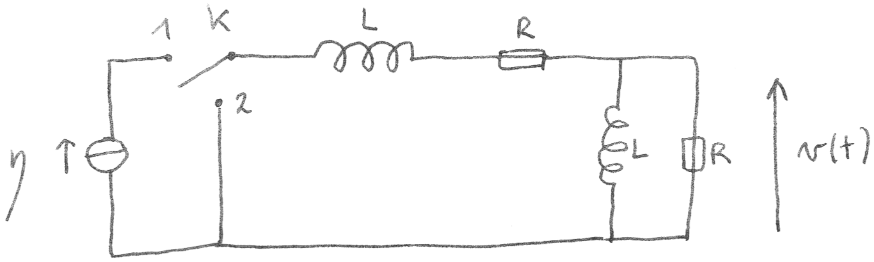


$t<0$: K en 1

$t>0$: K en 2

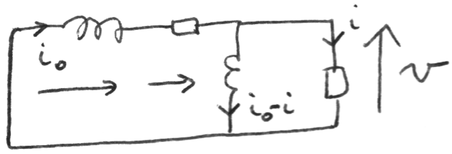
on pose $\tau = L/R$

1) Equa. diff. vérifiée par $v(t)$ pour $t>0$.

2) Expression de $v(t)$

Résolution

1)



$v = Ri = L\dfrac{d(i_0-i)}{dt}$

(*) $v = -L\dfrac{di_0}{dt} - Ri_0$

$Ri = L\dfrac{di_0}{dt} - L\dfrac{di}{dt} \Rightarrow \dfrac{di_0}{dt} = \dfrac{di}{dt} + \dfrac{R}{L}i$

(*) $\Rightarrow \dfrac{dv}{dt} = -L\dfrac{d^2i_0}{dt^2} - R\dfrac{di_0}{dt} = -L\dfrac{d^2i}{dt^2} - R\dfrac{di}{dt} - R\dfrac{di}{dt} - \dfrac{R^2}{L}i$

or $i = \dfrac{v}{R} \Rightarrow$ $\boxed{\dfrac{d^2v}{dt^2} + \dfrac{3}{\tau}\dfrac{dv}{dt} + \dfrac{1}{\tau^2}v = 0 \quad \text{avec } \tau = L/R}$

2) i_0 et $i_1 = i_0 - i$ f$^{\text{ons}}$ continues $\Rightarrow$ i cont $\Rightarrow$ v cont

éq. car : $d^2 + \dfrac{3}{\tau}d + \dfrac{1}{\tau^2} = 0$, $v = \alpha e^{dt}$

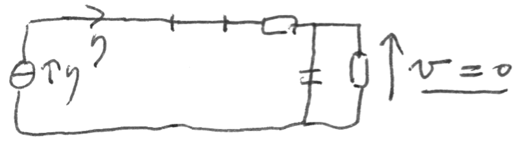
$\underline{d_{1,2} =} \dfrac{-3/\tau \pm \sqrt{5}/\tau}{2} = \underline{\dfrac{-3 \pm \sqrt{5}}{2\tau}}$

$\Delta = \dfrac{9}{\tau^2} - \dfrac{4}{\tau^2}$, $\Delta = \dfrac{5}{\tau^2} > 0$

régime pseudo périodique

$\underline{v = \alpha_1 e^{d_1 t} + \alpha_2 e^{d_2 t}}$ (α_1, α_2)?

$\underline{t<0}$:



$v(0^+) = v(0^-) \Rightarrow$ $\boxed{\alpha_1 + \alpha_2 = 0}$

$\dfrac{d(i_0-i)}{dt} = \dfrac{v}{L} \Rightarrow (i_0-i)(t) = \dfrac{1}{L}\left(\alpha_1\dfrac{e^{d_1 t}}{d_1} + \alpha_2\dfrac{e^{d_2 t}}{d_2}\right) + \beta$

d_1 et $d_2 < 0 \Rightarrow (i_0 - i)(+\infty) = \boxed{\beta = 0}$

$(i_0-i)(0^-) = (i_0-i)(0^+) = \boxed{\eta = \dfrac{1}{L}\left(\dfrac{\alpha_1}{d_1} + \dfrac{\alpha_2}{d_2}\right)} \rightarrow \alpha_1, \alpha_2$