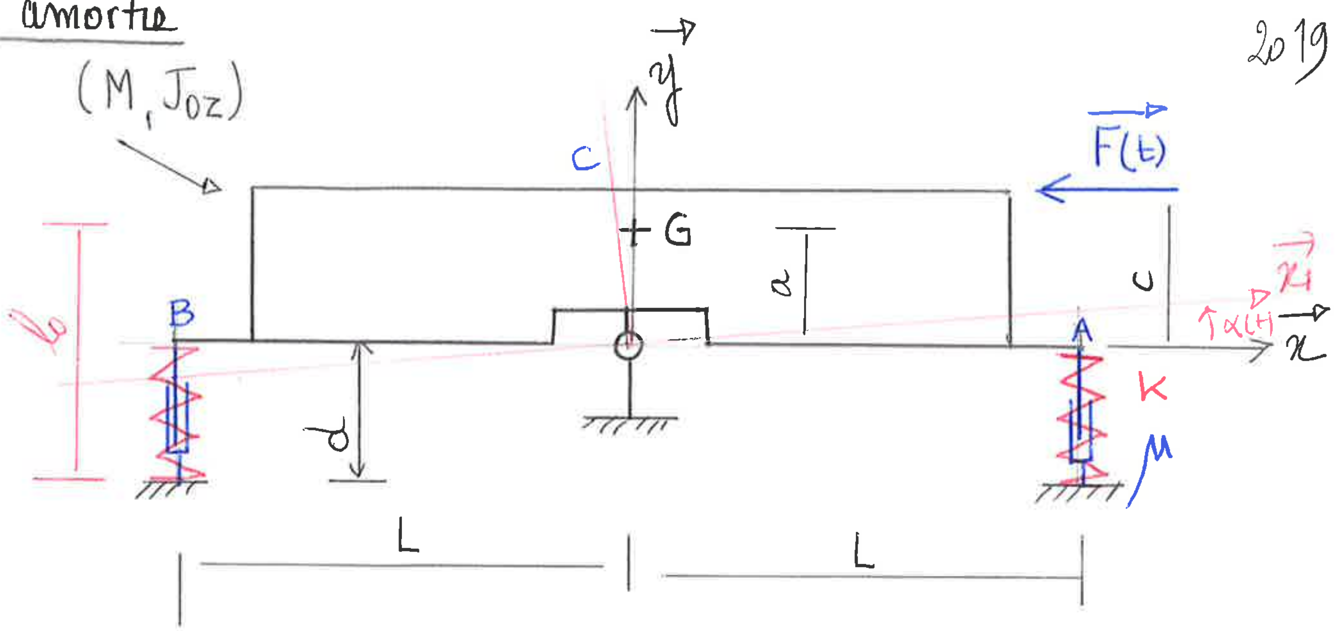
Table amortie

2019



On cherche la fonction de transfert $\alpha(p)/F(p)$

Équation de mouvement. Énergétique

Bilan – Puissances – Énergies Potentielles

$$\mathcal{P}(\text{ressorts} \to S/R_g) = \left\{ -k(d + L\alpha - l_0)\vec{y} \,;\, \vec{0} \right\}_A \otimes \left\{ \dot{\alpha}\vec{z} \,;\, L\dot{\alpha}\vec{y} \right\}_A$$

$$+ \left\{ -k(d - L\alpha - l_0)\vec{y} \,;\, \vec{0} \right\}_B \otimes \left\{ \dot{\alpha}\vec{z} \,;\, -L\dot{\alpha}\vec{y} \right\}_B$$

$$= -k(d + L\alpha - l_0)L\dot{\alpha} + k(d - L\alpha - l_0)L\dot{\alpha}$$

$$= -2kL^2\alpha\dot{\alpha}$$

$$Ep(\text{ressorts} \to S/R_g) = \frac{1}{2}k(d + L\alpha - l_0)^2 + \frac{1}{2}k(d - L\alpha - l_0)^2$$

$$\frac{d}{dt}Ep(\text{ressorts} \to S/R_g) = 2kL^2\alpha\dot{\alpha}.$$

$$\mathcal{P}(F(t) \to S/R_g) = \left\{ -\vec{F}(t).\vec{x} \,;\, \vec{0} \right\}_C \otimes \left\{ \dot{\alpha}\vec{z} \,;\, -c\dot{\alpha}\vec{x} \right\}_C$$

$$= c\,F(t)\,\dot{\alpha}$$

$$\mathcal{P}(\text{pesanteur} \to S/R_g) = \left\{ \begin{matrix} -m\vec{g} \\ \vec{0} \end{matrix} \right\}_G \otimes \left\{ \begin{matrix} \dot{\alpha}\vec{z} \\ -a\dot{\alpha}\vec{x} \end{matrix} \right\} = 0$$

$$E_p(\text{pesanteur} \to S/R_g) = +\, m \cdot g \cdot a \cos\alpha \simeq m g a .$$

$\mathcal{P}(\text{pivot} \to S/R_g) = 0$ (liaison parfaite).

$$\mathcal{P}(\text{amortisseurs} \to S/R_g) = \left\{ \begin{matrix} -\mu L\dot{\alpha}\vec{y} \\ \vec{0} \end{matrix} \right\}_A \otimes \left\{ \begin{matrix} \dot{\alpha}\vec{z} \\ L\dot{\alpha}\vec{y} \end{matrix} \right\}_A + \left\{ \begin{matrix} +\mu L\dot{\alpha}\vec{y} \\ \vec{0} \end{matrix} \right\}_B \otimes \left\{ \begin{matrix} \dot{\varphi}\vec{z} \\ -L\dot{\alpha}\vec{y} \end{matrix} \right\}_B$$

$$= -2\mu L^2 \dot{\alpha}^2$$

Energie cinétique

$$E_c(S/R_g) = \frac{1}{2} \left\{ \begin{matrix} \dot{\varphi}\vec{z} \\ \vec{0} \end{matrix} \right\}_O \otimes \left\{ \begin{matrix} m \cdot a\dot{\alpha}\vec{x} \\ J_{Oz}\dot{\alpha}\vec{z} \end{matrix} \right\}_O = \frac{1}{2} J_{Oz}\dot{\alpha}^2$$

Equation différentielle

$$J_{Oz}\ddot{\alpha} + 2\mu L^2\dot{\alpha} + 2KL^2\alpha = c\, F(t)$$

Fonction de transfert

$$\frac{\alpha(p)}{F(p)} = \frac{c/2KL^2}{1 + \frac{\mu}{K}p + \frac{J_{Oz}}{2KL^2}p^2}$$