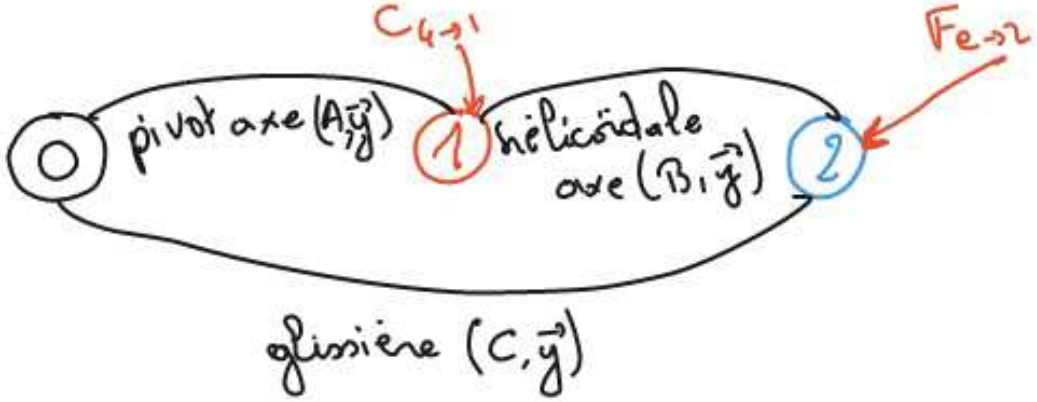
TD ST 1.3

Q1)



Q2) $\{\mathcal{T}_{0\to1}\} = \begin{Bmatrix} X_{01} & L_{01} \\ Y_{01} & 0 \\ Z_{01} & N_{01} \end{Bmatrix}_A$; $\{\mathcal{T}_{0\to2}\} = \begin{Bmatrix} X_{02} & L_{02} \\ 0 & M_{02} \\ Z_{02} & N_{02} \end{Bmatrix}_C$

Q3) $\{\mathcal{T}_{1\to2}\} = \begin{Bmatrix} X_{12} & L_{12} \\ Y_{12} & -\frac{p Y_{12}}{2\pi} \\ Z_{12} & N_{12} \end{Bmatrix}_B$

Q4) BAME au solide 2

$\begin{cases} \text{Action de liaison : hélicoïdale en B et glissière en C} \\ \text{Action de l'éprouvette en O} \end{cases}$

- $\overrightarrow{M_{B\,0\to2}} = \overrightarrow{M_{C\,0\to2}} + \overrightarrow{BC} \wedge \overrightarrow{R_{0\to2}}$

$\overrightarrow{M_{B\,0\to2}} = (L_{02}\vec{x} + M_{02}\vec{y} + N_{02}\vec{z}) + (D\vec{x} + h\vec{y}) \wedge (X_{02}\vec{x} + Z_{02}\vec{z})$

$\overrightarrow{M_{B\,0\to2}} = (L_{02} + hZ_{02})\vec{x} + (M_{02} - DZ_{02})\vec{y} + (N_{02} - hX_{02}\vec{z})$

- $\overrightarrow{M_{B\,e\to2}} = \overrightarrow{M_{O\,e\to2}} + \overrightarrow{BO} \wedge \left(-\frac{F}{2}\right)\vec{y} = \vec{0} + D\vec{x} \wedge \left(-\frac{F}{2}\vec{y}\right)$

$\overrightarrow{M_{B\,e\to2}} = -\frac{DF}{2}\vec{z}$

6 équations issues du PFS :

- $X_{12} + X_{02} = 0$
- $Y_{12} - \frac{F}{2} = 0$
- $Z_{12} + Z_{02} = 0$
- $L_{12} + L_{02} + hZ_{02} = 0$
- $-\frac{pY_{12}}{2\pi} + M_{02} - DZ_{02} = 0$
- $N_{12} + N_{02} - hX_{02} - \frac{DF}{2} = 0$

Q5) BAME au solide 1

$\begin{cases} \text{Action de liaison : pivot } (A, \vec{x}) \text{ et hélicoïdale } (B, \vec{y}) \\ \text{Action de la vumée en A} \end{cases}$

- $\overrightarrow{M_{B\,0\to1}} = \overrightarrow{M_{A\,0\to1}} + \overrightarrow{BA} \wedge \overrightarrow{R_{0\to1}}$

$\overrightarrow{M_{B\,0\to1}} = (L_{01}\vec{x} + N_{01}\vec{y}) + (-L\vec{y}) \wedge (X_{01}\vec{x} + Y_{01}\vec{y} + Z_{01}\vec{z})$

$\overrightarrow{M_{B\,0\to1}} = (L_{01} - LZ_{01})\vec{x} + (N_{01} + LX_{01})\vec{y}$

- PFS en B :
  - $X_{01} - X_{12} = 0$
  - $Y_{01} - Y_{12} = 0$
  - $Z_{01} - Z_{12} = 0$
  - $L_{01} - LZ_{01} - L_{12} = 0$
  - $+\frac{pY_{12}}{2\pi} + M_{41} = 0$
  - $N_{01} + LX_{01} - N_{12} = 0$

Q6) $\left.\begin{aligned} M_{41} &= -\frac{pY_{12}}{2\pi} \\ Y_{12} &= \frac{F}{2} \end{aligned}\right\} \Rightarrow$ $\boxed{M_{41} = \frac{-pF}{4\pi}}$

Q7) $M_{41} = \frac{-pF}{4\pi} = \frac{-20000p}{4\pi} = \frac{-5000p}{\pi}$

Q8) $M_{41} = \frac{-5000 \cdot 3.10^{-3}}{\pi} = 4,77 N.m$

$C_n = 20 N.m > 4,77 N.m$

Exigence vérifiée