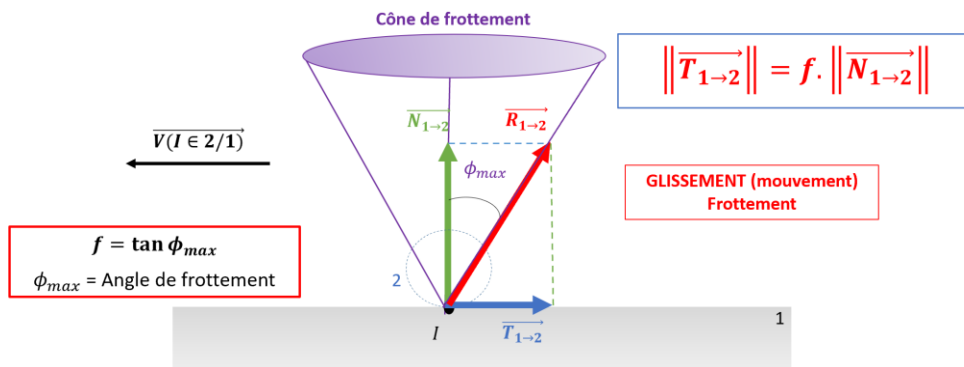


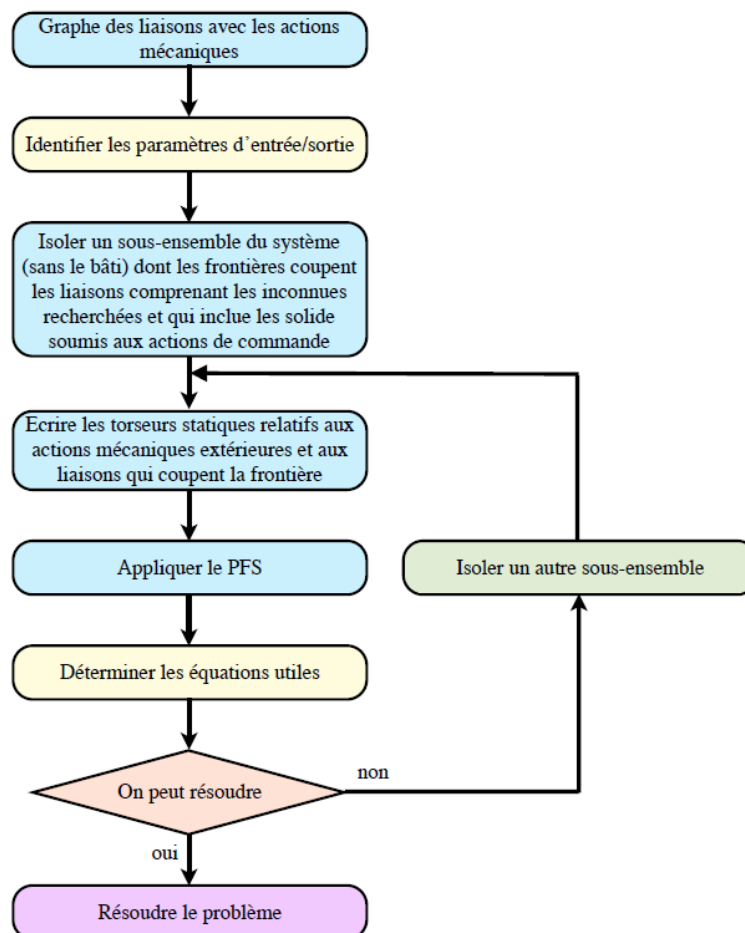
## TD – Robot de découpe

### POINT METHODE :

- Loi de Coulomb / Frottement (Q3) :

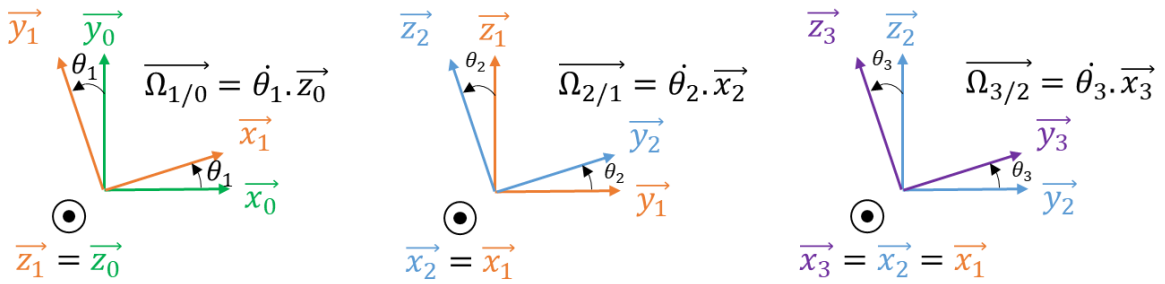


- Stratégie de résolution d'un problème de statique (Q5) :

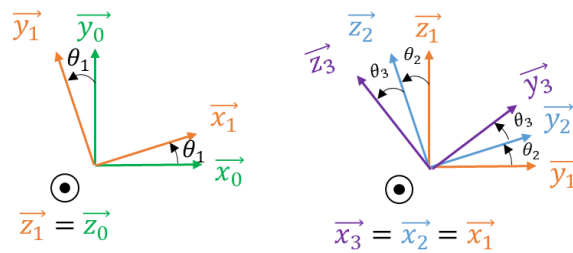


ELEMENTS DE CORRECTION :

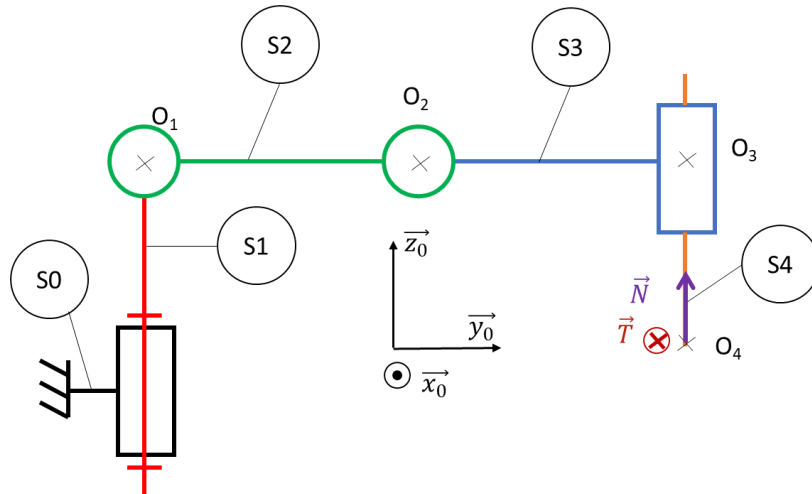
**Q1 :**



OU



**Q2 :**

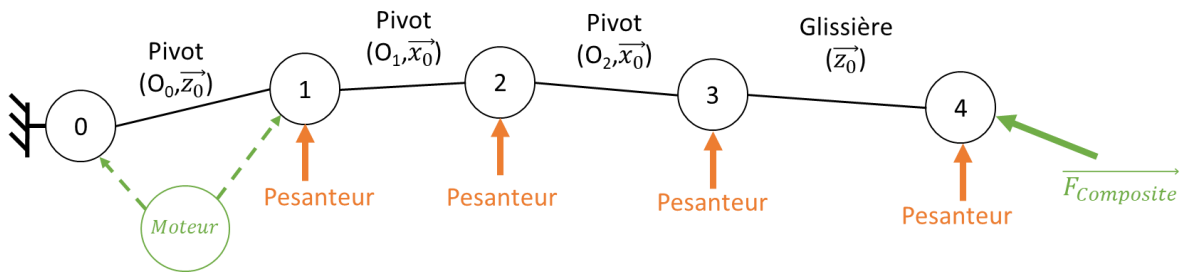


**Q3 :**

$$\{\tau_{Composite \rightarrow outil}\} = \begin{Bmatrix} N \cdot \vec{z}_0 - T \cdot \vec{x}_0 \\ \vec{0} \end{Bmatrix}_{O_4}$$

$$\{\tau_{Composite \rightarrow outil}\} = \begin{Bmatrix} N \cdot \vec{z}_0 - f \cdot N \cdot \vec{x}_0 \\ \vec{0} \end{Bmatrix}_{O_4} \text{ si frottement et glissement}$$

**Q4 :**



**Q5 :**

J'isole {3+4}

BAME :

$$\{\tau_{Composite \rightarrow 4}\} = \begin{Bmatrix} N \cdot \vec{z}_0 - f \cdot N \cdot \vec{x}_0 \\ \vec{0} \end{Bmatrix}_{O_4}$$

$$\{\tau_{Pesanteur \rightarrow 4}\} = \begin{Bmatrix} -m_4 \cdot g \cdot \vec{z}_0 \\ \vec{0} \end{Bmatrix}_{G_4}$$

$$\{\tau_{Pesanteur \rightarrow 3}\} = \begin{Bmatrix} -m_3 \cdot g \cdot \vec{z}_0 \\ \vec{0} \end{Bmatrix}_{G_3}$$

$$\{\tau_{2 \rightarrow 3}\} = \begin{Bmatrix} X_{23} & 0 \\ Y_{23} & M_{23} \\ Z_{23} & N_{23} \end{Bmatrix}_{O_2, R}$$

On déplace tous les torseurs en  $O_2$ .

TMS en  $O_2$  selon  $\vec{z}_0$

$$N_{23} = -L_2 \cdot f \cdot N$$

$$\text{Donc } C_{v_{23}} = |N_{43}| = L_2 \cdot f \cdot N$$

J'isole {2+3+4}

BAME :

.....

On déplace tous les torseurs en  $O_1$ .

TMS en  $O_1$  selon  $\vec{z}_0$

$$C_{v_{12}} = |N_{12}| = (L_2 + L_1) \cdot f \cdot N$$

$$\Delta\theta_{23} = C_{v_{23}} \cdot k = L_2 \cdot f \cdot N \cdot k = 4,05 \cdot 10^{-5} \text{ rad}$$

$$\Delta\theta_{12} = C_{v_{12}} \cdot k = (L_2 + L_1) \cdot f \cdot N \cdot k = 8,75 \cdot 10^{-5} \text{ rad}$$

**Q6 :**

$$\delta_{12} = L_1 \cdot \Delta\theta_{12}$$

$$\delta_{23} = L_2 \cdot \Delta\theta_{23}$$

$$\delta_{tot} = \delta_{12} + \delta_{23} = 0,086 \text{ mm}$$

**Q7 :**

$$\delta_{tot} = 0,086 \text{ mm} < 0,1 \text{ mm} \rightarrow \text{CdCF OK}$$