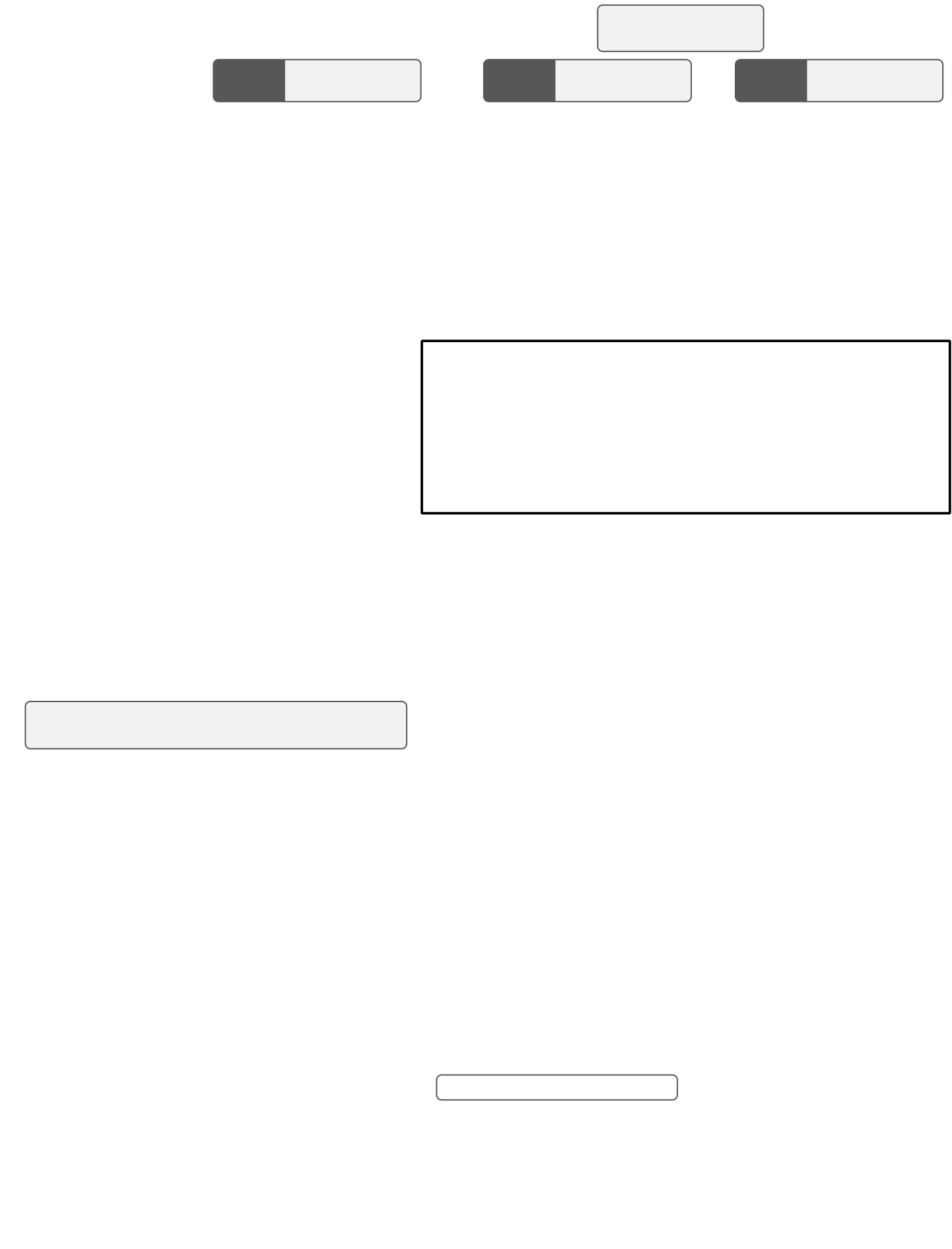
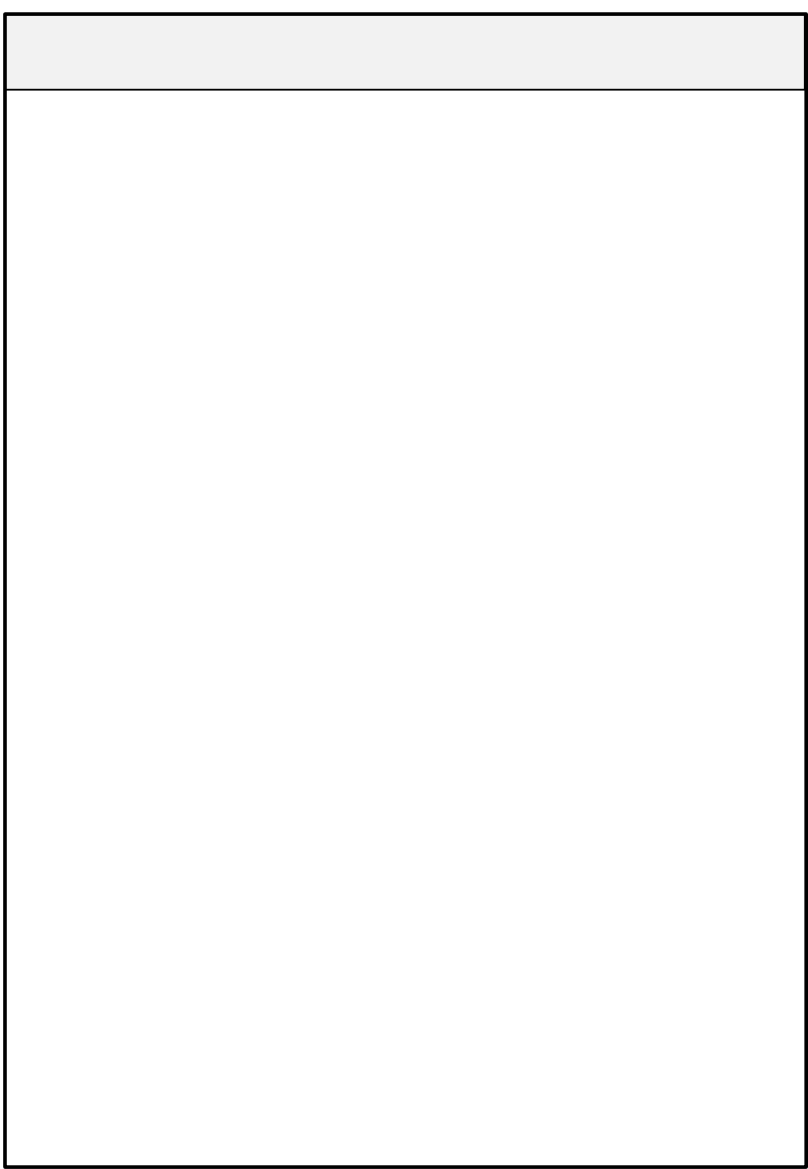
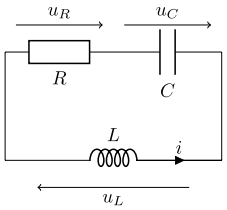






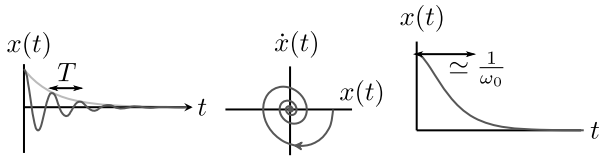
$$\frac{\mathrm{d}^2 i}{\mathrm{d}\, t^2} + \underbrace{\frac{R}{L}}_{\omega_0/Q} + \underbrace{\frac{1}{LC}}_{\omega_0^2} = 0$$

$$\ddot{x} + \frac{\omega_0}{Q}\dot{x} + \omega_0^2 x = 0$$

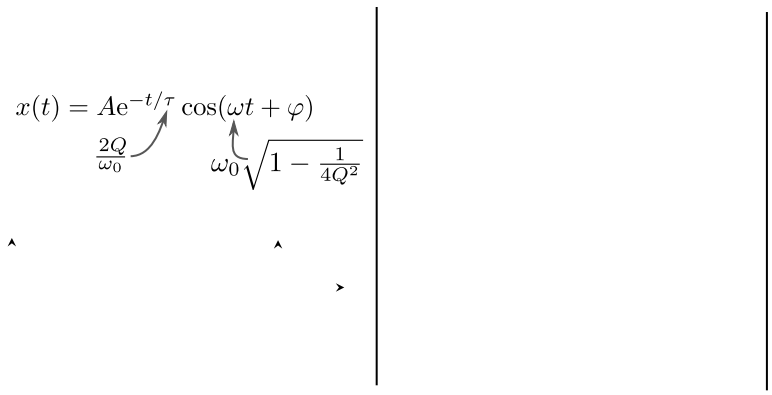
$$x(t) = (A + Bt)\mathrm{e}^{-\omega_0 t}$$

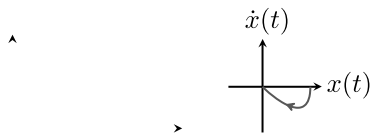
$$x(t) = A\mathrm{e}^{r_1 t} + B\mathrm{e}^{r_2 t}$$

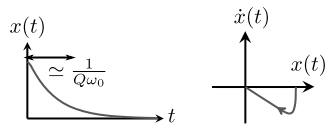
$$r_{1,2} = \tfrac{\omega_0}{2Q}\left(\pm\sqrt{1-4Q^2} - 1\right)$$

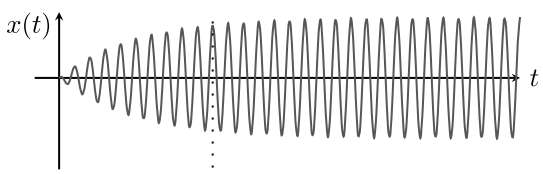


$Q < \frac{1}{2}$


$x(t) = A\mathrm{e}^{-t/\tau}\cos(\omega t + \varphi)$
$\frac{2Q}{\omega_0}$
$\omega_0\sqrt{1-\frac{1}{4Q^2}}$


$\dot{x}(t)$
$x(t)$


$x(t)$
$\simeq \frac{1}{Q\omega_0}$
t
$\dot{x}(t)$
$x(t)$

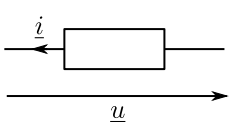

$x(t)$
t

$$x(t) = X\cos(\omega t + \varphi)$$

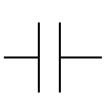
$$\longrightarrow \quad \underline{x}(t) = Xe^{j(\omega t+\varphi)}$$

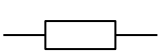
$\dot{\underline{x}} = j\omega\underline{x}$ $\qquad$ $x = Re(\underline{x})$

$\ddot{\underline{x}} = -\omega^2\underline{x}$ $\qquad$ $X = |\underline{x}|$ $\qquad$ $\omega t + \varphi = \arg(\underline{x})$



$$\underline{Z} = \frac{\underline{u}}{\underline{i}}$$





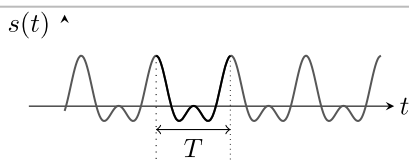
C

$$\underline{Z}_C = \frac{1}{jC\omega}$$

$$\underline{Z}_L = jL\omega$$

R $\underline{Z}_R = R$


L

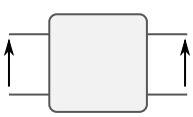

$s(t)$
t
T

T : période
$f = \frac{1}{T}$: fréquence
$\omega = 2\pi f$: pulsation

$$s(t) = c_0 + \sum_{i=1}^{n} c_n \cos(n\omega t + \varphi_n)$$

$$\underbrace{\langle s(t)\rangle = \frac{1}{T}\int_0^T s(t)\,dt}$$

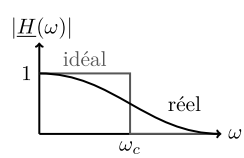
$$\langle s(t) \rangle = \sqrt{\frac{1}{T} \int_0^T s^2(t)\, dt}$$

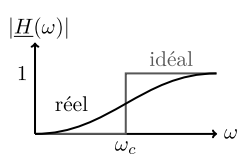


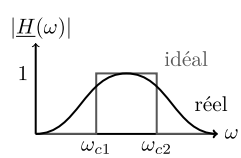
$\underline{e}(\omega)$ $\underline{H}(\omega)$ $\underline{s}(\omega)$ $\underline{H}(\omega) = \dfrac{\underline{s}(\omega)}{\underline{e}(\omega)}$

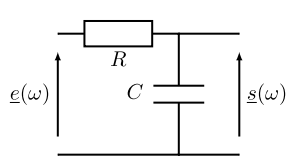
Gain : $G = |\underline{H}(\omega)|$

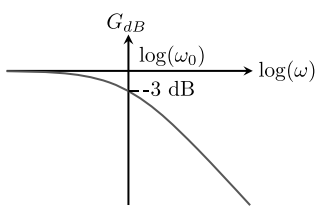
Déphasage : $\varphi = \arg(\underline{H}(\omega))$ Gain en décibels : $G_{dB} = 20\log(G)$











$$\underline{H}(\omega) = \frac{1}{1 + jRC\omega} = \frac{1}{1 + j\frac{\omega}{\omega_0}}.$$

$\frac{\mathrm{d}\,i}{\mathrm{d}\,t}$ i