Correction DS de SI, MPSI 1, janvier 25

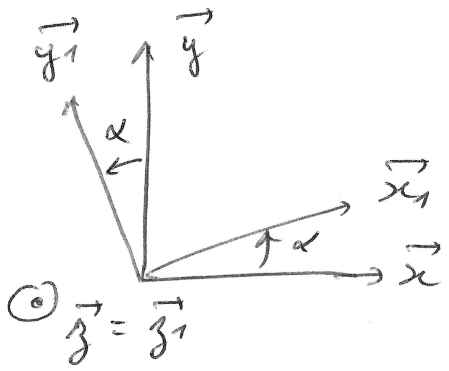
Q de cours

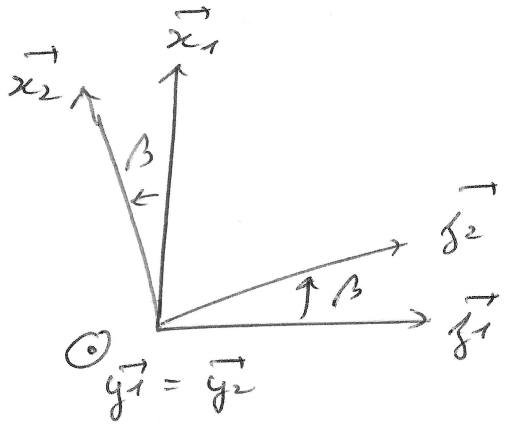
1]  2T 3R

2]  1T

Exo 1

1]





2] $\vec{v}(A \in 1/0) = \left(\frac{d\vec{OA}}{dt}\right)_0$ $\quad \vec{OA} = \vec{OB} + \vec{BA} = -\ell\vec{y} + a\vec{y_1}$

$\vec{v}(A \in 1/0) = -a\dot{\alpha}\vec{x_1}$ $\quad \vec{A}(A \in 1/0) = -a\ddot{\alpha}\vec{x_1} - a\dot{\alpha}^2\vec{y_1}$

3] $\vec{v}(C \in 2/0) = \left(\frac{d\vec{OC}}{dt}\right)_0$ $\quad \vec{OC} = \vec{OB} + \vec{BC} = -\ell\vec{z} + c\vec{z_2}$

$\left(\frac{d\vec{z_2}}{dt}\right)_0 = \left(\frac{d\vec{z_2}}{dt}\right)_1 + \vec{\Omega}_{2/1} \wedge \vec{z_2} = \dot{\beta}\vec{x_2} + \dot{\alpha}\vec{z_1} \wedge (\cos\beta\vec{z_1} + \sin\beta\vec{x_1})$

$\vec{v}(C \in 2/0) = c\dot{\beta}\vec{x_2} + c\dot{\alpha}\sin\beta\vec{y_1}$

4] $\left(\frac{d\vec{x_2}}{dt}\right)_0 = \left(\frac{d\vec{x_2}}{dt}\right)_1 + \vec{\Omega}_{2/1} \wedge \vec{x_2} = -\dot{\beta}\vec{z_2} + \dot{\alpha}\vec{z_1} \wedge (\cos\beta\vec{x_1} + \dots\vec{z_1})$

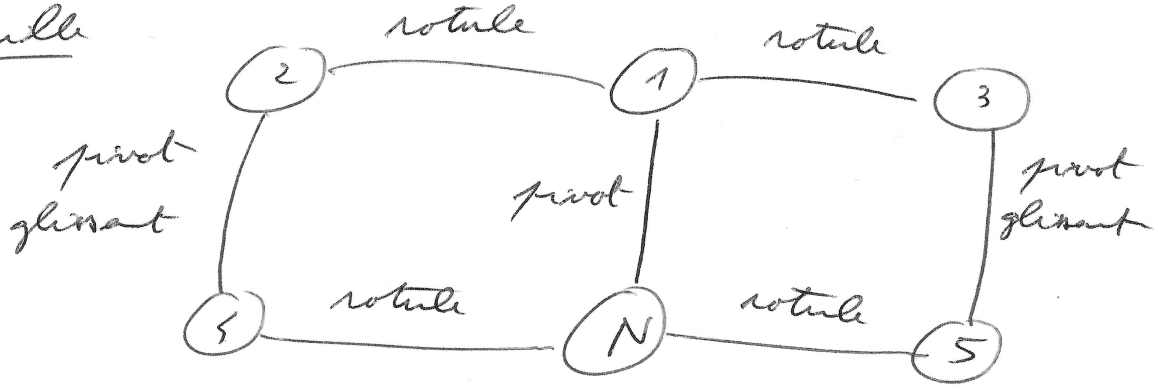
$\left(\frac{d\vec{x_2}}{dt}\right)_0 = -\dot{\beta}\vec{z_2} + \dot{\alpha}\cos\beta\vec{y_1}$ $\quad (x \subset \beta)$

$\vec{A}(C \in 2/0) = +c\ddot{\beta}\vec{x_2} - c\dot{\beta}^2\vec{z_2} + c\dot{\beta}\dot{\alpha}\cos\beta\vec{y_1} + c\ddot{\alpha}\sin\beta\vec{y_1}$
$+ c\dot{\alpha}\dot{\beta}\cos\beta\vec{y_1} - c\dot{\alpha}^2\sin\beta\vec{x_1}$

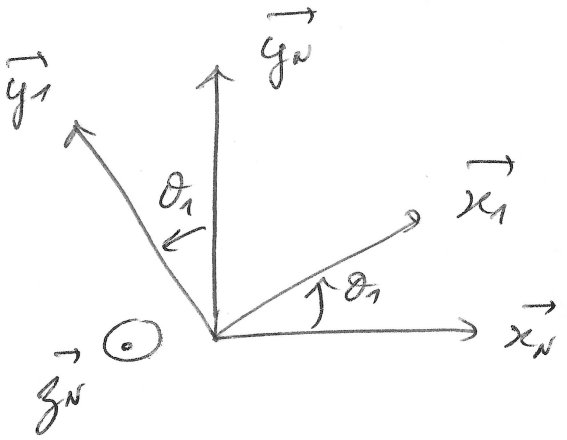
(2)

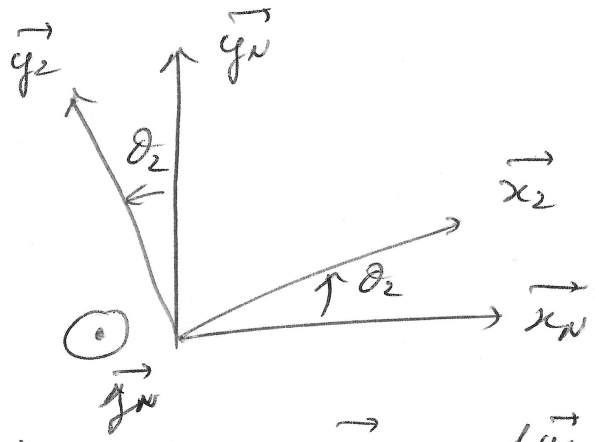
EXO 2 Quille

1]



2]





3] $\vec{v}(D \in 1/N) = \left(\frac{d\vec{OD}}{dt}\right)_N = a\dot{\theta}_1 \vec{x_1}$ $\qquad \vec{OD} = -d\vec{y_1}$

4] $\vec{OA} = \vec{OC} + \vec{CA} \Rightarrow R\vec{y_1} = -a\vec{x_N} + b\vec{y_N} + x\vec{x_2}$

$$\begin{cases} \vec{y_1} = -\sin\theta_1 \vec{x_N} + \cos\theta_1 \vec{y_N} \\ \vec{x_2} = \cos\theta_2 \vec{x_N} + \sin\theta_2 \vec{y_N} \end{cases}$$

$$\Rightarrow \begin{cases} -R\sin\theta_1 = -a + x\cos\theta_2 \\ R\cos\theta_1 = b + x\sin\theta_2 \end{cases}$$

$$x\cos\theta_2 = a - R\sin\theta_1$$

$$x\sin\theta_2 = R\cos\theta_1 - b$$

$$x^2 = \sqrt{(a - R\sin\theta_1)^2 + (R\cos\theta_1 - b)^2}$$

5] Pour $\theta_1 = -30 \Rightarrow x = 3100$ mm

Pour $\theta_1 = 30 \Rightarrow x = 2926$ mm

$\Rightarrow \Delta x = 174$ mm