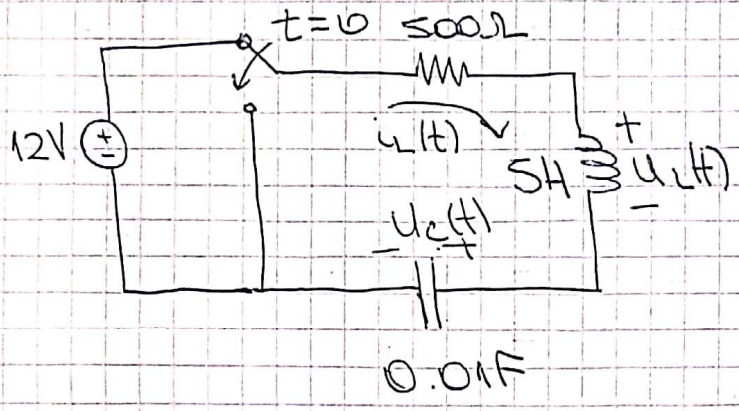
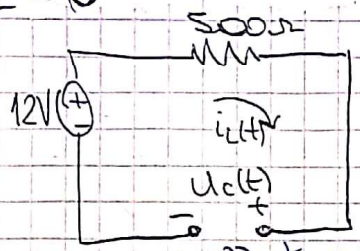
① $i_L(t)$? $u_C(t)$? Graficar



- $t<0$



$i_L(t<0)$ cte $\Rightarrow u_L(t)=0$

$i_L(t<0)=0$

$u_C(t<0)=12V$

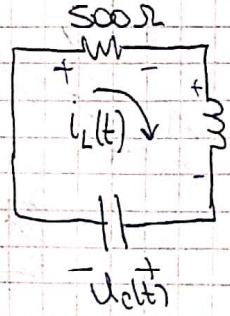
$u_C(t<0)$ cte $\Rightarrow i_C(t)=0$

- $t=0$: como $i_L(t)$ es continua $\Rightarrow i_L(0)=0$

  idem $u_C(0)=0$

- $t>0$:

$$\overbrace{L\frac{di_L(t)}{dt}}^{u_L} + u_C(t) + R i_L(t) = 0 \iff$$



$i_C = i_L = C\frac{du_C}{dt}$

$$LC\frac{d^2u_C}{dt^2} + u_C(t) + RC\frac{du_C}{dt}(t) = 0 \iff$$

$$\frac{d^2u_C}{dt} + \frac{R}{L}\frac{du_C}{dt} + \frac{1}{LC}u_C = 0$$

$s_1 = 0.2$ $\quad$ $s_2 = 99.8$

$$\Rightarrow u_C(t) = Ae^{s_1 t} + Be^{s_2 t}$$

$\alpha = \frac{R}{2L} = 50$

$\omega_0 = \sqrt{\frac{1}{LC}} = 447$

$\xi = \frac{\alpha}{\omega_0} = \frac{R}{2L}\sqrt{LC} = \frac{R\sqrt{C}}{\sqrt{L}} = 22\ldots \Rightarrow$ sobreamort.

$$u_c(0^+) = u_c(0^-) \Leftrightarrow A + B = 12\,V$$

$$i_L(t) = i_c(t) = C\frac{du_c}{dt} = C \cdot (-AS_1 e^{-S_1 t} - BS_2 e^{-S_2 t})$$

$$i_L(0^+) = i_L(0^-) \Rightarrow C \cdot (-AS_1 - BS_2) = 0 \Rightarrow AS_1 + BS_2 = 0$$

$$\Rightarrow A = 12.024\,V, \quad B = -0.024\,V$$

$$\Rightarrow u_c(t) = 12.024\,V \cdot e^{-0.2\frac{1}{s}t} - 0.024\,V \cdot e^{-99.8\frac{1}{s}t}$$

$$i_L(t) = 2.44A \cdot e^{-0.2\frac{1}{s}t} - 0.021A$$

$$i_L(t) = 0.024A \cdot (e^{-99.8\frac{1}{s}t} - e^{-0.2\frac{1}{s}t})$$