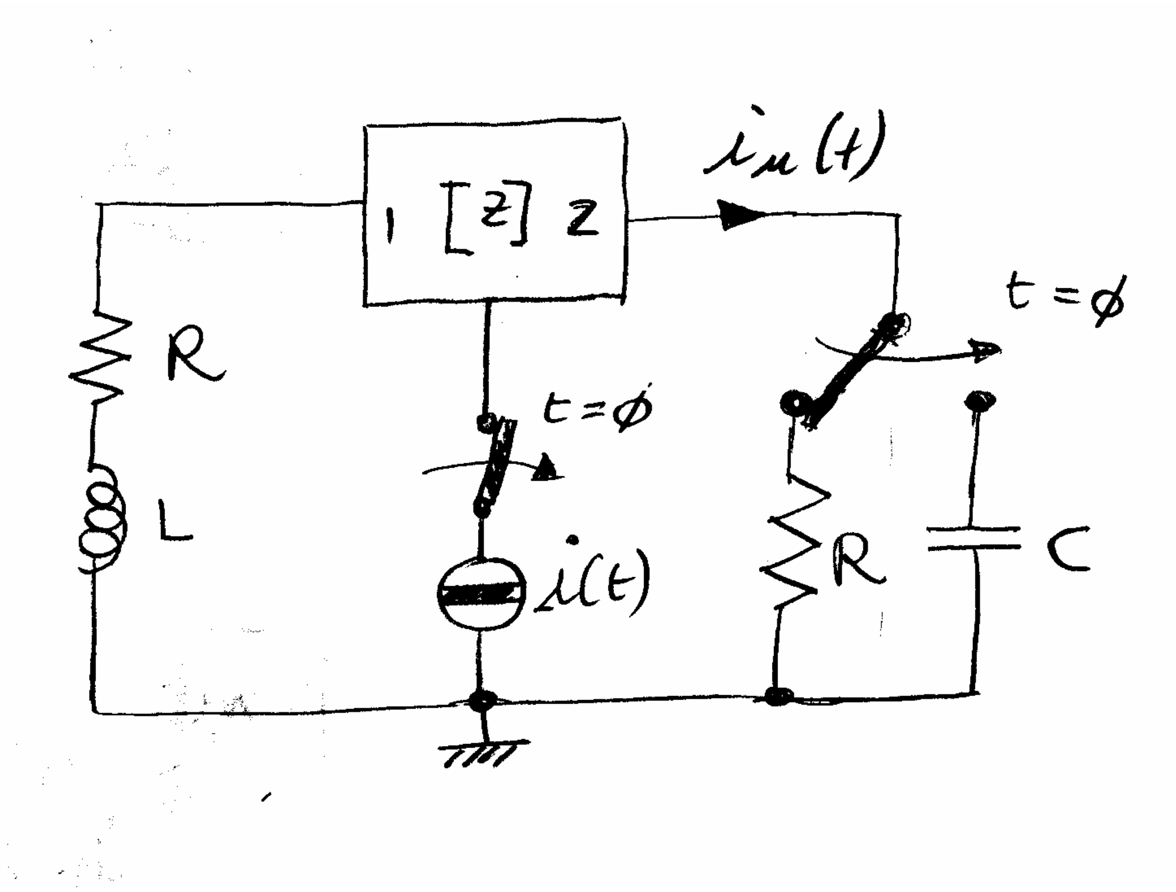
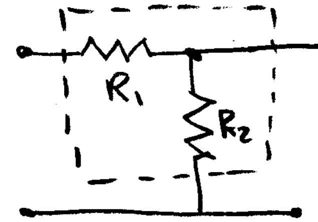
1. Determinare la corrente $i_u(t)$ per tutto l'asse dei tempi. $i(t) = \sin(2t)$

(R=1/2, C=1, L=1 [A, Ω, F, H]; $[Z] = \begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$).

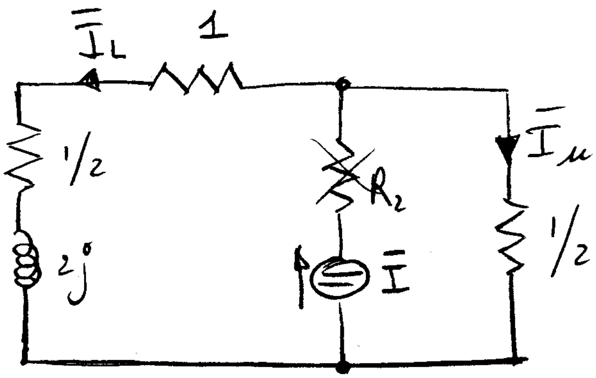


1) $t<0$ Fasori

Nota: $[Z] = \begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix} \Rightarrow$

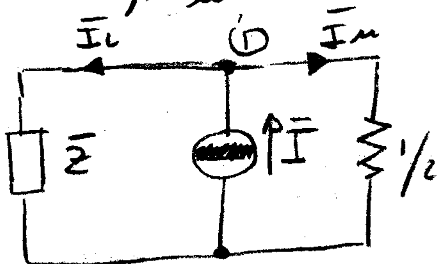


$R_1 = 1$; $R_2 = 1$



Nota: R_2 in serie

Calcolo $\bar{I}_L, \bar{I}_u$



$\bar{Z} = \frac{3}{2} + 2j$

$\bar{I} = -j$

Eq. Nodo 1 $\quad \left[\frac{1}{\bar{Z}} + 2\right][\bar{E}_1] = \bar{I} \Rightarrow \bar{E}_1 = \frac{\bar{I}}{2 + 1/\bar{Z}} = \frac{\bar{Z}\bar{I}}{2\bar{Z}+1}$

$$\bar{I}_u = \frac{\bar{E}_1}{R} = \frac{2\bar{Z}\bar{I}}{2\bar{Z}+1} = \frac{-2j\left(\frac{3}{2}+2j\right)}{3\left(\frac{3}{2}+2j\right)+1} = \frac{(4-3j)(4-4j)}{4+4i} = \frac{16-16j-12j-12}{32} = \frac{1}{8} - \frac{7}{8}j$$

$= \sqrt{\frac{25}{32}}\, e^{-j\,\mathrm{atn}(7)}$

$\Rightarrow \boxed{i_u(t) = \sqrt{\frac{25}{32}} \cos(2t - \mathrm{atn}(7)) \quad t<0}$

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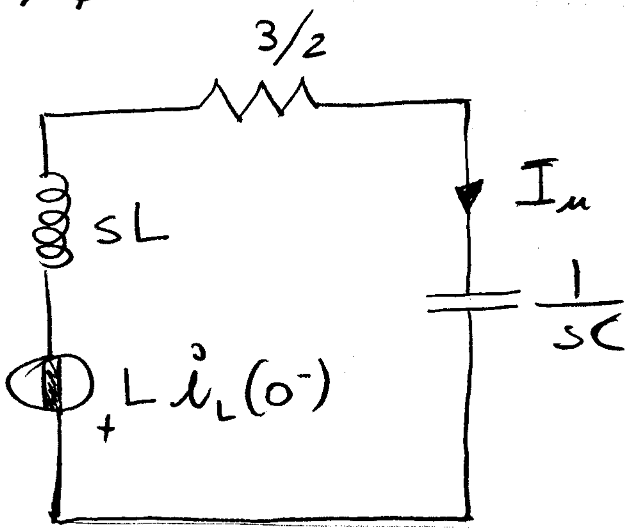
$$\bar{I}_L = \bar{I} - \bar{I}_u = -j - \frac{1}{8} + \frac{7}{8}j = -\frac{1}{8} - \frac{1}{8}j = \frac{1}{\sqrt{32}} e^{j\,\mathrm{atn}(1)} \Rightarrow$$

$$i_L(t) = \frac{1}{\sqrt{32}} \cos(2t + \pi/4)$$

$$i_L(0) = \frac{1}{\sqrt{32}} \cos(\pi/4) = \frac{1}{8}$$

$t \geq \phi$



$$I_u(s) = \frac{L\, i(0^-)}{R + sL + \frac{1}{sC}} = \frac{-1/8}{\frac{3}{2} + s + \frac{1}{s}} = \frac{s/8}{s^2 + \frac{3}{2}s + 1} =$$

$$= \frac{r e^{j\theta}}{s + \alpha - j\omega} + \frac{r e^{-j\theta}}{s + \alpha + j\omega} \Rightarrow$$

$$\boxed{\begin{aligned} r &= 0.094 \\ \theta &\cong \pi/4 \\ \alpha &= \tfrac{3}{4} \\ \omega &= \sqrt{\tfrac{7}{16}} \end{aligned}}$$

$$i_u(t) = r e^{j\theta} e^{-(\alpha - j\omega)t} + r e^{-j\theta} e^{-(\alpha + j\omega)t} \Rightarrow$$

$$i_u(t) = 2r e^{-\alpha t} \cos(\omega t + \theta) \Rightarrow$$

$$\boxed{i_u(t) = -0.189\, e^{-\frac{3}{4}t} \cos\left(\sqrt{\tfrac{7}{16}}\, t + \pi/4\right)}$$