(1)

Exo 1

Corrigé DS de SI, MPSI 1, avril 24

(Q1) $\omega_{42} = 0$ car glissière entre 4 et 2

WILLIS $\Rightarrow$ $$\frac{\omega_{45}}{\omega_{75}} = -\frac{Z_7}{Z_4}$$

On cherche $$\frac{\omega_{52}}{\omega_{72}} = ?$$

On utilise WILLIS $\Rightarrow$ $$\frac{\omega_{25}}{\omega_{75}} = -\frac{Z_7}{Z_4}$$

$$\frac{\omega_{52}}{\omega_{72} - \omega_{52}} = \frac{Z_7}{Z_4}$$

$$\omega_{52} Z_4 = Z_7 (\omega_{72} - \omega_{52})$$

$$\frac{\omega_{52}}{\omega_{72}} = \frac{Z_7}{Z_7 + Z_4} = \frac{12}{48} = \frac{1}{4}$$

(Q2) $$k_g = \left(\frac{1}{4}\right)^4 = \frac{1}{256}$$

(Q3) $$\Delta\theta_{m2} = \frac{1}{20} \text{ tr}$$

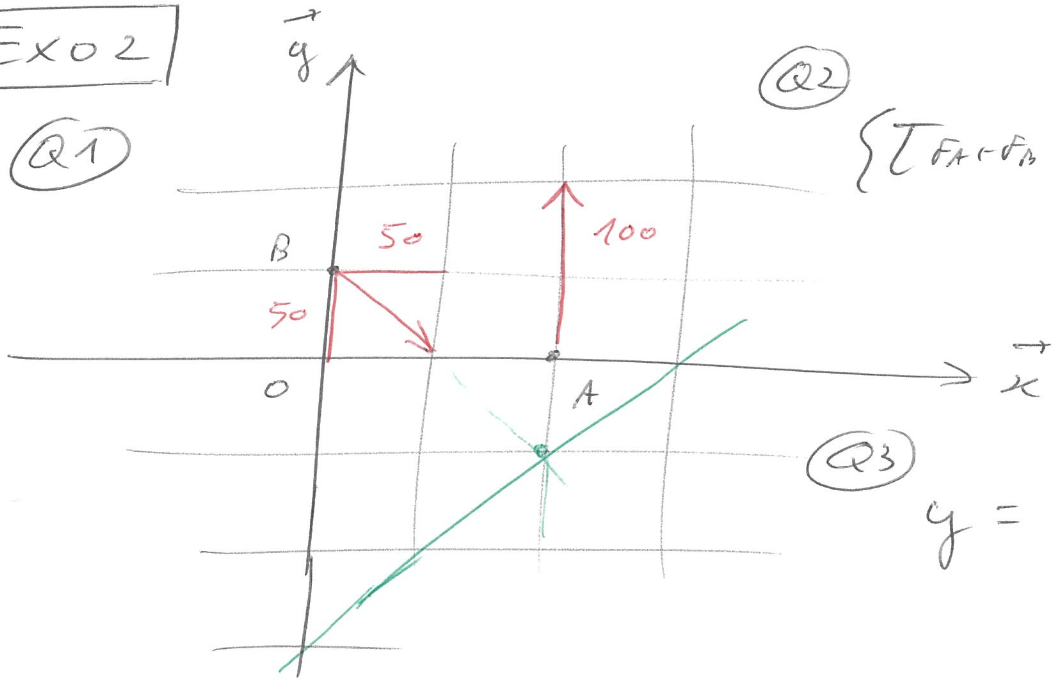
$$\Delta\theta_{52} = \frac{1}{20} \times \frac{1}{256} \text{ tr}$$

$$\Delta d_0 = \frac{1}{20} \times \frac{1}{256} \times 0{,}35 = 6{,}8 \cdot 10^{-5} \text{ mm}$$

$$\Delta d_0 = 6{,}8 \cdot 10^{-2} = 0{,}068 \ \mu m < 3 \ \mu m$$

Exo 2

Q1



Q2

$$\{\mathcal{T}_{F_A+F_B}\} = \begin{Bmatrix} 50\vec{x}+50\vec{y} \\ 150\vec{z} \end{Bmatrix}_O$$

Q3

$$y = x - 3$$

Exo 3

Q1 $H(t) = 2L \sin\theta$ $\lambda(t) = 2L\cos\theta$

Q3 H varie de 370 à 1545 $\Rightarrow \Delta l_3 = 370$ mm

Q4 $510 - 65 = 445 < 370$ OK

Q5 N_m en tr/min

$$V = p \times r \times \frac{N_m}{60} = 5 \times \frac{1}{40} \times \frac{1}{60} \times N_m$$

$$V = \frac{N_m}{480} \quad (\text{mm/s})$$

③

Q2 $\vec{OM} + \vec{MN} = \vec{OA} + \vec{AN}$

$$l_1 \vec{x_1} + e_1 \vec{y_1} + l_3 \vec{x_3} = \lambda \vec{x_0} + l_2 \vec{x_2} + e_2 \vec{y_2}$$

$$\vec{x_1} = \cos\theta \, \vec{x_0} + \sin\theta \, \vec{y_0} \quad (\times l_1)$$

$$\vec{y_1} = -\sin\theta \, \vec{x_0} + \cos\theta \, \vec{y_0} \quad (\times e_1)$$

$$\vec{x_3} = \cos\delta \, \vec{x_0} + \sin\delta \, \vec{y_0} \quad (\times l_3)$$

$$\vec{x_2} = \cos\beta \, \vec{x_0} + \sin\beta \, \vec{y_0} = -\cos\theta \, \vec{x_0} + \sin\theta \, \vec{y_0} \quad (\times l_2)$$

Rem : $\beta = \pi - \theta$

$$\vec{y_2} = -\sin\beta \, \vec{x_0} + \cos\beta \, \vec{y_0} = -\sin\theta \, \vec{x_0} - \cos\theta \, \vec{y_0} \quad (\times e_2)$$

$$\left| \begin{array}{l} l_1 \cos\theta - e_1 \sin\theta + l_3 \cos\delta = \cancel{\lambda} L \cos\theta - l_2 \cos\theta - e_2 \sin\theta \\ l_1 \sin\theta + e_1 \cos\theta + l_3 \sin\delta = l_2 \sin\theta - e_2 \cos\theta \end{array} \right.$$

$$l_3 \cos\delta = \cos\theta \left[2L - l_2 - l_1 \right] + \sin\theta \left[e_1 - e_2 \right]$$

$$l_3 \sin\delta = \cos\theta \left[-e_2 - e_1 \right] + \sin\theta \left[l_2 - l_1 \right]$$

$$l_3 = \sqrt{\quad \cdots \quad}$$

$$\left| \begin{array}{l} A_3 = 2L - l_2 - l_1 \\ B_3 = e_1 - e_2 \\ C_3 = -e_1 - e_2 \\ D_3 = l_2 - l_1 \end{array} \right.$$