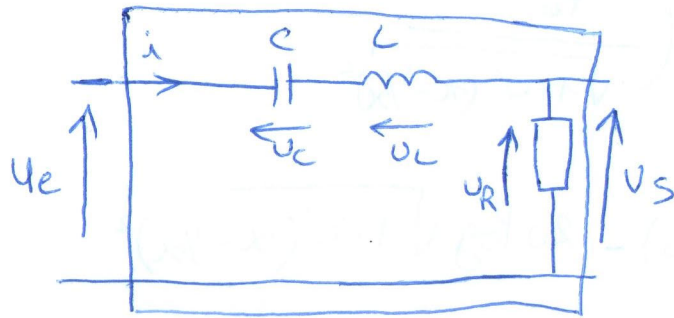


filtre passe bande



Q₁: Equation différentielle en fonction de U_e et U_s

Loi des mailles

$$U_C + U_L + U_R = U_e$$

$$U_R = U_S = R \cdot i \rightarrow i = \frac{U_S}{R}$$

$$\frac{q}{C} + L \frac{di}{dt} + R i = U_e$$

$$\frac{1}{C} \int i dt + L \frac{di}{dt} + (r+R) i = U_e$$

$$\frac{1}{RC} \int U_S dt + \frac{L}{R} \frac{dU_S}{dt} + \frac{(r+R)}{R} U_S = U_e$$

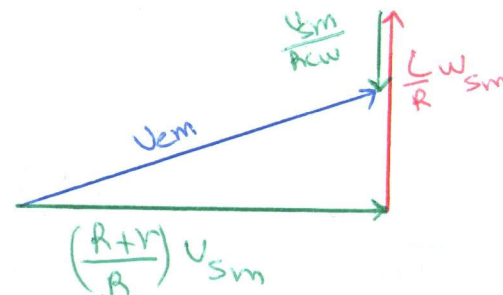
Q₂: transmittance $T = \frac{U_{sm}}{U_{em}}$ (Frennel):

$$\left(\frac{r+R}{R} \right) U_S(t) = \left(\frac{R+r}{R} \right) U_{sm} \sin(\omega t + \phi_s) \rightarrow \vec{V}_1 \left| \begin{array}{l} \frac{(R+r)}{R} U_{sm} \\ \phi_s \end{array} \right.$$

$$- \frac{L}{R} \frac{dU_S}{dt} = \frac{L}{R} \omega_{sm} \sin(\omega t + \phi_s + \pi/2) \rightarrow \vec{V}_2 \left| \begin{array}{l} \frac{L}{R} \omega U_{sm} \\ \phi_s + \pi/2 \end{array} \right.$$

$$\frac{1}{RC} \int U_S dt = \frac{U_{sm}}{RC \omega} \sin(\omega t + \phi_s - \pi/2) \rightarrow \vec{V}_3 \left| \begin{array}{l} \frac{\omega_{sm}}{RC \omega} \\ \phi_s - \pi/2 \end{array} \right.$$

$$U_e(t) = U_{em} \sin(\omega t + \phi_e) \rightarrow \vec{N} \left| \begin{array}{l} U_{em} \\ \phi_e \end{array} \right.$$



pythagore:

$$U_{em}^2 = \left(\frac{R+r}{R} \right)^2 U_{sm}^2 + \left(\frac{L}{R} \omega - \frac{1}{R \omega} \right)^2 U_{sm}^2$$

$$= \left(\frac{R+r}{R} \right)^2 \left(1 + \left(\frac{R}{R+r} \left(\frac{L}{R} \omega - \frac{1}{R \omega} \right) \right)^2 \right) U_{sm}^2$$

$$\frac{U_{sm}^2}{U_{em}^2} = \frac{\left(\frac{R}{R+r} \right)^2}{\left(1 + \left(\frac{L \omega}{R+r} - \frac{1}{(R+r) \omega} \right)^2 \right)}$$