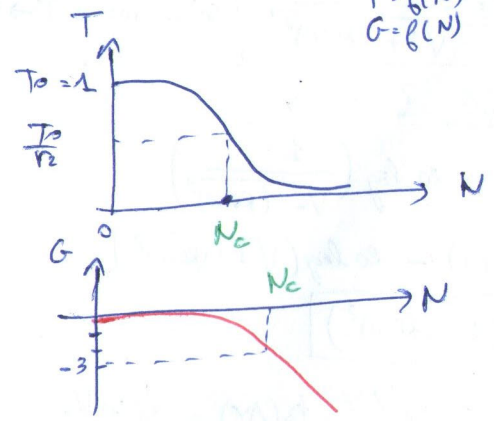
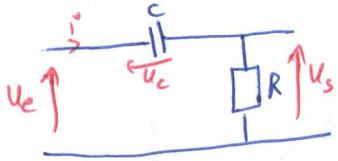
la bande passante :

$$\Delta N = \left[0, N_c = \frac{1}{2\pi RC}\right]$$

exemple de courbe : (courbe de réponse $T = f(N)$, $G = f(N)$)



Q3 : filtre passe haut passif :



Déterminer l'éq diff en f° de U_s et U_e ?

Loi des mailles : $U_R + U_c = U_e$

$U_R = U_s = Ri° \Rightarrow i° = \frac{U_s}{R}$

$U_c = \frac{q}{C} = \frac{1}{C}\int i\,dt = \frac{1}{RC}\int U_s\,dt$

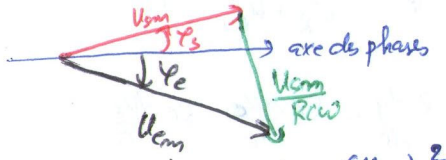
donc $\boxed{U_s + \frac{1}{RC}\int U_s\,dt = U_e}$

A l'aide de la construction de Fresnel déterminer l'expression de la transmittance $T = \frac{U_{sm}}{U_{em}}$?

$U_s(t) = U_{sm}\sin(\omega t + \varphi_s) \longrightarrow \vec{V_1} \mid \begin{matrix} U_{sm} \\ \varphi_s \end{matrix}$

$\frac{1}{RC}\int U_s\,dt = \frac{U_{sm}}{RC\omega}\sin\left(\omega t + \varphi_s - \frac{\pi}{2}\right) \longrightarrow \vec{V_2} \mid \begin{matrix} \frac{U_{sm}}{RC\omega} \\ \varphi_s - \frac{\pi}{2} \end{matrix}$

$U_e(t) = U_{em}\sin(\omega t + \varphi_e) \longrightarrow \vec{V} \mid \begin{matrix} U_{em} \\ \varphi_e \end{matrix}$



d'après Pythagore : $U_{em}^2 = U_{sm}^2 + \left(\frac{U_{sm}}{RC\omega}\right)^2$

$U_{em}^2 = \left(1 + \frac{1}{(RC\omega)^2}\right) U_{sm}^2$

$$\boxed{T = \frac{U_{sm}}{U_{em}} = \frac{1}{\sqrt{1 + \frac{1}{(RC\omega)^2}}}}$$ si $\omega \to 0 \Leftrightarrow T \to 0$; si $\omega \to \infty \Leftrightarrow T \to 1$

Calculer le Gain $G = 20\log(T)$?

$G = 20\log(T) = 20\log\left(\frac{1}{\sqrt{1 + \frac{1}{(RC\omega)^2}}}\right) = -10\log\left(1 + \frac{1}{(RC\omega)^2}\right)$

Calculer le déphasage $\Delta\varphi = \varphi_s - \varphi_e$?

$tg(\Delta\varphi) = -\frac{\frac{U_{sm}}{RC\omega}}{U_{sm}} = -\frac{1}{RC\omega}$

Calculer la fréquence de coupure N_b ?

$T = \frac{T_0}{\sqrt{2}} = \frac{1}{\sqrt{2}} \Leftrightarrow \frac{1}{\sqrt{1 + \frac{1}{(RC\omega)^2}}} = \frac{1}{\sqrt{2}}$

$\Leftrightarrow 1 + \frac{1}{(RC\omega)^2} = 2 \Leftrightarrow \omega = \frac{1}{RC} \Leftrightarrow 2\pi N_b = \frac{1}{RC}$

$\Leftrightarrow \boxed{N_b = \frac{1}{2\pi RC}}$

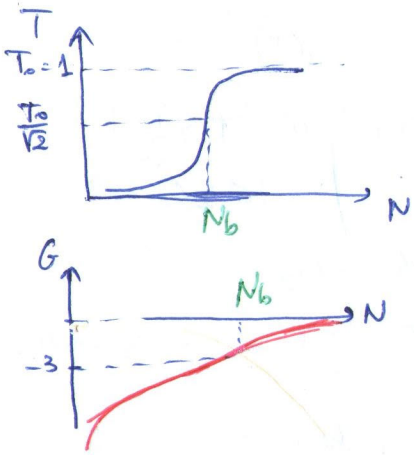
ou bien : $G \geq G_0 - 3 \Leftrightarrow -10\log\left(1 + \frac{1}{(RC\omega)^2}\right) \geq -3$

$\Leftrightarrow N \geq \boxed{\frac{1}{2\pi RC} = N_b}$

la bande passante ΔN ?

$\Delta N = [N_b, \infty[$: passe haut.

exemple de courbe : (courbe de réponse $T = f(N)$, $G = f(N)$)



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