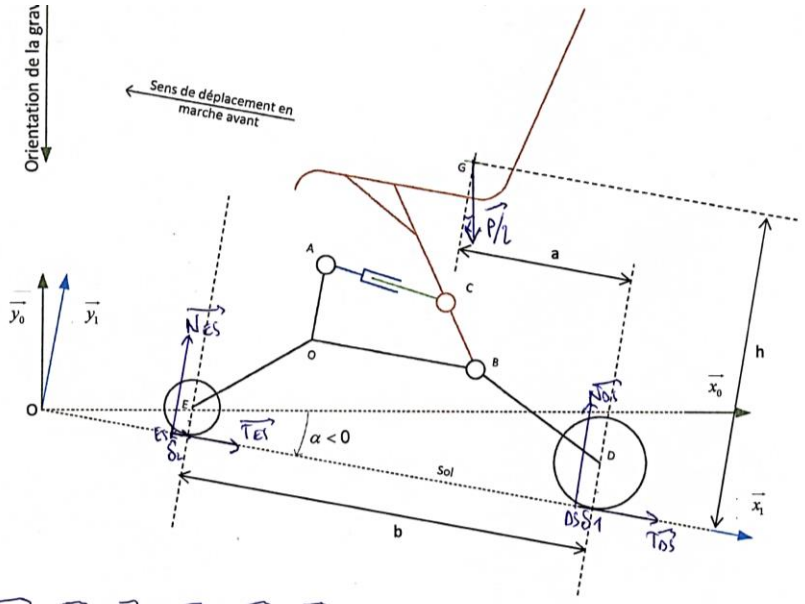
EVALUATION ROULEMENTS ET FROTTEMENTS n°2 - CORRECTION



② $\overrightarrow{N_{ES}} + \overrightarrow{T_{ES}} + \frac{\overrightarrow{P}}{2} + \overrightarrow{N_{DS}} + \overrightarrow{T_{DS}} = \overrightarrow{0}$

$$\begin{pmatrix} 0 \\ N_{ES} \\ 0 \end{pmatrix} + \begin{pmatrix} T_{ES} \\ 0 \\ 0 \end{pmatrix} + \begin{pmatrix} \frac{P}{2}\sin\alpha \\ -\frac{P}{2}\cos\alpha \\ 0 \end{pmatrix} + \begin{pmatrix} 0 \\ N_{DS} \\ 0 \end{pmatrix} + \begin{pmatrix} T_{DS} \\ 0 \\ 0 \end{pmatrix} = \overrightarrow{0}$$

$$\Rightarrow \boxed{T_{ES} + T_{DS} + \frac{P}{2}\sin\alpha = 0}$$

$$\boxed{N_{ES} + N_{DS} = \frac{P}{2}\cos\alpha}$$

③ $\overrightarrow{M_{DS}}(\overrightarrow{N_{ES}}) + \overrightarrow{M_{DS}}(\overrightarrow{T_{DS}}) + \overrightarrow{M_{DS}}(\overrightarrow{P/2}) + \overrightarrow{M_{DS}}(\overrightarrow{N_{DS}}) + \overrightarrow{M_{DS}}(\overrightarrow{T_{ES}}) = \overrightarrow{0}$

$\overrightarrow{DS\,ES} \wedge \overrightarrow{N_{ES}} + \overrightarrow{DS\,G} \wedge \frac{\overrightarrow{P}}{2} + \overrightarrow{DS\,ES} \wedge \overrightarrow{T_{ES}} = \overrightarrow{0}$

$$\begin{pmatrix} \delta_1 - b - \delta_2 \\ 0 \\ 0 \end{pmatrix} \wedge \begin{pmatrix} 0 \\ N_{ES} \\ 0 \end{pmatrix} + \begin{pmatrix} +\delta_1 - a \\ h \\ 0 \end{pmatrix} \wedge \begin{pmatrix} \frac{P}{2}\sin\alpha \\ -\frac{P}{2}\cos\alpha \\ 0 \end{pmatrix} + \begin{pmatrix} \delta_1 - b - \delta_2 \\ 0 \\ 0 \end{pmatrix} \wedge \begin{pmatrix} T_{ES} \\ 0 \\ 0 \end{pmatrix}$$

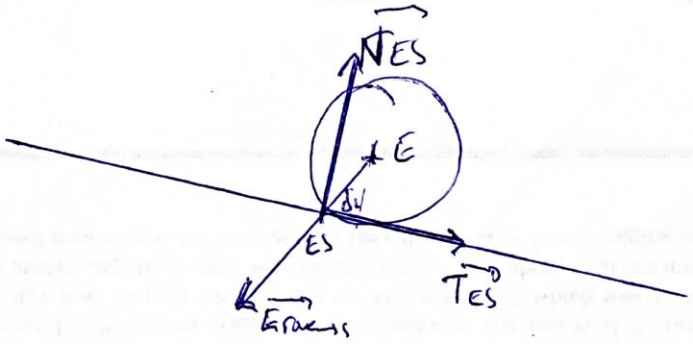
$$\boxed{N_{ES}(\delta_1 - b - \delta_2) - \frac{P}{2}\cos\alpha(\delta_1 - a) - h\frac{P}{2}\sin\alpha = 0}$$

$$\Rightarrow N_{ES} = \frac{P}{2} \cdot \frac{(\delta_1 - a)\cos\alpha + h\sin\alpha}{\delta_1 - b - \delta_2}$$

$$\boxed{N_{ES} = 121{,}9\,N}$$

$$\hookrightarrow \boxed{N_{DS} = 96\,5N}$$

(4)



$$\vec{M}_E(\overrightarrow{E_{fluide\to sol}}) + \vec{M}_E(\vec{N}_{ES}) + \vec{M}_E(\vec{T}_{ES}) = \vec{0}$$

$$\overrightarrow{EES} \wedge \vec{N}_{ES} + \overrightarrow{EES} \wedge \vec{T}_{ES} = \vec{0}$$

$$\begin{pmatrix} -\delta_L \\ -\frac{D_L}{2} \\ 0 \end{pmatrix} \wedge \begin{pmatrix} 0 \\ N_{ES} \\ 0 \end{pmatrix} + \begin{pmatrix} -\delta_L \\ -D_L/2 \\ 0 \end{pmatrix} \wedge \begin{pmatrix} T_{ES} \\ 0 \\ 0 \end{pmatrix} = \vec{0}$$

$$\boxed{-\delta_L N_{ES} + \frac{D_L}{2} T_{ES} = 0}$$

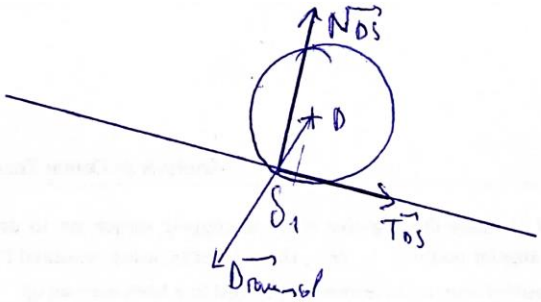
$$\hookrightarrow T_{ES} = \frac{2\delta_L \cdot N_{ES}}{D_L}$$

$$\boxed{T_{ES} = 2{,}4\,N}$$

(5) - $T_{DS} = -T_{ES} - \frac{P}{2}\sin\alpha$

$$\hookrightarrow \boxed{T_{DS} = -163{,}7\,N}$$

(6).



$$\vec{M_D}(\Sigma\vec{F}) = \vec{M_D}(\vec{D_{roue \to sol}}) + \vec{M_D}(\vec{N_{DS}}) + \vec{M_D}(\vec{T_{DS}})$$

$$= -N_{DS} \cdot \delta_1 + T_{DS} \frac{D_1}{2} = C_r$$

$$\Rightarrow C_r = -32{,}8\,N$$

(7). × On a $\frac{T_{ES}}{N_{ES}} = 0{,}02$ donc la résultante au point Es est dans le cône de frottement → pas de glissement.

× On a $-\frac{T_{DS}}{N_{DS}} = 0{,}17$ donc il n'y a pas glissement non plus.