrow \quad \dot{\vec{V}} = \vec{0}$

$\vec{\omega}^{Gi} = te$ $\quad \not\Rightarrow \quad \dot{\vec{\omega}}^{Gi} = \vec{0}$

$$\boxed{\ddot{\vec{r}} = \vec{\omega}^{Gi} \times (\vec{\omega}^{Gi} \times \vec{r})}$$

ii)

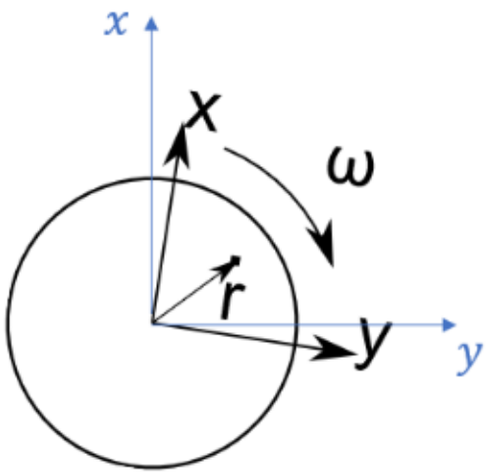


$$\vec{V} = \vec{0} \quad \Rightarrow \quad \dot{\vec{V}} = \vec{0}$$

$$\vec{\omega}^{ai} = f(t) \quad \Rightarrow \quad \dot{\vec{\omega}}^{ai} = \frac{d}{dt} f(t)$$

$$\ddot{\vec{r}} = \dot{\vec{\omega}}^{ai} \times \vec{r} + \vec{\omega}^{ai} \times \left(\vec{\omega}^{ai} \times \vec{r} \right)$$

iii)

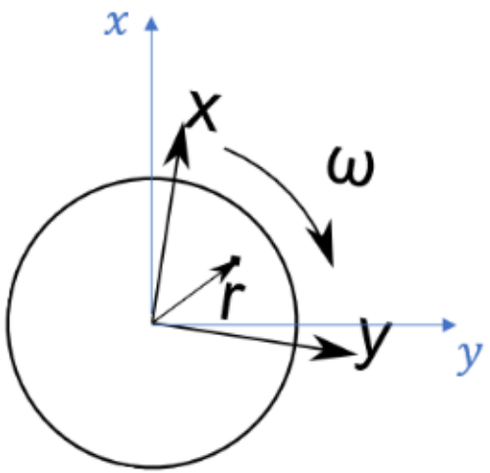


$\vec{V} = \vec{q}(t) \rightarrow \dot{\vec{V}} = \frac{d}{dt}\vec{q}(t)$

$\vec{\omega}^{Gi} = cte \rightarrow \dot{\vec{\omega}}^{Gi} = \vec{0}$

$$\dot{\vec{\pi}} = \dot{\vec{V}} + 2\vec{\omega}^{Gi} \times \vec{V} + \vec{\omega}^{Gi} \times \left(\vec{\omega}^{Gi} \times \vec{\pi}\right)$$

iv)



$$\vec{V} = \vec{q}(t) \quad \Rightarrow \quad \dot{\vec{V}} = \frac{d}{dt}\vec{q}(t)$$

$$\vec{\omega}^{Gi} = \vec{f}(t) \quad \Rightarrow \quad \dot{\vec{\omega}}^{Gi} = \frac{d}{dt}\vec{f}(t)$$

$$\dot{\vec{\Pi}} = \dot{\vec{V}} + 2\vec{\omega}^{Gi} \times \vec{V} + \dot{\vec{\omega}} \times \vec{\Pi} + \vec{\omega}^{Gi} \times \left(\vec{\omega}^{Gi} \times \vec{\Pi}\right)$$