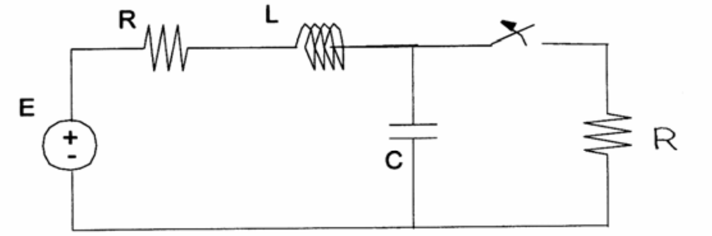


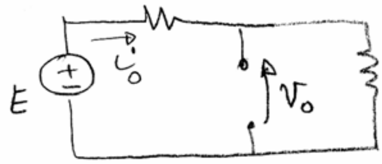
$E = 10(1+k)\,V$

$R = 10\,\Omega$

$L = 10^{-2}\,H$

$C = 0{,}5 \cdot 10^{-3}\,F$

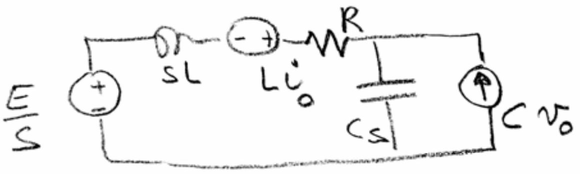
Condizioni iniziali



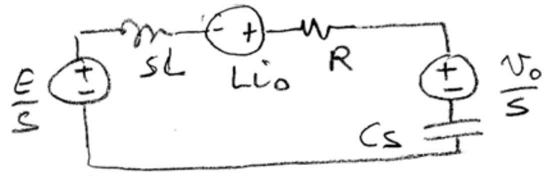
$$i_0 = \frac{E}{2R} = 0{,}5(1+k)$$

$$v_0 = \frac{E}{2} = 5(1+k)$$

Circuito a tasto aperto nel dominio $\mathcal{L}$



$\Rightarrow$



$$I = \frac{\frac{E}{s} + Li_0 - \frac{v_0}{s}}{sL + R + \frac{1}{Cs}} = \frac{1}{L}\,\frac{(E - v_0) + sL\,i_0}{s^2 + \frac{R}{L}s + \frac{1}{LC}} = 10^2\,\frac{5(1+k) + s\cdot 10^{-2}\cdot 0{,}5(1+k)}{s^2 + 10^3 s + 2\cdot 10^5} =$$

calcolo poli:

$$s = -\frac{R}{2L} \pm \sqrt{\left(\frac{R}{2L}\right)^2 - \frac{1}{LC}} =$$

$$= -\frac{10}{2\cdot 10^{-2}} \pm \sqrt{25\cdot 10^4 - 2\cdot 10^5} = -5\cdot 10^2 \pm 10^2\sqrt{5} = (-5 \pm 2{,}24)10^2$$

$$I = 10^2\,\frac{\left[5 + s\cdot 0{,}5\cdot 10^{-2}\right](1+k)}{(s + 7{,}24\cdot 10^2)(s + 2{,}76\cdot 10^2)} = 10^2(1+k)\left[\frac{k_1}{s + 7{,}24\cdot 10^2} + \frac{k_2}{s + 2{,}76\cdot 10^2}\right] =$$

$$= 10^2(1+k)\,\frac{k_1(s + 2{,}76\cdot 10^2) + k_2(s + 7{,}24\cdot 10^2)}{(s + 7{,}24\cdot 10^2)(s + 2{,}76\cdot 10^2)}$$

$$(k_1 + k_2)s + k_1\,2{,}76\cdot 10^2 + k_2\,7{,}24\cdot 10^2 = 5 + s\cdot 0{,}5\cdot 10^{-2}$$

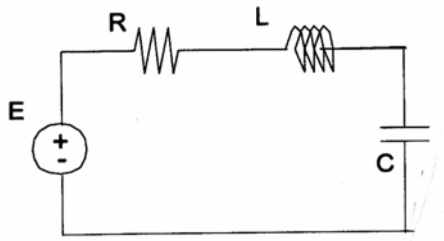
$$\begin{cases} k_1 + k_2 = 0{,}5\cdot 10^{-2} & k_2 = 0{,}5\cdot 10^{-2} - k_1 \\ k_1\,2{,}76\cdot 10^2 + (0{,}5\cdot 10^{-2} - k_1)\,7{,}24\,10^2 = 5 \end{cases}$$

$$-k_1\,4{,}48\cdot 10^2 = 5 - 3{,}62 = 1{,}38$$

$$k_1 = -0{,}309\cdot 10^{-2} \qquad k_2 = 0{,}809\cdot 10^{-2}$$

$$I = 10^2(1+k)\left[\frac{0{,}3\cdot 10^{-2}}{s + 7{,}24\cdot 10^2} + \frac{0{,}2\cdot 10^{-2}}{s + 2{,}76}\right]$$

$$i = (1+k)\left[-0{,}309\,e^{-7{,}24\cdot 10^2 t} + 0{,}809\,e^{-2{,}76\cdot 10^2 t}\right]$$



$$e(t) = \sqrt{2}\; 100\,(1+k) \cos 2\pi 50 t \qquad \bar{E} = 10(1+k)$$

$$\omega = 314 \text{ rad/s}$$

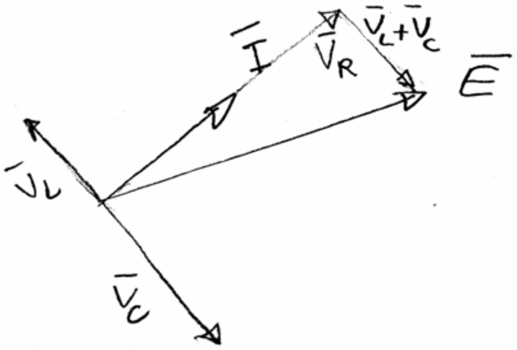
$$\omega L = 314 \cdot 10^{-2} = 3{,}14\,\Omega$$

$$\frac{1}{\omega C} = \frac{1}{314 \cdot 0{,}5 \cdot 10^{-3}} = 6{,}37\,\Omega$$

$$\bar{Z} = R + j\left[\omega L - \frac{1}{\omega C}\right] = 10 + j\,[3{,}14 - 6{,}4] = 10 - j\,3{,}23$$

$$\bar{I} = \frac{\bar{E}}{\bar{Z}} = \frac{10\,(1+k)}{10 - j\,3{,}23} = \frac{10(1+k)(10 + j\,3{,}23)}{100 + 11} = (1+k)(9{,}05 + j\,2{,}92)$$

$$i(t) = \sqrt{2}\,(1+k)\,9{,}51 \cos\left(2\pi 50 t + \operatorname{artg}\frac{3{,}23}{10}\right) = \sqrt{2}\,(1+k)\,9{,}51 \cos(2\pi 50 t + 18°)$$



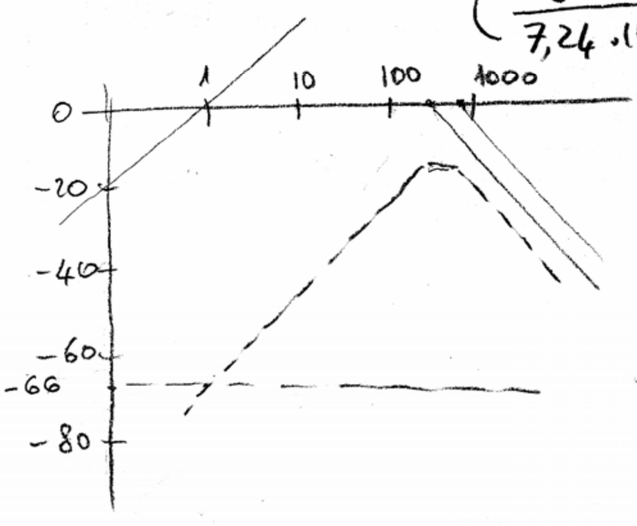
$$\bar{V}_R = R\bar{I} = 10\,(1+k)(9{,}05 + j\,2{,}92)$$

$$\bar{V}_L = j\omega L \bar{I} = j\,3{,}14\,(1+k)(9{,}05 + j\,2{,}92)$$

$$\bar{V}_C = -\frac{j}{\omega C}\,\bar{I} = -j\,6{,}37\,(1+k)(9{,}05 + j\,2{,}92)$$

$$\bar{H}(j\omega) = \frac{\bar{E}}{\left(R + j\omega L + \frac{1}{j\omega C}\right)} \cdot \frac{1}{\bar{E}} = C\,\frac{j\omega}{(j\omega)^2 LC + j\omega RC + 1} =$$

$$= 0{,}5 \cdot 10^{-3}\,\frac{j\omega}{\left(\frac{j\omega}{7{,}24 \cdot 10^{2}} + 1\right)\left(\frac{j\omega}{2{,}76 \cdot 10^{2}} + 1\right)}$$



$$20 \lg 0{,}5 \cdot 10^{-3} = -66 \text{ dB}$$