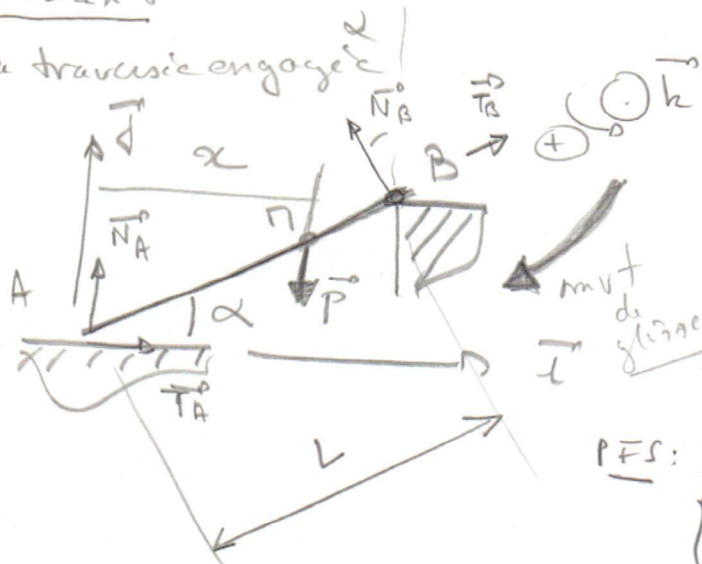


exercice 8

La traverse engagée



$$\mathcal{P}_A = \begin{Bmatrix} \vec{N}_A + \vec{T}_A \\ 0 \end{Bmatrix}_{(A)}$$

$$\mathcal{P}_B = \begin{Bmatrix} \vec{N}_B + \vec{T}_B \\ 0 \end{Bmatrix}_{(B)}$$

$$\mathcal{P}_G = \begin{Bmatrix} \vec{P} \\ 0 \end{Bmatrix}_{(G)}$$

P.F.S.:

$$\begin{cases} \vec{N}_A + \vec{T}_A + \vec{N}_B + \vec{T}_B + \vec{P} = 0 \\ 0 + \vec{AB} \wedge (\vec{N}_B + \vec{T}_B) + \vec{AG} \wedge \vec{P} = 0 \end{cases}$$

$$\begin{cases} \vec{N}_A = N_A \vec{j} \\ \vec{T}_A = T_A \vec{i} \end{cases} \quad \begin{cases} \vec{N}_B = -N_B \sin \alpha \vec{i} + N_B \cos \alpha \vec{j} \\ \vec{T}_B = T_B \cos \alpha \vec{i} + T_B \sin \alpha \vec{j} \end{cases} \quad \text{et} \quad \vec{P} = -mg \vec{j}$$

$$\begin{cases} \vec{AB} = L \cos \alpha \vec{i} + L \sin \alpha \vec{j} \\ \vec{AG} = x \vec{i} + y \vec{j} \end{cases} \quad (\text{rem. } L \cos \alpha \text{ c'est la longueur qui se va fonction comparée avec } \alpha!)$$

Remplaçons dans les équations de P.F.S.:

$$\begin{cases} T_A - N_B \sin \alpha + T_B \cos \alpha = 0 \\ N_A + N_B \cos \alpha + T_B \sin \alpha - mg = 0 \\ L N_B \cos^2 \alpha - L N_B \sin^2 \alpha - \alpha mg = 0 \end{cases} \quad \left| \begin{array}{l} \text{La plaque glisse sur} \\ \frac{|T_A|}{|N_A|} = f_A \text{ et } \frac{|T_B|}{|N_B|} = f_B \end{array} \right.$$

$$\Rightarrow x = \frac{L N_B}{mg} \quad \begin{cases} |N_A| f_A - N_B \sin \alpha + |N_B| f_B \cos \alpha = 0 \quad (1) \\ N_A + N_B \cos \alpha + |N_B| f_B \sin \alpha - mg = 0 \quad (2) \end{cases}$$

$$\begin{aligned} (1) - f_A (2) &= -N_B \sin \alpha + N_B f_B \cos \alpha - N_A f_A \cos \alpha \\ &\quad - N_B f_A \sin \alpha + mg f_A = 0 \end{aligned}$$

$$f_A = 0.2$$

$$\Rightarrow N_B = mg f_A / (\sin \alpha + f_B \cos \alpha + f_A \cos \alpha + f_A f_B \sin \alpha)$$

$$\alpha = 20^\circ$$

$$\Rightarrow (x/L \cos \alpha) = f_A / (\sin \alpha (1 + f_A f_B) + \cos \alpha (f_B - f_A)) \cos \alpha$$