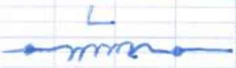
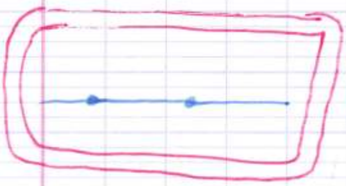
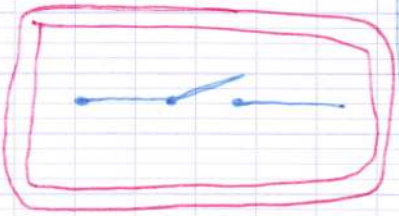
L $\underline{Z_L} = jL\omega$



$Z_L = |\underline{Z_L}| = L\omega$

Basse Fréquence	Haute fréquence
$\begin{pmatrix} f \to 0 \\ \omega \to 0 \end{pmatrix}$	$\begin{pmatrix} f \to +\infty \\ \omega \to +\infty \end{pmatrix}$
$\lim_{\omega \to 0} Z_L = 0$	$\lim_{\omega \to +\infty} Z_L = +\infty$

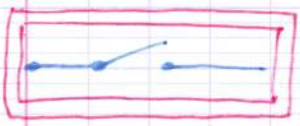


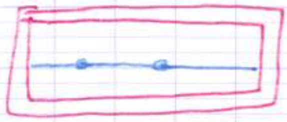


C $\underline{Z_C} = \frac{1}{jC\omega}$

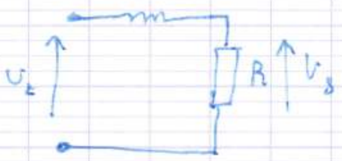
$Z_C = |\underline{Z_C}| = \frac{1}{C\omega}$

Basse Fréquence	Haute Fréquence
$\begin{pmatrix} f \to 0 \\ \omega \to 0 \end{pmatrix}$	$\begin{pmatrix} f \to +\infty \\ \omega \to +\infty \end{pmatrix}$
$\lim_{\omega \to 0} Z_C = +\infty$	$\lim_{\omega \to +\infty} Z_C = 0$

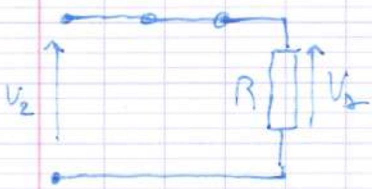




1)bis)



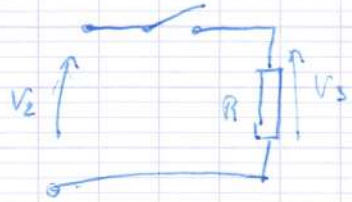
BF



$V_S = V_2$

$A(\omega \to 0) = 1$

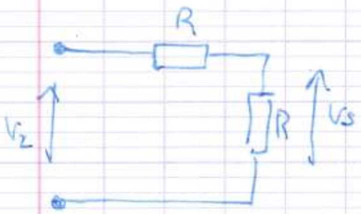
HF



$V_s = 0$

$A(\omega \to +\infty) = \frac{V_s}{V_2} = \frac{0}{V_2} = 0$

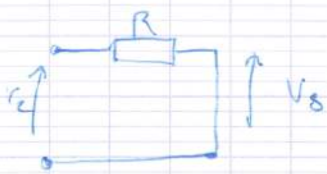
2) BF



$V_s = \frac{V_2}{2}$

$A(\omega \to 0) = \frac{1}{2}$

HF

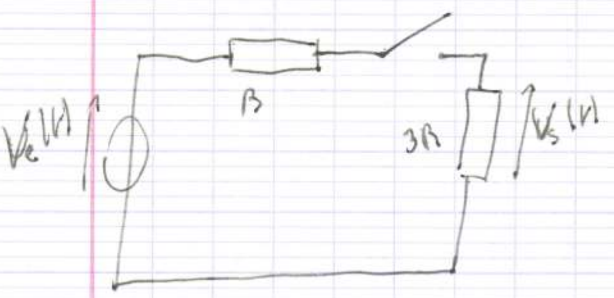


$V_s = 0$

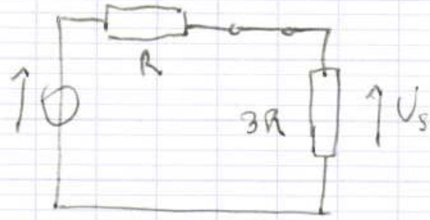
$A = 0$.

By Hyperion

BF



HF



$V_s = \frac{3R}{R+R3} = \frac{3}{4} V_e(t)$

$V_s(t) = 0$ Filtre passe haut.

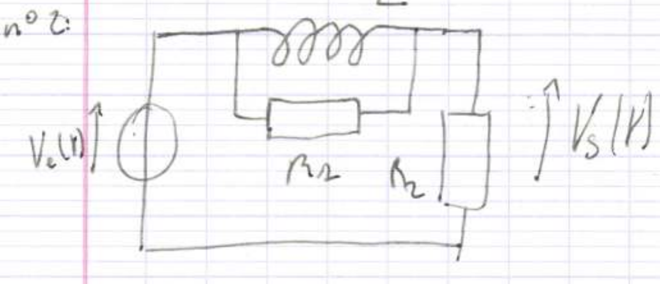
3) $BF = \frac{5}{6}$ Filtre passe bas $HF = 0$

4) $BF\ A \to 1$ passe bas $HF - V_s(t) = \frac{2}{3}$

5.) BF $V_s(t) = 0$ HF: $V_s(t) = 0$

6) BF $V_s(t) = 1$ HF: $A \to 1$. Coupe bande.

Exercice n° 2:



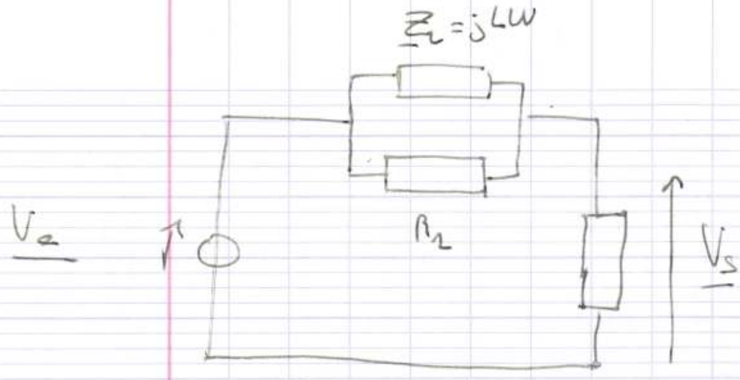
BF: $V_s(t) = \frac{R_2}{R_1+R_2} V_e(t)$ HF $V_s(t) = V_e(t)$.

Passe Bas.

$R_1 = 3k\Omega$ $G_{min} = -12$ dB

R_2 $A \xrightarrow[0]{} \frac{R_2}{R_1+R_2}$; $A \xrightarrow[+\infty]{} 1$

By Hyperion



$$\underline{T}(\omega) = \frac{\underline{V_s}}{\underline{V_e}}$$

$\underline{V_s}$ ADJ $\underline{Z} = \dfrac{jLR_1\omega}{R_1 + jL\omega}$

$$\underline{V_s} = \underline{V_e} \times \frac{R_2}{R_2 + \underline{Z}}$$

$$\underline{T}(\omega) = \frac{\underline{V_s}}{\underline{V_e}} = \frac{R_2}{R_2 + \dfrac{jLR_1\omega}{R_1 + jL\omega}} = \frac{R_1R_2 + jLR_2\omega}{R_1R_2 + jL(R_1+R_2)\omega}$$

$$= \frac{1 + j\frac{L\omega}{R_1}}{1 + jL\omega\left(\frac{R_1+R_2}{R_1R_2}\right)}$$

$$A(\omega) = |\underline{T}(\omega)| = \frac{\sqrt{1 + \left(\frac{L\omega}{R_1}\right)^2}}{\sqrt{1 + \left[\frac{L\omega(R_1+R_2)}{R_1R_2}\right]^2}}$$

$$\varphi(\omega) = \operatorname{Arg}(\underline{T}(\omega)) = \operatorname{Arg}(\text{numérateur}) - \operatorname{Arg}(\text{dénominateur})$$
$$= \operatorname{Arctan}\left(\frac{L\omega}{R_1}\right) - \operatorname{Arctan}\left(\frac{L\omega(R_1+R_2)}{R_1R_2}\right)$$

$$G(\omega) = 20\log A(\omega) = 20\log\left(\sqrt{1+\left(\frac{L\omega}{R_1}\right)^2}\right) - 20\log\left(\sqrt{1+\left(\frac{L\omega(R_1+R_2)}{R_1R_2}\right)^2}\right)$$
$$= 10\log\left(1+\left(\frac{L\omega}{R_1}\right)^2\right) - 10\log\left(1+\left(\frac{L\omega(R_1+R_2)}{R_1R_2}\right)^2\right)$$

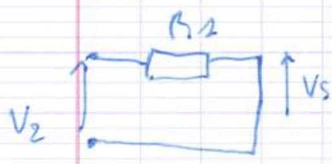
$$\lim_{\omega\to+\infty} G(\omega) = \lim_{\omega\to+\infty}\left[10\log\left(\frac{L\omega}{R_1}\right)^2 - 10\log\left(\frac{L\omega(R_1+R_2)}{R_1R_2}\right)^2\right]$$

$$= \lim_{\omega\to+\infty}\left(20\log\frac{\frac{L\omega}{R_1}}{L\omega\frac{(R_1+R_2)}{R_1R_2}}\right) = 20\log\left(\frac{R_2}{R_1+R_2}\right)$$

Electro
5/4

Exercice n°3 a) Passe-~~bande~~ : Passe-

BF : -HF



$\lim_{\omega \to 0} A = 0$

$\lim_{\omega \to +\infty} A = 0$

filtre passe bandes d'ordre 2.

$$\underline{Y} = \frac{1}{\underline{Z}} = \frac{1}{R_2} + jC\omega + \frac{1}{jL\omega} = \frac{1}{R_2} + j\left(C\omega - \frac{1}{L\omega}\right).$$

$$\underline{T}(\omega) = \frac{\underline{V_s}}{\underline{V_2}} = \frac{\underline{Z}}{R_1 + \underline{Z}} = \frac{\frac{1}{\underline{Y}}}{R_1 + \frac{1}{\underline{Y}}} = \frac{1}{1 + R_1 \underline{Y}}$$

$$\underline{T}(\omega) = \frac{1}{1 + \frac{R_1}{R_2} + jR_1\left(C\omega - \frac{1}{L\omega}\right)}$$

$$A(\omega) = |\underline{T}(\omega)| = \frac{1}{\sqrt{\left(1 + \frac{R_1}{R_2}\right)^2 + \left(jR_1\left(C\omega - \frac{1}{L\omega}\right)\right)^2}}$$

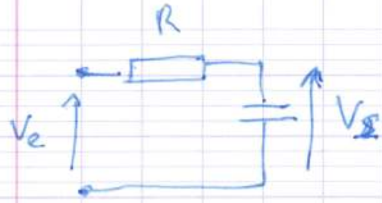
$$\varphi(\omega) = \mathrm{Arg}\left(\underline{T}(\omega)\right) = 0 - \mathrm{Arctan}\left[\frac{R_1\left(C\omega - \frac{1}{L\omega}\right)}{1 + \frac{R_1}{R_2}}\right].$$

$G(\omega) = 20 \log A(\omega)$.

$G_{MAX} = 20 \log A_{MAX}$.

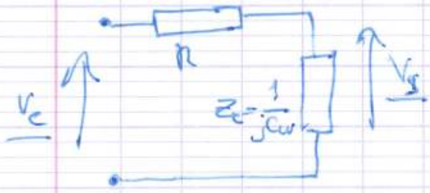
A_{MAX} quand $C\omega - \frac{1}{L\omega} = 0 \iff C\omega = \frac{1}{L\omega}$

$$\boxed{LC\omega^2 = 1.}$$



$$\underline{T}(\omega) = \frac{\underline{V_s}}{\underline{V_e}}$$

$$= \frac{1}{1+RC\omega}$$



$$A(\omega) = |\underline{T}(\omega)| = \frac{V_s}{V_e} = \frac{1}{\sqrt{1+(RC\omega)^2}}$$

$$\varphi(\omega) = \theta_{V_s} - \theta_{V_e} = -\text{Arctan}(RC\omega)$$

$$G(\omega) = 20\log(A(\omega)) =$$

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

$$\underline{V_s} = \frac{\frac{1}{jC\omega}}{\frac{1}{jC\omega}+R} \cdot \underline{V_e}$$

Coupe/Passe bande: Fréquences limites G_{MAX} ou G_{MIN}

Coupe Haut/Bas: Fréquence coupure.

$$A(\omega_c) = \frac{A_{max}}{\sqrt{2}} \Rightarrow \frac{1}{\sqrt{1+(RC\omega_c)^2}} = \frac{1}{\sqrt{2}} \Rightarrow \omega_c = \frac{1}{RC}$$

$$\underline{T}(\omega) = \frac{1}{1+jRC\omega} = A_{Max}\,\frac{1}{1+j\frac{\omega}{\omega_c}}$$ Forme normalisée filtre passe bas du 1er ordre

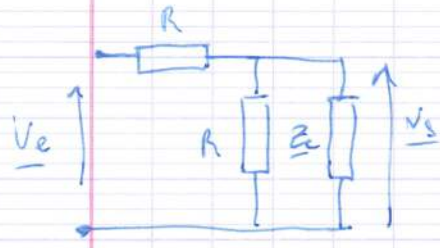
$$A_{Max} = 1 \qquad G_{MAX} = 0\,dB$$

Forme normalisée

$$A(\omega) = A_{MAX} \cdot \frac{1}{1+j\frac{\omega}{\omega_c}}$$

Passe bas 1er ordre: $\underline{T}(\omega) = \frac{1}{1+j\frac{\omega}{\omega_c}} \cdot A_{MAX}$.

By Hyperion



$\underline{Y} = \frac{1}{R} + jC\omega$

$\underline{T}(\omega) = \frac{\underline{V_s}}{\underline{V_e}} = \frac{1}{1+R.\underline{Y}} = \frac{1}{1+1+jRC\omega}$

$\underline{T}(\omega) = \frac{1}{2+jCR\omega}$

$\underline{T}(\omega) = \frac{\frac{1}{2}}{1+\frac{jCR\omega}{2}} = \frac{A_{MAX}}{1+j\frac{\omega}{\omega_c}}$

$A(\omega) = \frac{1}{\sqrt{4+(RC\omega^2)}}$ $\quad A_{MAX} = \frac{1}{2}$ $\quad A(\omega_c) = \frac{\frac{1}{2}}{\sqrt{2}}$

$G(\omega) = -10\log(4+(RC\omega)^2)$ $\quad \frac{1}{\sqrt{4+RC\omega)^2}} = \frac{1}{2\sqrt{2}} = \frac{1}{\sqrt{8}}$

$\varphi(\omega) = -\mathrm{Arctan}\left(\frac{RC\omega}{2}\right)$.

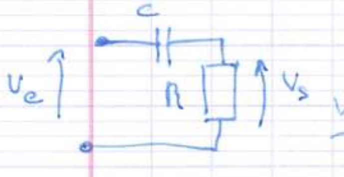
$\omega_c = \frac{2}{Rc}$

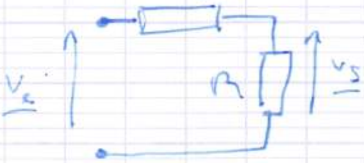
$\underline{T}(\omega) = \frac{5R}{6R+jL\omega} = \frac{\frac{5}{6}}{1+j\frac{L\omega}{6R}}$ $\quad A_{MAX} = \frac{5}{6}$

$\omega_c = \frac{6R}{L}$.

Passe haut du 1er ordre : $\underline{T}(\omega) = A_{MAX} \cdot \frac{j\frac{\omega}{\omega_c}}{1+j\frac{\omega}{\omega_c}}$

$\underline{Z_c} = \frac{1}{jc\omega}$





$V_s = \frac{R}{R+\frac{1}{jc\omega}} \cdot V_e$

$\underline{T}(\omega) = \frac{R}{R+j\frac{1}{c\omega}} = \frac{1}{1+j\left(\frac{1}{cR\omega}\right)} =$ $\quad A_{MAX} = 1$

$\frac{\underline{V_s}}{\underline{V_e}}$ $\quad \omega_c = \frac{1}{CR}$.

$\frac{3jR\omega}{1+4jR\omega} = \frac{j3\frac{\omega}{4\omega_c}}{1+j\frac{\omega}{\omega_c}}$

$\omega_c = \frac{1}{4RC} = \frac{3}{4} \times \frac{j\frac{\omega}{\omega_c}}{1+j\frac{\omega}{\omega_c}}$

By Hyperion

Correction QCM :

$$\frac{1}{C\omega} = \frac{V}{I} = \frac{\frac{20}{\sqrt{2}}}{\frac{5.10^{-3}}{\sqrt{2}}} = 4\times10^3 = 0,25\mu F.$$

4) VRAI   5) FAUX.

Passe bas du 1er ordre : $T(\omega) = A_{max} \cdot \frac{1}{1+j\frac{\omega}{\omega_c}}$

$$A(\omega) = A_{max} \cdot \frac{1}{\sqrt{1+\left(\frac{\omega}{\omega_c}\right)^2}}$$

$$G(\omega) = 20\log\frac{A_{max}}{\sqrt{1+\left(\frac{\omega}{\omega_c}\right)^2}} = 20\log(A_{max}) - 10\log\left(1+\left(\frac{\omega}{\omega_c}\right)^2\right).$$

$$\varphi(\omega) = -\mathrm{Arctan}\left(\frac{\omega}{\omega_c}\right).$$

En BF : $G(\omega) = 20\log\frac{A_{max}}{\sqrt{1+\left(\frac{\omega}{\omega_c}\right)^2}}$
$(\omega < \omega_c)$

~~devient~~ petit devant 1

$\Rightarrow$ Asymptote horizontal : $20\log(A_{max}) = G_{MAX}$.

En HF : $G(\omega) = 20\log\frac{A_{max}}{\sqrt{1+\left(\frac{\omega}{\omega_c}\right)^2}}$ $1+\left(\frac{\omega}{\omega_c}\right)^2 \simeq \left(\frac{\omega}{\omega_c}\right)^2$
$(\omega > \omega_c)$

$\Rightarrow$ Asymptote : $20\log\left(A_{max}\cdot\frac{\omega_c}{\omega}\right)$.

$20\log(A_{max}) + 20\log\left(\frac{\omega_c}{\omega}\right) = 20\log(A_{max}) - 20\log\left(\frac{\omega}{\omega_c}\right)$.

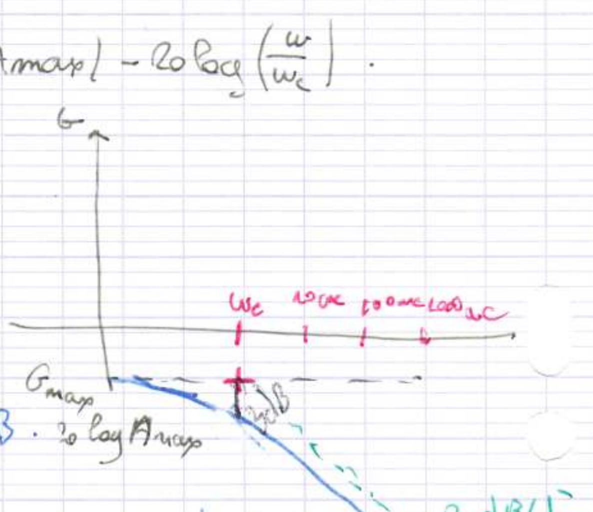
$\omega = 10\,\omega_c$: $G \simeq G_{max} - 20dB$

$\omega = 100\,\omega_c$: $G \simeq G_{max} - 40dB$

$\omega = 1000\,\omega_c$: $G \simeq G_{max} - 60dB$

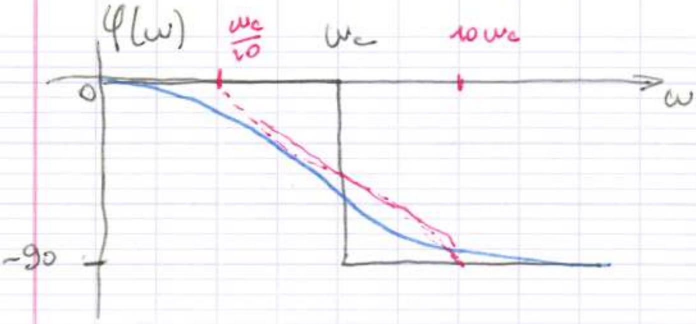
$\omega = 10\,000\,\omega_c$: $G \simeq G_{max} - 80\,dB$

$\omega = 10^n\omega_c$: $G \simeq G_{max} - n\times20\,dB$. $20\log A_{max}$



By Hyperion

11/04
Electro



$$\lim_{\omega \to \infty} 20 \log \frac{A_{max}}{\sqrt{1+\left(\frac{\omega}{\omega_c}\right)^2}} = 20 \log \frac{A_{max}}{\sqrt{\left(\frac{\omega}{\omega_c}\right)^2}} = 20 \log \frac{A_{max}}{\frac{\omega}{\omega_c}}$$

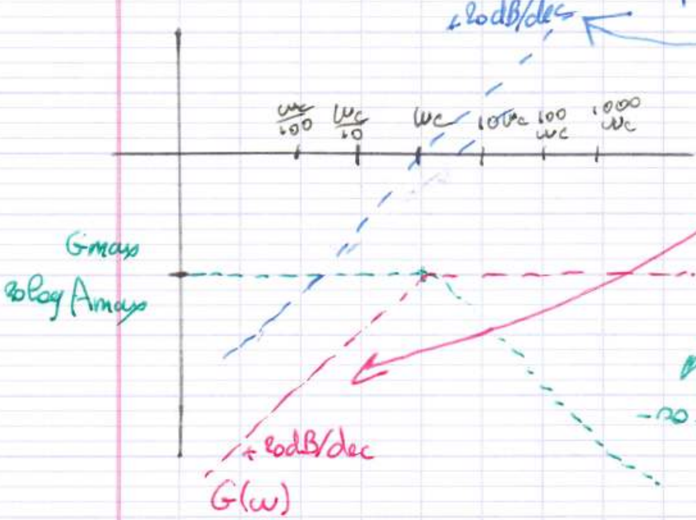
Passe Haut du 1er ordre : $\underline{T}(\omega) = A_{max} \cdot \dfrac{j\frac{\omega}{\omega_c}}{1+j\frac{\omega}{\omega_c}}$

$$A(\omega) = A_{max} \frac{\frac{\omega}{\omega_c}}{\sqrt{1+\left(\frac{\omega}{\omega_c}\right)^2}}$$

$$G(\omega) = 20 \log A_{max} \frac{\frac{\omega}{\omega_c}}{\sqrt{1+\left(\frac{\omega}{\omega_c}\right)^2}}$$

$\varphi(\omega)_{(rad)} = \frac{\pi}{2} - \text{Arctan}\left(\frac{\omega}{\omega_c}\right)$.

$\varphi(\omega)_{(°)} = 90 - \text{Arctan}\left(\frac{\omega}{\omega_c}\right)$



$$\boxed{G} = \underbrace{\boxed{20 \log \frac{A_{max}}{\sqrt{1+\left(\frac{\omega}{\omega_c}\right)^2}}}}_{G_{PB}} + \boxed{20 \log \left(\frac{\omega}{\omega_c}\right)}.$$

$D_H(\omega) = 20 \log\left(\frac{\omega}{\omega_c}\right)$:

$\omega = \omega_c \Rightarrow D_H(\omega_c) = 0\,dB$.

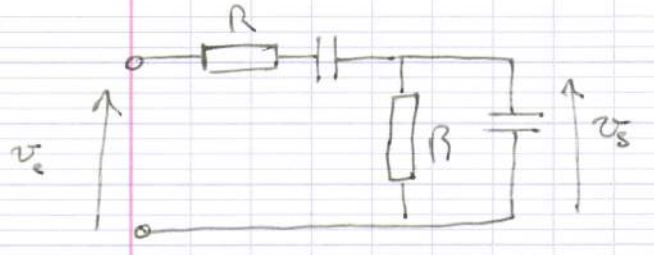
$\omega = 10\omega_c \Rightarrow D_H(\omega) = 20\,dB$

$\omega = 100\omega_c \Rightarrow D_H(\omega) = 40\,dB$

$\omega = \frac{\omega_c}{10} \Rightarrow D_H(\omega) = -20\,dB$.

courbe verte + courbe bleu = courbe rouge.

By Hyperion



$$\underline{T}(\omega) = \frac{1}{1+\left(R+\frac{1}{jC\omega}\right)\underline{Y}}$$

$$\underline{Y} = \frac{1}{R} + jC\omega.$$

$$\underline{T}(\omega) = \frac{1}{1+\left(R+\frac{1}{jC\omega}\right)\left(\frac{1}{R}+jC\omega\right)} = \frac{1}{1+1+jRC\omega+\frac{1}{jRC\omega}+1}.$$

$$\underline{T}(\omega) = \frac{1}{3+jRC\omega+\frac{1}{jRC\omega}} = \frac{jRC\omega}{1+3RC\omega j-(RC\omega)^2}.$$

Filtre du 2e ordre:

$$\underline{T}(\omega) = \frac{Num(\omega)}{1+j\xi\cdot\frac{\omega}{\omega_c}-\left(\frac{\omega}{\omega_c}\right)^2}$$

Passe bas

$$\underline{T}(\omega) = \frac{A_0}{1+2j\xi\frac{\omega}{\omega_c}+\left(\frac{\omega}{\omega_c}\right)^2}$$

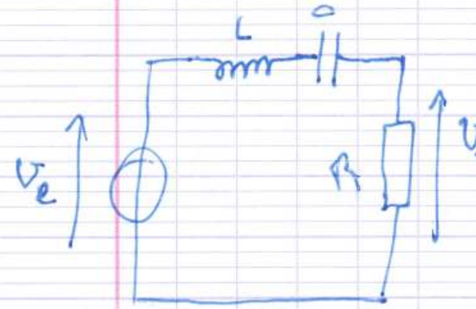
Passe bande

$$\underline{T}(\omega) = \frac{A_0\cdot j\left(\frac{\omega}{\omega_c}\right)}{1+2j\xi\frac{\omega}{\omega_c}-\left(\frac{\omega}{\omega_c}\right)^2}$$

Passe haut

$$\underline{T}(\omega) = \frac{A_0\left(-\left(\frac{\omega}{\omega_c}\right)^2\right)}{1+2j\xi\left(\frac{\omega}{\omega_c}\right)-\left(\frac{\omega}{\omega_c}\right)^2}$$

$$\underline{T}(\omega) = \frac{jL\omega}{R+jL\omega} = \frac{j\frac{L\omega}{R}}{1+j\frac{L\omega}{R}}$$



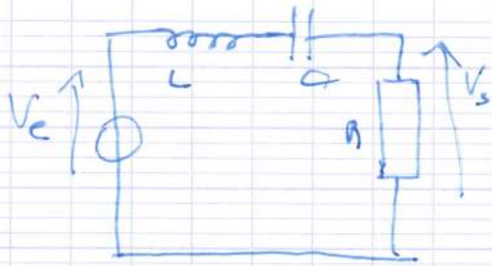
BF:

$\lim_{\to 0} = v_e$

$\lim_{\to \infty} = v_e$

Electro
18/04

① $T(\omega) = A_0 \dfrac{Num(\omega)}{1 + 2j\frac{\omega}{\omega_0} - \left(\frac{\omega}{\omega_0}\right)^2}$



$Num(\omega) = 1 \Rightarrow$ Filtre ~~bas~~ passe bas

$Num(\omega) = 2j\mathfrak{z}\frac{\omega}{\omega_0} \Rightarrow$ Filtre passe bande

$Num(\omega) = -\left(\frac{\omega}{\omega_0}\right)^2 \Rightarrow$ Filtre passe haut.

$\underline{T}(\omega) = \dfrac{jR\omega}{1 + jRC\omega - L\omega^2}$

Filtre passe bande :

$Num(\omega) = jRC\omega = 2j\mathfrak{z}\frac{\omega}{\omega_0}$

et $\left(\frac{\omega}{\omega_0}\right)^2 = LC\omega^2$

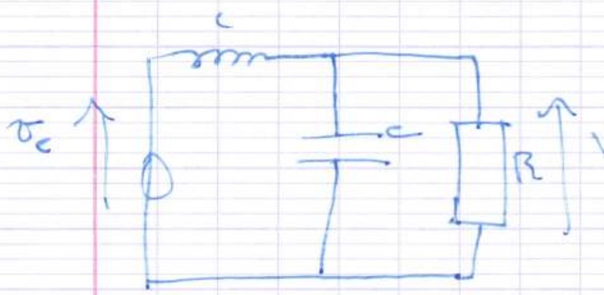
et $2j\mathfrak{z}\frac{\omega}{\omega_0} = jRC\omega$.

$\omega_0 = \dfrac{1}{\sqrt{LC}}$

$A_0 = 1$

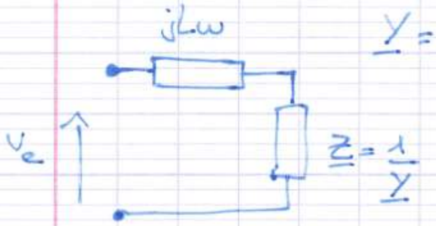
$\mathfrak{z} = \dfrac{R}{2}\sqrt{\dfrac{C}{L}} \Leftarrow \dfrac{RC}{2\sqrt{LC}}$

②



$\underline{T}(\omega) = A_0 \dfrac{Num(\omega)}{1 + 2j\frac{\omega}{\omega_0} - \left(\frac{\omega}{\omega_0}\right)^2}$

$\underline{T}(\omega) =$



$\underline{Z} = \dfrac{1}{\underline{Y}}$

$\underline{Y} = \frac{1}{R} + jC\omega$

$\underline{Z} = \dfrac{R \times \frac{1}{jC\omega}}{R + \frac{1}{jC\omega}} = \dfrac{R}{1 + jRC\omega}$.

$\underline{V_s} = \dfrac{\underline{Z}}{\underline{Z} + jL\omega}\underline{V_e}$

$\underline{T}(\omega) = \dfrac{\underline{V_s}}{\underline{V_e}} = \dfrac{\underline{Z}}{\underline{Z} + jL\omega} = \dfrac{1}{1 + \frac{jL\omega}{\underline{Z}}} = \dfrac{1}{1 + jL\omega \times \underline{Y}}$

$\underline{T}(\omega) = \dfrac{1}{1 + jL\omega\left(\frac{1}{R} + jC\omega\right)} = \dfrac{1}{1 + j\frac{L\omega}{R} - LC\omega^2} = \dfrac{A_0}{1 + 2j\mathfrak{z}\frac{\omega}{\omega_0} - \left(\frac{\omega}{\omega_0}\right)^2}$

$A_0 = 1$

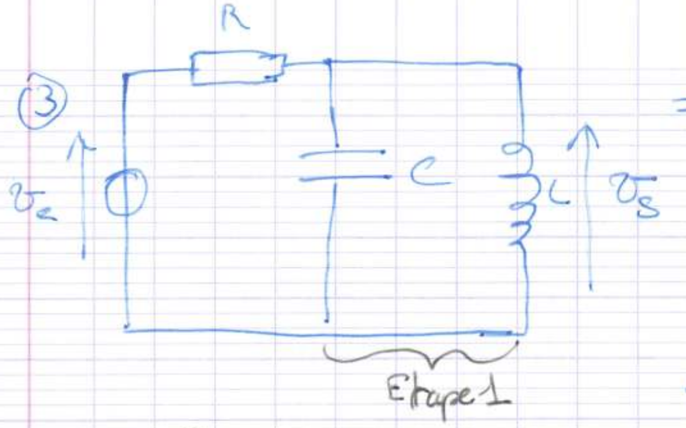
$\omega_0 = \dfrac{1}{\sqrt{LC}}$

$\mathfrak{z} = \dfrac{1}{2R} \times \sqrt{\dfrac{L}{C}}$

$\begin{cases} A_0 = 1 \\ \frac{L\omega}{R} = 2\mathfrak{z}\left(\frac{\omega}{\omega_0}\right) \\ LC\omega^2 = \left(\frac{\omega}{\omega_0}\right)^2 \end{cases}$

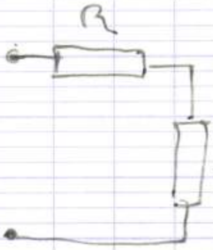
By Hyperion

3



$\Rightarrow$ Passe bande d'ordre 2 :

$$\underline{T}(\omega) = \frac{2j\xi\frac{\omega}{\omega_0}}{1+2j\xi\frac{\omega}{\omega_0}-\left(\frac{\omega}{\omega_0}\right)^2}$$



$$\underline{Y} = \frac{1}{jL\omega} + jC\omega .$$

$$\underline{T}(\omega) = \frac{1}{1+R\left(\frac{1}{jL\omega}+jC\omega\right)} =$$

$$\underline{T}(\omega) = \frac{1}{1+\frac{R}{jL\omega}+jRC\omega}$$

$$= \frac{jL\omega}{jL\omega + R + j^2 LRC\omega^2}$$

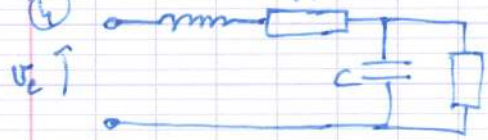
$$\underline{T}(\omega) = \frac{jLc\omega}{R + jL\omega - LRC\omega^2}$$

$$\underline{T}(\omega) = \frac{\frac{jL\omega}{R}}{1+\frac{jL\omega}{R} - L\omega^2}$$

$$\underline{T}(\omega) = \frac{A_0\, 2j\xi\frac{\omega}{\omega_0}}{1+2j\xi\frac{\omega}{\omega_0}-\left(\frac{\omega}{\omega_0}\right)^2}$$

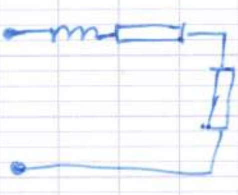
$$\begin{cases} LC = \frac{1}{\omega_0^2} \\ \frac{2\xi}{\omega_0} = \frac{L}{R} \\ A_0 \cdot 2j\xi\frac{\omega}{\omega_0} = j\frac{L\omega}{R} \end{cases} \qquad \begin{cases} \omega_0 = \frac{1}{\sqrt{LC}} \\ \xi = \frac{L\omega_0}{2R} = \frac{1}{2R}\sqrt{\frac{L}{C}} \\ A_0 = \frac{L}{R}\times\frac{\omega_0}{2\xi} = \frac{L}{R}\times\frac{1}{2RLC} = 2R\sqrt{\frac{C}{\sqrt{L}}} \\ A_0 = 1 \end{cases}$$

4



$\lim_{\to 0} = 2R$ passe Bas.

$\lim_{\to +\infty} = 0$

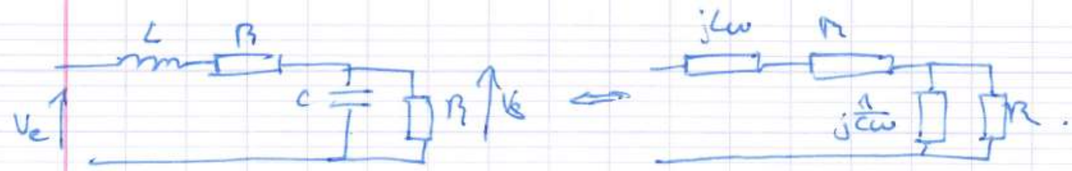


$$\underline{Z} = \frac{1}{\underline{Y}}$$

$$\underline{Y} = \frac{1}{R} + jC\omega \qquad \underline{Z} = \frac{R\times\frac{1}{jC\omega}}{R+\frac{1}{jC\omega}} = \frac{R}{1+RjC\omega}$$

By Hyperion

Electro
18/04



$$\underline{T}(\omega) = \frac{1}{1+(jL\omega+R)\times(jC\omega+\frac{1}{R})} = \frac{1}{1-LC\omega^2+\frac{jL\omega}{R}+RjC\omega+1}$$

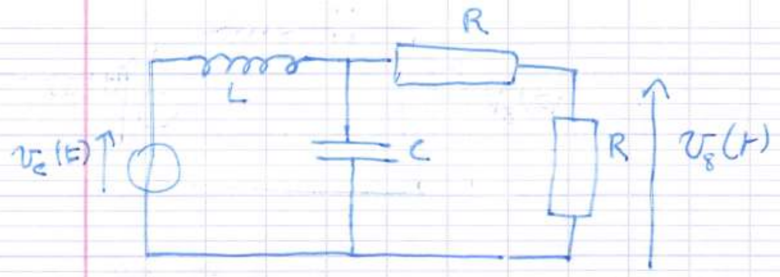
$j\times j=-1$

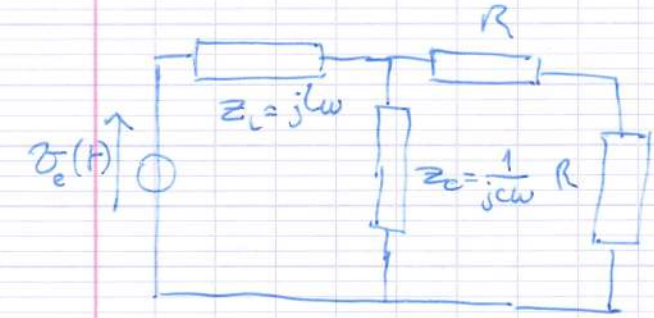
$$= \frac{1/2}{1+\frac{jL\omega+R^2jC\omega}{2R}-\frac{LC\omega^2}{2}}$$

$$\begin{cases} A_0 = \frac{1}{2} \\ \frac{LC\omega^2}{2} = \frac{\omega^2}{\omega_0} \\ \frac{jL\omega+RjC\omega}{2R} = \end{cases}$$

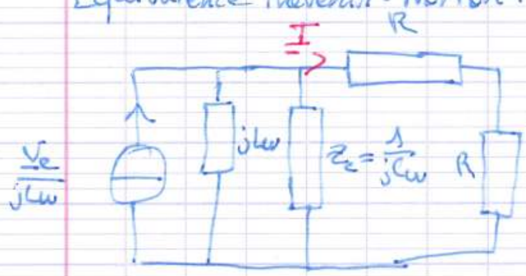
Prof à la [redacted]

Electro
16/05





Equivalence Thevenin - Norton :



$\underline{V_s} = R.\underline{I}$

$$\underline{I} = \frac{\frac{1}{2R}}{\frac{1}{2R} + jC\omega + \frac{1}{jL\omega}} \times \frac{\underline{V_e}}{jL\omega}$$

$$\underline{V_s} = R \times \frac{\frac{1}{2R}}{\frac{1}{2R} + jC\omega + \frac{1}{jC\omega}} \times \frac{\underline{V_e}}{jL\omega}$$

$$\underline{V_s} = \frac{\frac{1}{2}}{\frac{1}{2R} + jC\omega + \frac{1}{jL\omega}} \times \frac{\underline{V_e}}{jL\omega}$$

$$\frac{\underline{V_s}}{\underline{V_e}} = \frac{\frac{1}{2}}{\frac{jL\omega}{2R} - LC\omega^2 + 1}$$

$$\underline{T}(\omega) = \frac{\underline{V_s}}{\underline{V_e}} = \frac{\frac{1}{2}}{\frac{jL\omega}{2R} - LC\omega^2 + 1}$$

$$= \frac{1}{2} \times \frac{1}{1 + \frac{jL\omega}{2R} - CL\omega^2}$$

Filtre passe-bas :

$$= A_0 \times \frac{1}{1 + 2j\sigma\frac{\omega}{\omega_0} - \left(\frac{\omega}{\omega_0}\right)^2}$$

$$\begin{cases} CL\omega^2 = \left(\frac{\omega}{\omega_0}\right)^2 \\ \frac{L\omega}{2R} = 2\sigma\frac{\omega}{\omega_0} \\ A_0 = \frac{1}{2} \end{cases} \iff \begin{cases} CL = \frac{1}{\omega_0^2} \\ L\omega_0 = 4R\sigma \\ A_0 = \frac{1}{2} \end{cases}$$

$$\iff \begin{cases} \omega_0 = \frac{1}{\sqrt{LC}} \\ \sigma = \frac{L}{4R\sqrt{LC}} = \frac{1}{4R}\sqrt{\frac{L}{C}} \\ A_0 = \frac{1}{2} \end{cases}$$

→ Circuit linéaire en régime sinusoïdale
→ 1er et 2e ordre
Diagramme de Bode du premier ordre

By Hyperion