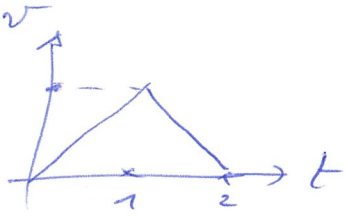
Correction DM de SI, TP, nov 22

Sujet Centrale TP 22, "SLED"

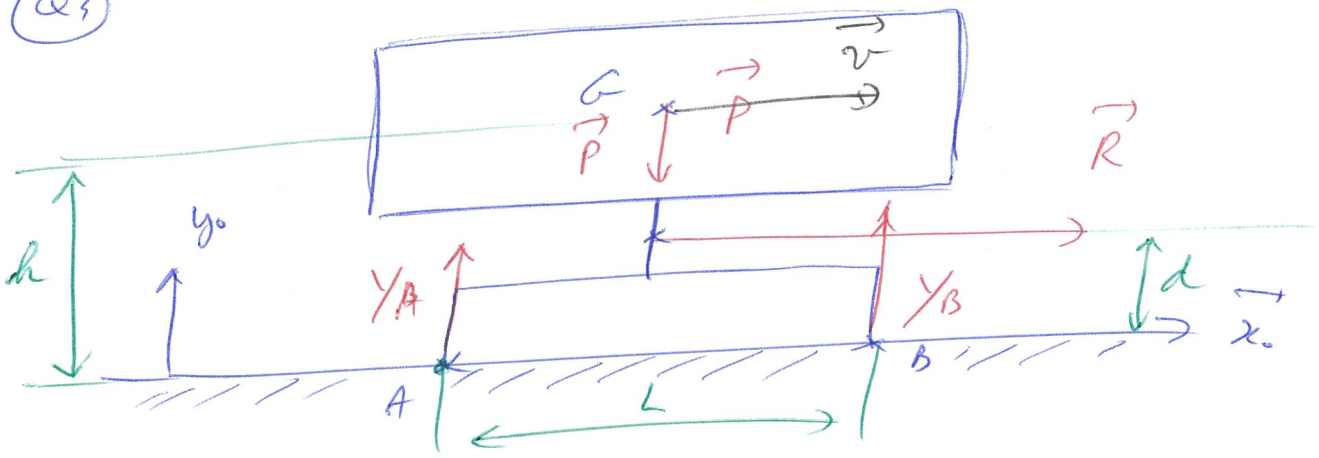
(Q1) $a_c = 0,3 \cdot g = 2,943\ m.s^{-2}$

(Q2) $v(t) = 0,3\,g\,t$; $v(1) = 2,943\ m.s^{-1}$



(Q3) $x_{max} = 2,943\ m$ (aire de la courbe)

(Q4)



(Q5) $\vec{\delta}(G, S/S_0) = \vec{0}$

$\vec{\delta}(A, S/S_0) = \vec{S}(G, S/S_0) + \vec{AG} \wedge m.\vec{a_c}$

$= \vec{0} + \left(\frac{L}{2}\vec{x_0} + h\,\vec{y_0}\right) \wedge m\,a_c\,\vec{x_0} = -m\,a_c\,h\,\vec{z_0}$

(Q6) TMD en A $\Rightarrow$ $-m\,a\,h = L\,y_B - m\,g\,\frac{L}{2} - d\,R$

$\Rightarrow y_B = \frac{m\,g}{2} + \frac{d\,R}{L} - \frac{m\,a\,h}{L}$

(Q7) Non basculement $\Rightarrow y_B > 0$

(Q8) On isole S, TRD sur $\vec{x_0}$ $\Rightarrow R = m.a_c$

(Q9) $y_B > 0 \Rightarrow \dots \Rightarrow L > \frac{2a}{g}(h-d) = L_{min}$

(Q10) L_{min} indépendant de m.

(Q11) $L_{min} = 528\ mm$ (Q12) $x + L_{min} = 3,428 < 4,5\ m$

(2) "SLED" mode (partie TEC)

(Q36) $k = \frac{\omega_1}{\omega_2} = \frac{D_2}{D_1} = \frac{100}{35}$

(Q37) $v = \frac{D_3}{2}\omega_2 \qquad \omega_2 = \frac{D_1}{D_2}\omega_1 \Rightarrow v = \frac{D_1}{2}\omega_1$

(Q38) $E(\Sigma/S_0) = \frac{1}{2} m_S v^2 + \frac{1}{2} J_1 \omega_1^2 + \frac{1}{2} J_2 \omega_2^2$

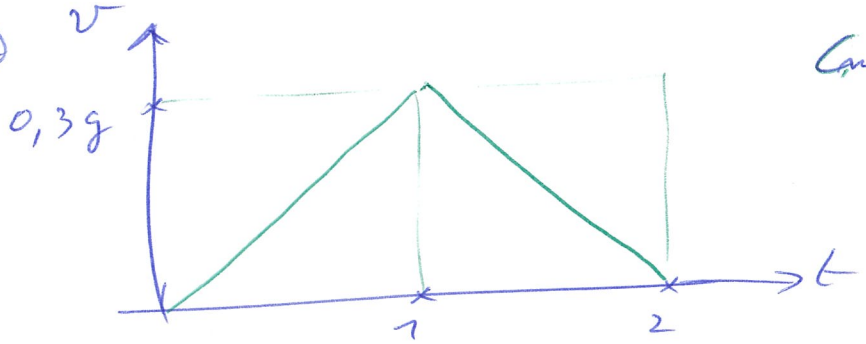
$$E(\Sigma/S_0) = \frac{1}{2}\underbrace{\left[m_S\left(\frac{D_1}{2}\right)^2 + J_1 + J_2\left(\frac{D_1}{D_2}\right)^2 \right]}_{J_{eq}} \omega_1^2$$

(Q40) $J_{eq}\dot{\omega}_1\omega_1 = \eta C_m \omega_1 = \underbrace{C_m\omega_1}_{P_{ent}} - \underbrace{(1-\eta)C_m\omega_1}_{P_{int}}$

$\Rightarrow J_{eq}\dot{\omega}_1 = \eta C_m \Rightarrow C_m = \frac{J_{eq}}{\eta}\dot{\omega}_1$

(Q41) $\omega_1 = \frac{2}{D_1}v \Rightarrow C_m = \frac{2 J_{eq}}{\eta D_1} v$

(Q42)



$C_{m\,max} = 32$ Nm.

$C_{m\,moy} = \frac{2 J_{eq}}{\eta D_1} \times v_{moy} = 19,6$ Nm