Banc de mesure d'inertie

Q1 $\cancel{\alpha}$ $\dot{\alpha} = -\dot{\theta}\frac{R}{\cancel{R}\, r}$

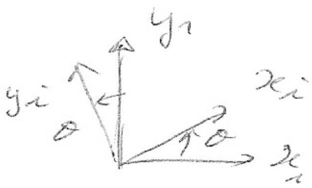
Q2 $T(2/1) = \frac{1}{2} m_2 \left(\vec{V}(G\in 2/1)\right)^2 + \frac{1}{2}\vec{\Omega}_{2/1}\cdot\vec{\sigma}(G\in 2/1)$

$\vec{V}(G\in 2/1) = (R-r)\dot{\theta}\,\vec{x_i} = \dot{\theta}\, r\left(\frac{R}{r}-1\right)\vec{x_i}$

$\vec{\sigma}(G\in 2/1) = (\dot{\theta}+\dot{\alpha})\, C_2\cdot\vec{z_1} = \dot{\theta}\left(1-\frac{R}{r}\right) C_2\cdot\vec{z_1}$

$\vec{\Omega}_{2/1} = (\dot{\theta}+\dot{\alpha})\,\vec{z_1} = \dot{\theta}\left(1-\frac{R}{r}\right)\vec{z_1}$

$$T_{2/1} = \frac{1}{2}\dot{\theta}^2\left[m_2 R^2 + C_2\right]\left(1-\frac{R}{r}\right)^2$$



Q3 $P(pes\to 2) = \{\mathcal{T}_{pes\to 2}\}\otimes\{\mathcal{V}_{2/1}\}$

en G $\{\mathcal{T}_{pes\to 2}\} = \begin{Bmatrix}\vec{F}\\ \vec{0}\end{Bmatrix}_G$ $\quad \vec{F} = -m_2 g\cdot\vec{y_1}$

$\vec{F} = -m_2 g\left(\cos\theta\,\vec{y_i} + \sin\theta\,\vec{x_i}\right)$

$\{\mathcal{V}_{2/1}\} = \begin{Bmatrix}\vec{\Omega}_{2/1}\\ \vec{V}(G\in 2/1)\end{Bmatrix}_G$ $\quad \vec{V}(G\in 2/1) = (R-r)\dot{\theta}\,\vec{x_i}$.

$P(pes\to 2) = -m_2\, g\,(R-r)\,\dot{\theta}\sin\theta$

Q4 $\frac{dT(2/1)}{dt} = P(pes\to 2)$

$\ddot{\theta}\left(m_2 r^2 + C_2\right)\left(1-\frac{R}{r}\right)^2 = -m_2 g\,(R-r)\sin\theta.$

$(\times r)$ $\quad \ddot{\theta}\left(m_2 r^2 + C_2\right)\left(1-\frac{R}{r}\right)^{\cancel{2}} = +m_2 g\, r\,\cancel{\left(1-\frac{R}{r}\right)}\sin\theta$

$$\boxed{\ddot{\theta}\left(m_2 r^2 + C_2\right)(R-r) + m_2 g\, r^2 \sin\theta = 0}$$