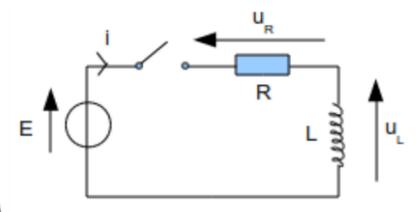
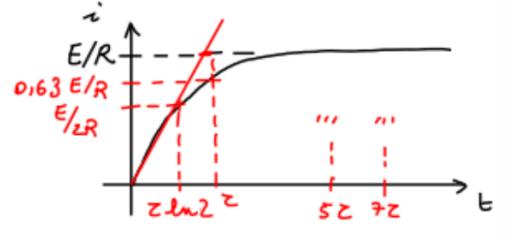


Échelons montants de tension

Constante de temps du circuit RL
 $\tau = \frac{L}{R}$
 cf. carte mentale sur les équations différentielles
 $i = \frac{E}{R} (1 - e^{-t/\tau})$

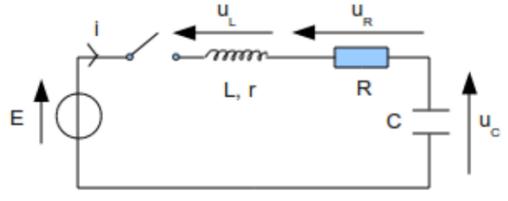


$$\frac{di}{dt} + \frac{1}{\tau} i = \frac{E}{L}$$



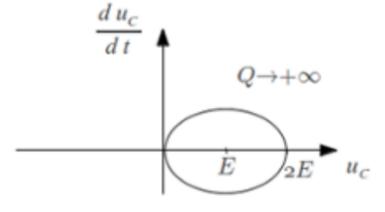
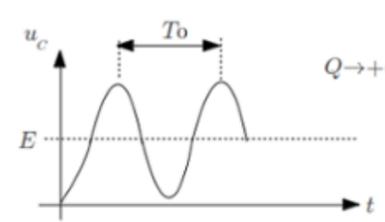
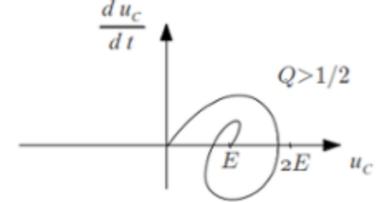
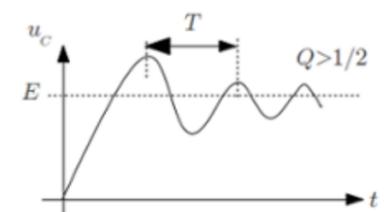
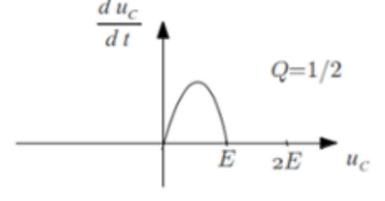
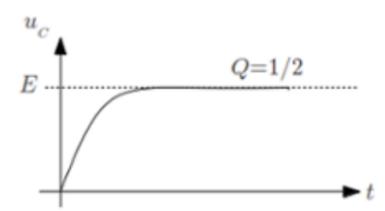
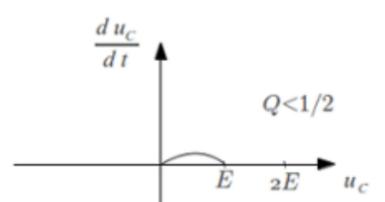
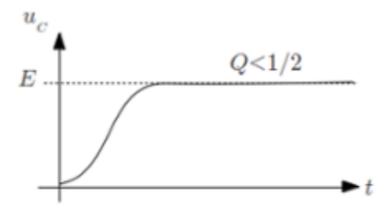
Circuit RL série

Pulsation propre et facteur de qualité
 $\omega_0 = \frac{1}{\sqrt{LC}}$
 $Q = \frac{1}{R} \sqrt{\frac{L}{C}}$



$$\frac{d^2 u_C}{dt^2} + \frac{\omega_0}{Q} \frac{du_C}{dt} + \omega_0^2 u_C = \frac{E}{LC}$$

cf. carte mentale sur les équations différentielles



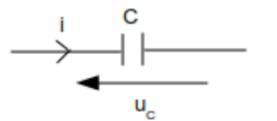
3 cas

Circuit RLC série

$$T = \frac{2\pi}{\Omega} \approx T_0$$

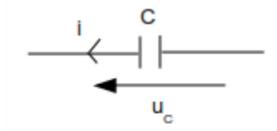
Condensateur
 $q(C) = C(F) \times u_C(V)$

Convention récepteur



$$i = C \frac{du_C}{dt}$$

Convention générateur



$$i = -C \frac{du_C}{dt}$$

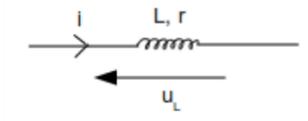
Énergie emmagasinée

$$W_C(J) = \frac{1}{2} C u_C^2$$

Conditions aux limites

À $t = 0$, $u(0^-) = u(0^+)$
 Lorsque t est infini, le condensateur se comporte comme un interrupteur ouvert

Bobine



$$u_L = r i + L \frac{di}{dt}$$

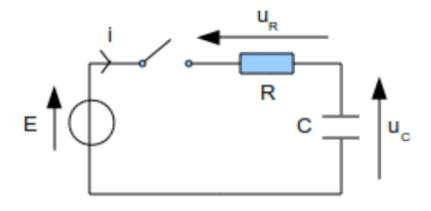
Énergie emmagasinée

$$W_L = \frac{1}{2} L i^2$$

Conditions aux limites

À $t = 0$, $i(0^-) = i(0^+)$
 Lorsque t est infini, la bobine se comporte comme un résistor de résistance r , ou comme un fil si $r=0$

Circuit RC série

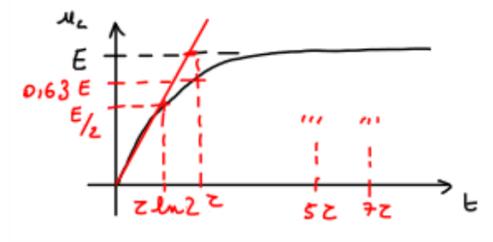


Constante de temps du circuit RC
 $\tau(s) = RC$

cf. carte mentale sur les équations différentielles

$$u_C = E (1 - e^{-t/\tau})$$

$$\frac{du_C}{dt} + \frac{1}{\tau} u_C = \frac{E}{RC}$$



Portrait de phase

$$\frac{du_C}{dt} = f(u_C)$$