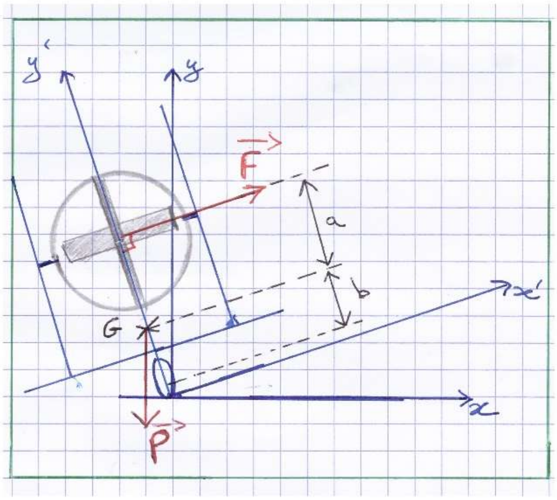
ANNEXE 1

Calcul du PFD



$$\tau(\vec{F}) = {}_{F}\begin{Bmatrix} F\cos\alpha & 0 \\ F\sin\alpha & 0 \end{Bmatrix}$$

$$\tau(\vec{s}) = {}_{S}\begin{Bmatrix} -Sx & 0 \\ Sy & 0 \end{Bmatrix}$$

$$\tau(\vec{P}) = {}_{G}\begin{Bmatrix} 0 & 0 \\ -mg & 0 \end{Bmatrix}$$

On définit les torseurs au point G :

$$\tau(\vec{S}) = \begin{Bmatrix} -Sx & 0 \\ \text{Sy} & 0 \\ 0 & bSx\cos\alpha + bSy\sin\alpha \end{Bmatrix} \qquad \tau(\vec{F}) = \begin{Bmatrix} F\cos\alpha & 0 \\ \text{F}\sin\alpha & 0 \\ 0 & -\cos\alpha\,(F+a) - \sin\alpha\,(F+a) \end{Bmatrix}$$

PFS :

$$/x:\ -Sx + F\cos\alpha = 0$$

$$/y:\ -mg + Sy + F\sin\alpha = 0$$

$$/z:\ -bSx\cos\alpha + bSy\sin\alpha - aFcos^2\alpha - asin^2\alpha = 0$$

⇨ Isoler F

$$Sx = Fcos\alpha$$

$$Sy = -Fsin\alpha + mg$$

$$-b.Fcos^2\alpha + b.sin\alpha(-Fsin\alpha + mg) - aF = 0$$

$$-b.Fcos^2\alpha + Fb.sin^2\alpha + b.sin\alpha.mg - aF = 0$$

$$-bF(cos^2\alpha + sin^2\alpha) + b.sin\alpha.mg - aF = 0$$

$$-bF + b.sin\alpha.mg - aF = 0$$

$$b.sin\alpha.mg = F(a+b) = \boldsymbol{\frac{b.sin\alpha.mg}{a+b}}$$