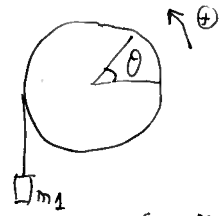


on a donc $\begin{cases} m_1 a_1 = -m_1 g + T_{f/1} \\ -m_2 a_1 = -m_2 g + T_{f/2} \\ I_0 \dot\omega = \rho\,(T_{f/1} - T_{f/2}) \end{cases}$

or on a aussi $\dot\omega = \ddot\theta$ et $\boxed{a_1 = \ddot y_1 = -\rho\ddot\theta}$ (si $\ddot\theta > 0$ alors $a_1 < 0$)

d'où $\boxed{\begin{cases} -m_1\rho\ddot\theta = -m_1 g + T_{f/1} \\ +m_2\rho\ddot\theta = -m_2 g + T_{f/2} \\ I_0\ddot\theta = \rho\,(T_{f/1} - T_{f/2}) \end{cases}}$ $\begin{cases} -m_1\rho\ddot\theta - T_{f/1} = -m_1 g \\ +m_2\rho\ddot\theta - T_{f/2} = -m_2 g \\ I_0\ddot\theta - \rho T_{f/1} + \rho T_{f/2} = 0 \end{cases}$

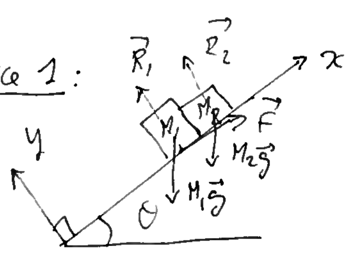
$$\begin{pmatrix} m_1\rho & 1 & 0 \\ -m_2\rho & 0 & 1 \\ I_0 & -\rho & \rho \end{pmatrix}\begin{pmatrix} \ddot\theta \\ T_{f/1} \\ T_{f/2} \end{pmatrix} = \begin{pmatrix} m_1 g \\ m_2 g \\ 0 \end{pmatrix} \Rightarrow \begin{pmatrix} \ddot\theta \\ T_{f/1} \\ T_{f/2} \end{pmatrix} = \frac{1}{(m_1+m_2)\rho^2 + I_0}\begin{pmatrix} \rho & +m_2\rho^2+I_0 & +m_2\rho^2 \\ -\rho & m_1\rho^2 & +m_1\rho^2+I_0 \\ 1 & -m_1\rho & +m_2\rho \end{pmatrix}^T\begin{pmatrix} m_1 g \\ m_2 g \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} \ddot\theta \\ T_{f/1} \\ T_{f/2} \end{pmatrix} = \frac{1}{(m_1+m_2)\rho^2 + I_0}\begin{pmatrix} \rho & -\rho & 1 \\ +m_2\rho^2+I_0 & m_1\rho^2 & -m_1\rho \\ +m_2\rho^2 & +m_1\rho^2+I_0 & +m_2\rho \end{pmatrix}\begin{pmatrix} m_1 g \\ m_2 g \\ 0 \end{pmatrix} = \frac{1}{(m_1+m_2)\rho^2 + I_0}\begin{pmatrix} (m_1-m_2)\rho g \\ m_1 g I_0 + 2m_1m_2 g\rho^2 \\ m_2 g I_0 + 2m_1m_2 g\rho^2 \end{pmatrix}$$

$$\boxed{\ddot\theta = \frac{(m_1-m_2)\rho g}{(m_1+m_2)\rho^2 + I_0} \qquad T_{f/1} = \frac{m_1 g(I_0 + 2m_2\rho^2)}{(m_1+m_2)\rho^2 + I_0} \qquad T_{f/2} = \frac{m_2 g(I_0 + 2m_1\rho^2)}{(m_1+m_2)\rho^2 + I_0}}$$

Examen Partiel :

Exercice 1 :



- système : $(M_2 + M_1)$ PFD dans R Galiléen :
$(M_1+M_2)\vec a = \vec R_1 + \vec R_2 + \vec F + \vec P_1 + \vec P_2$
projection sur x : $(M_1+M_2)a = F - M_1 g\sin\theta - M_2 g\sin\theta$
$\boxed{a = \dfrac{F - (M_1+M_2)g\sin\theta}{M_1+M_2} = \dfrac{F}{M_1+M_2} - g\sin\theta}$

- système M_2 : PFD dans R Galiléen : $M_2\vec a = \vec F_{1\to2} + \vec P_2 + \vec R_2$
projection sur x : $M_2 a = F_{1\to2} - M_2 g\sin\theta$
d'où $F_{1\to2} = M_2 a + M_2 g\sin\theta = \dfrac{M_2 F}{M_1+M_2} - M_2 g\sin\theta + M_2 g\sin\theta$
$\boxed{F_{1\to2} = \dfrac{M_2 F}{M_1+M_2}}$

- $v = v_0 - at = -at$ (selon x)
$x = x_0 - \frac{1}{2}at^2$ donc $d = \frac{1}{2}at^2 \Rightarrow t = \sqrt{\dfrac{2d}{a}}$
alors la vitesse vaut $v = -a\sqrt{\dfrac{2d}{a}}$ $\boxed{v = -\sqrt{2ad}}$ $\boxed{= -\sqrt{\dfrac{2dF}{M_1+M_2} - 2dg\sin\theta}}$