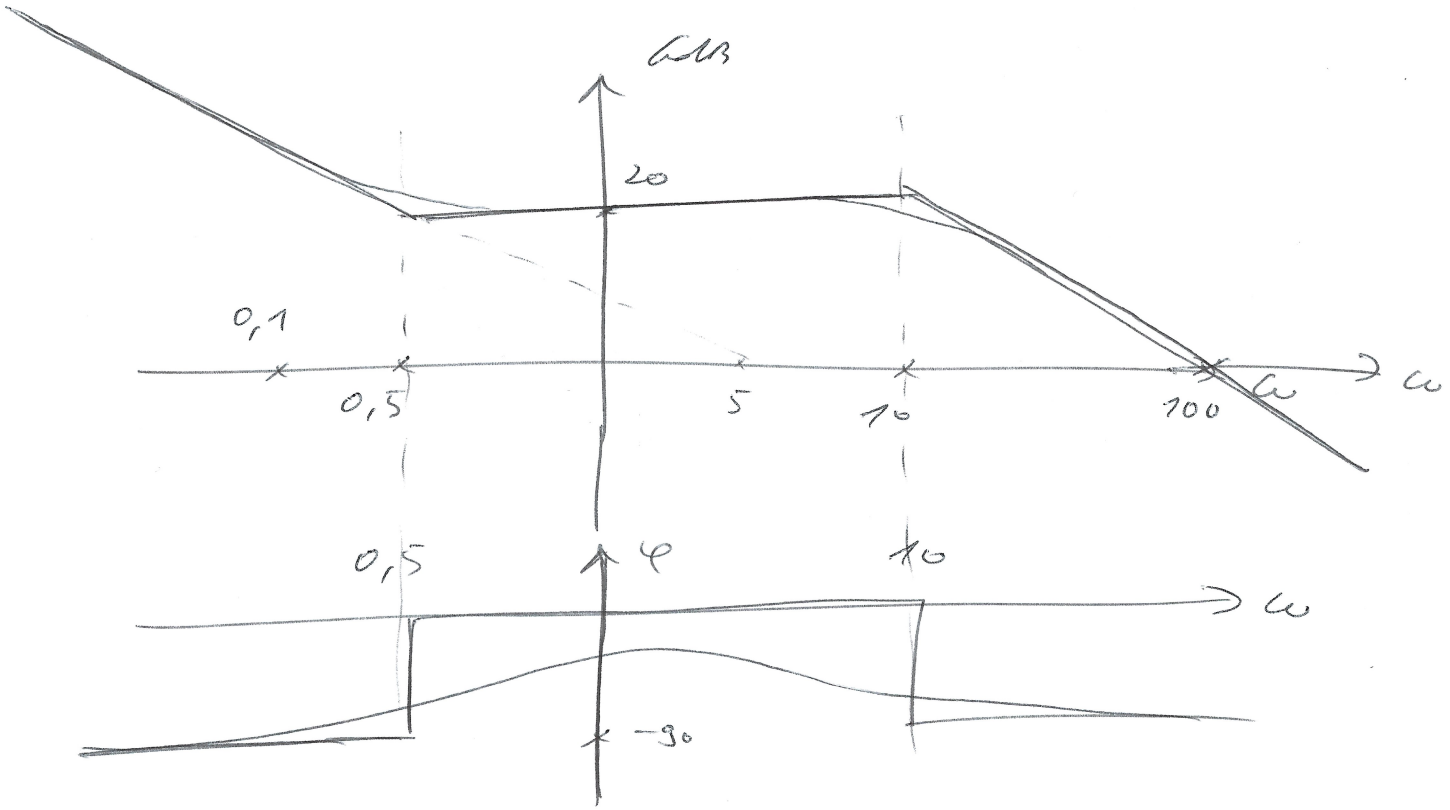
DS de SI, MPSI 1, janvier 25.

Exo 1

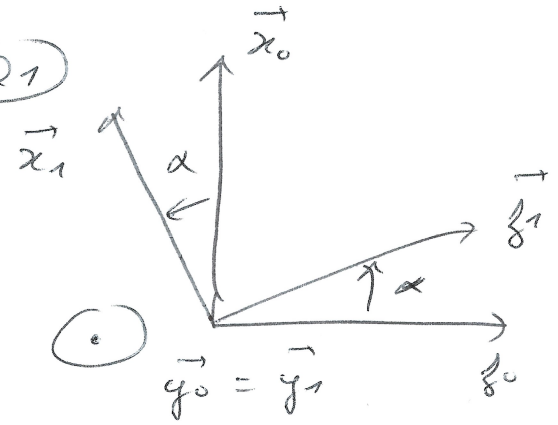
$$H(p) = \frac{5(1+2p)}{p(1+0,1p)}$$

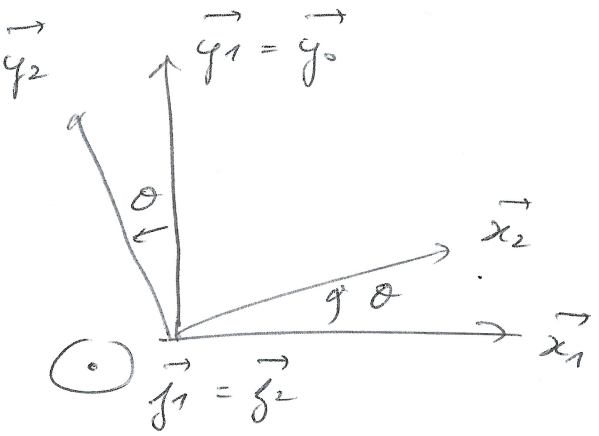
Asymptotes $\omega = 0,5$ et 10



Exo 2

(Q1)





(Q2) $\vec{OD} = \vec{OA} + \vec{AD} = -a\vec{x_1} + (b+\lambda)\vec{x_2}$

$$\left(\frac{d\vec{x_2}}{dt}\right)_0 = \left(\frac{d\vec{x_2}}{dt}\right)_1 + \vec{\Omega}_{1/0} \wedge \vec{x_2} = \dot{\theta}\vec{y_2} + \dot{\alpha}\vec{y_1} \wedge (\cos\theta\vec{x_1} + \sin\theta\vec{y_1})$$

$$= \dot{\theta}\vec{y_2} - \dot{\alpha}\cos\theta\vec{z_1}$$

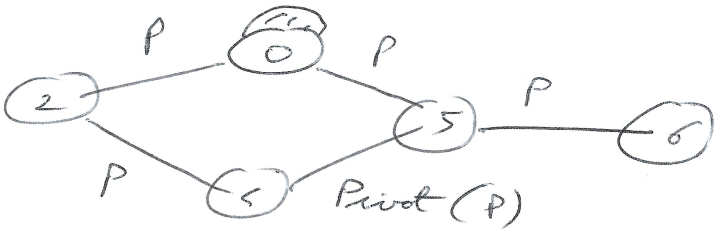
$$\vec{v}(D \in 3/0) = a\dot{\alpha}\vec{z_1} + \dot{\lambda}\vec{x_2} + (b+\lambda)(\dot{\theta}\vec{y_2} - \dot{\alpha}\cos\theta\vec{z_1})$$

(Q3) $\vec{OE} = -a\vec{x_1} + (b+\lambda)\vec{x_2} + c\vec{x_1}$

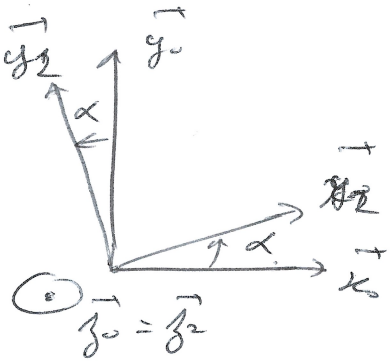
(2) $\vec{OE} = \left[c - a + (\ell + \lambda)\cos\theta\right]\vec{x_1} + (\ell+\lambda)\sin\theta\,\vec{y_1}$

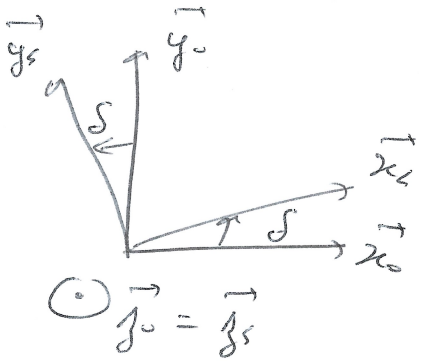
Il faut : $\begin{cases} c - a + (\ell+\lambda)\cos\theta = -d \\ \dot\lambda \sin\theta + (\ell+\lambda)\dot\theta\cos\theta = V \end{cases}$

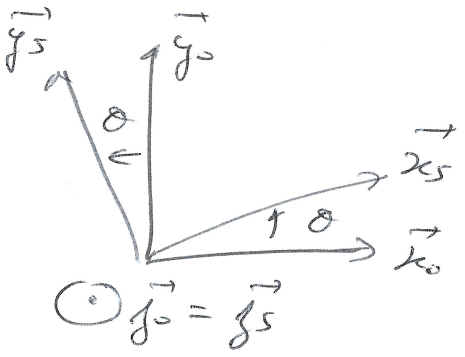
Exo 3 ~~Buggy~~ (Q1)



(Q2)







(Q3) $\vec{EA} + \vec{AH} = \vec{EG} + \vec{GH}$

$c\vec{y_2} + a\vec{x_0} + \ell\vec{y_0} = d\vec{x_4} + e\vec{x_5} + \ell\vec{y_5}$

$\begin{cases} \vec{y_2} = -\sin\alpha\,\vec{x_0} + \cos\alpha\,\vec{y_0} \\ \vec{x_4} = \cos\delta\,\vec{x_0} + \sin\delta\,\vec{y_0} \\ \vec{x_5} = \cos\theta\,\vec{x_0} + \sin\theta\,\vec{y_0} \\ \vec{y_5} = -\sin\theta\,\vec{x_0} + \cos\theta\,\vec{y_0} \end{cases} \Rightarrow \begin{cases} -c\sin\alpha + a = d\cos\delta + e\cos\theta - \ell\sin\theta \\ c\cos\alpha + \ell = d\sin\delta + e\sin\theta + \ell\cos\theta \end{cases}$

$d\cos\delta = \dots$

$d\sin\delta = \dots$

$d^2 = \left(a - c\sin\alpha - e\cos\theta + \ell\sin\theta\right)^2 + \left(c\cos\alpha + \ell - e\sin\theta - \ell\cos\theta\right)^2 = A^2 + B^2$

(Q5) $\vec{v}(I \in S_0) = \left(\dfrac{d\vec{HI}}{dt}\right)_0 \qquad \vec{HI} = g\vec{x_5} - h\vec{y_5}$

$\vec{v}(I \in S_0) = g\dot\theta\,\vec{y_5} + h\dot\theta\,\vec{x_5}$