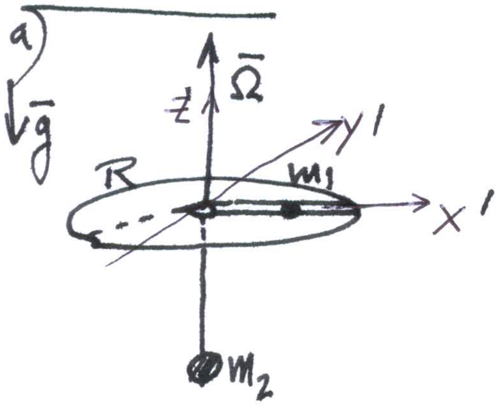
Problema 3 (1)

a)



Resuelvo desde el sistema S': (x', y', z') solidario a la plataforma circular.

$$\bar{\Omega} = \Omega \hat{z}' \quad , \quad \bar{r}_1' = x' \hat{x} , \quad \bar{v}_1' = \dot{x}' \hat{x}' , \quad \bar{a}' = \ddot{x}' \hat{x}'$$

$$\cdot \ \bar{r}_2' = z' \hat{z}' \quad \text{con } z' < 0$$

$x \to y \to z$

Vínculo: $x' - z' = L$

Partícula m1:

. Fuerzas ficticias

$$\bar{F}_{cor} = -2m \bar{\omega} \wedge \bar{v}' = -2m (\Omega \hat{z}' \wedge \dot{x}' \hat{x}) = -2m \Omega \dot{x}' \hat{y}'$$

$$\bar{F}_{cenc} = -m \bar{\omega} \wedge (\bar{\omega} \wedge \bar{r}') = -m(\Omega \hat{z}') \wedge [\Omega \hat{z}' \wedge x' \hat{x}'] = m \Omega^2 x' \hat{x}'$$

. Fuerzas Reales:

$$\bar{N}_1 = N_z \hat{z} , \quad \bar{P} = m_1 g - \hat{z}'$$

$$\bar{T}_1 = T(-\hat{x}') , \quad \bar{F}_v = F_{vy'} \hat{y}'$$

Partícula m2: $\bar{T}_2 = T_2 \hat{z} , \quad \bar{P}_2 = m_2 g (-\hat{z}')$

Ec. de Newton soga ideal $|\bar{T}_1| = |\bar{T}_2| = T$

$m_2 | \hat{z}')$ $\quad T - m_2 g = m_2 \ddot{z}' \quad (1)$

$m_1 | \hat{x}')$ $\quad m_1 \Omega^2 x' - T = m_1 \ddot{x}' \quad (2)$

$\hat{y}')$ $\quad N_y = F_{vy} = 2 m_1 \Omega \dot{x}' \quad (3)$

$\hat{z}')$ $\quad N_z = m_1 g \quad (4)$

b) (1) + (2):

$$m_1 \Omega^2 x' - m_2 g = (m_1 + m_2) \ddot{x}'$$

si $x' = x_c \ / \ \dot{x}'_c = 0 , \ \ddot{x}'_c = 0$

el cuerpo se queda quieto

$$\Rightarrow \quad x'_c = \frac{m_2 g}{m_1 \Omega^2} \leq R$$

c) $x'(t=0) = x'_c$ con $\dot{x}'(t=0)=0$, $T=0$

$$\Rightarrow \ddot{x}' \cancel{m_1} = \cancel{m_1}\Omega^2 x' \therefore \boxed{\ddot{x}' = \Omega^2 x'}$$

$$\int_{\dot{x}'_0}^{\dot{x}'} \dot{x}' d\dot{x}' = \int_{x'_0}^{x'} \Omega^2 x' dx'$$

$$\frac{\dot{x}'}{\cancel{2}}\Big|_{\dot{x}'_0}^{\dot{x}'} = \Omega^2 \frac{x'^2}{\cancel{2}}\Big|_{x'_0}^{x'}$$

$$|\dot{x}'(x')| = \sqrt{\underset{0}{\overset{\shortparallel}{\dot{x}'_0}} + \Omega^2(x'^2 - \underset{x'_c}{\overset{\shortparallel}{x'^2_0}})}$$

$\dot{x}'_0 = \dot{x}'_c = 0$

$|\dot{x}'(x'=R)| = \Omega\sqrt{x'^2 - x'^2_c}$ con $x' > x'_c$

$$\vec{\dot{x}'}(x'=R) = \Omega\sqrt{\underbrace{R^2 - x'^2_c}_{>0}}\,\hat{x}' \text{ con } \boxed{x'_c = \frac{m_2 g}{m_1\Omega^2}}$$

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