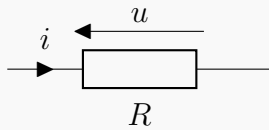
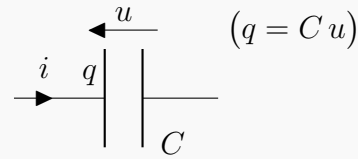


Lois constitutives des composants

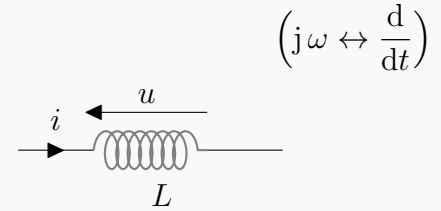
$$u = R i \Leftrightarrow \underline{Z} = R$$

Résistance



$$i = C \frac{du}{dt} \Leftrightarrow \underline{Z} = \frac{1}{j C \omega}$$

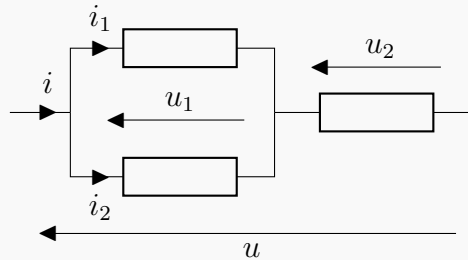
Condensateur



$$u = L \frac{di}{dt} \Leftrightarrow \underline{Z} = j L \omega$$

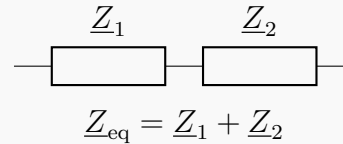
Bobine

$$(j\omega \leftrightarrow \frac{d}{dt})$$

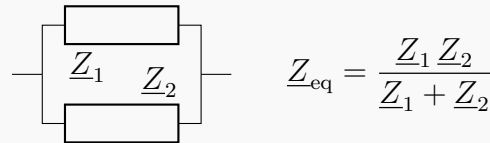
Formules élémentaires

$$i = i_1 + i_2 \quad \text{et} \quad u = u_1 + u_2$$

Lois des noeuds et des mailles

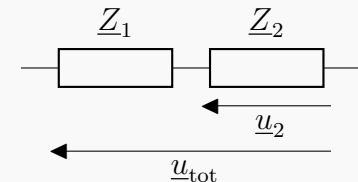


$$\underline{Z}_{eq} = \underline{Z}_1 + \underline{Z}_2$$



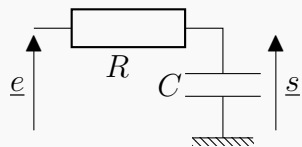
$$\underline{Z}_{eq} = \frac{\underline{Z}_1 \underline{Z}_2}{\underline{Z}_1 + \underline{Z}_2}$$

Lois d'associations d'impédances



$$u_2 = \frac{\underline{Z}_2}{\underline{Z}_1 + \underline{Z}_2} u_{tot}$$

Pont diviseur de tension

Filtres (exemple du passe-bas du premier ordre)

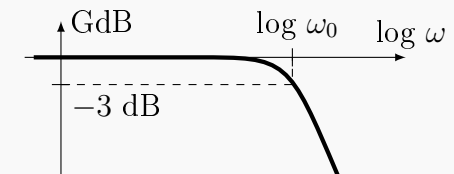
$$\underline{H} \equiv \frac{s}{e} = \frac{1}{1 + j R C \omega}$$

$$\omega_0 = \frac{1}{R C}$$

$$\text{GdB} \equiv 20 \log |\underline{H}| = -10 \log \left(1 + \frac{\omega^2}{\omega_0^2} \right); \quad \varphi \equiv \arg \underline{H} = -\arctan (\omega / \omega_0)$$

$$\text{GdB} \xrightarrow{\omega \rightarrow 0} 0; \quad \text{GdB} \underset{\omega \rightarrow \infty}{\sim} -20 \log \omega$$

$$\varphi \xrightarrow{\omega \rightarrow 0} 0; \quad \varphi \xrightarrow{\omega \rightarrow \infty} -\pi / 2$$

Aspects énergétiques

$$\mathcal{P} = u i$$

exemple du condensateur : $\mathcal{P} = C u \frac{du}{dt} = \frac{d}{dt} \left(\frac{1}{2} C u^2 \right)$ on identifie $\mathcal{E} = \frac{1}{2} C u^2$.