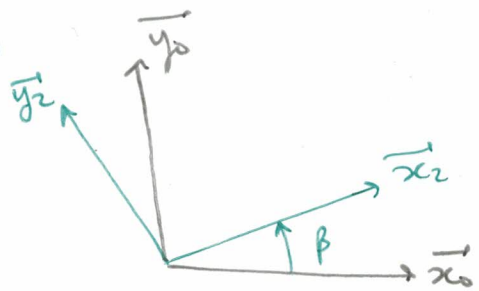
TD1 - Hayon de coffre

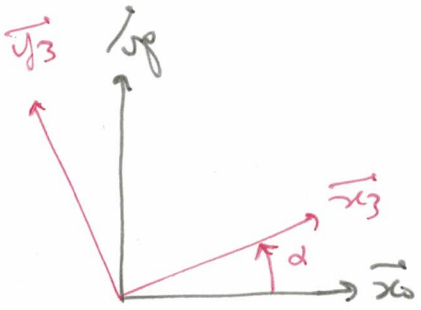
Q1)

Paramètres constants	Paramètres variables
h, l	λ, α, β

Q2)



$$\begin{cases} \vec{x_2} = \cos\beta\,\vec{x_0} + \sin\beta\,\vec{y_0} \\ \vec{y_2} = \cos\beta\,\vec{y_0} - \sin\beta\,\vec{x_0} \\ \vec{z_2} = \vec{z_0} \end{cases}$$



$$\begin{cases} \vec{x_3} = \cos\alpha\,\vec{x_0} + \sin\alpha\,\vec{y_0} \\ \vec{y_3} = \cos\alpha\,\vec{y_0} - \sin\alpha\,\vec{x_0} \\ \vec{z_3} = \vec{z_0} \end{cases}$$

Q3) $\overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{CA} = \vec{0}$

$-h\vec{y_0} - \lambda\vec{x_2} + l\vec{x_3} = \vec{0}$

on projette dans la base 0 : sur $\vec{x_0}$: $-\lambda\cos\beta + l\cos\alpha = 0$

sur $\vec{y_0}$: $-h - \lambda\sin\beta + l\sin\alpha = 0$

Q4) On isole β :

$$\begin{cases} \lambda\cos\beta = l\cos\alpha & (1) \\ \lambda\sin\beta = h - l\sin\alpha & (2) \end{cases}$$

on fait $(1)^2 + (2)^2$: $\lambda^2 = (l\cos\alpha)^2 + (h - l\sin\alpha)^2$

Soit $\boxed{\lambda = \sqrt{l^2\cos^2\alpha + (h - l\sin\alpha)^2}}$

Q5) fermé : $\alpha = 60°$: $\lambda_{min} = 47{,}6$ cm

ouvert : $\alpha = -30°$: $\lambda_{max} = 68{,}7$ cm

$\boxed{\text{course} = \lambda_{max} - \lambda_{min} = 21{,}1 \text{ cm}}$