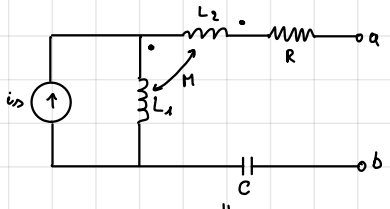
ESERCITAZIONE

ESERCIZIO 1



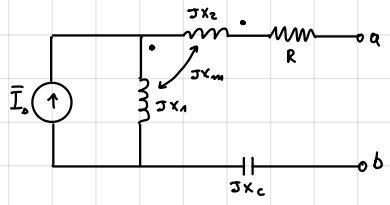
$i_s = 3\sqrt{2}\cos(2\pi \cdot 50 \cdot t)$

$R = 10\ \Omega$

$L_1 = 12\ mH$ $\quad K = 0{,}8$ $\quad K = \frac{|M|}{\sqrt{L_1 L_2}}$

$L_2 = 4\ mH$

$C = 1\ mF$



$\bar{I}_s = 3\ A_{RMS}$

$z_{L_1} = jx_1 = j\omega L_1 = j\,2\pi \cdot 50 \cdot 12 \cdot 10^{-3} = j\,3{,}77\ \Omega$

$z_{L_2} = jx_2 = j\omega L_2 = \dots = j\,1{,}26\ \Omega$

$z_M = jx_m = j\omega M = j\omega K\sqrt{L_1 L_2} = \dots = j\,1{,}74\ \Omega$

$z_C = jx_C = \frac{1}{j\omega C} = \dots = -j\,3{,}18\ \Omega$

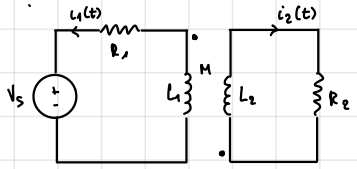
Usiamo le prove semplici:

$V_{EQ} = V_1 + V_2 + \cancel{V_R} + \cancel{V_C} = V_1 + V_2 = \dots = j\,27{,}55\ V_{RMS}$

$$\begin{cases} V_1 = jx_1 \bar{I}_1 + \cancel{jx_m \bar{I}_2} \\ V_2 = jx_M \bar{I}_1 + \cancel{jx_2 \bar{I}_2} \end{cases}$$

$z_{eq} = \dots$

ESERCIZIO 3



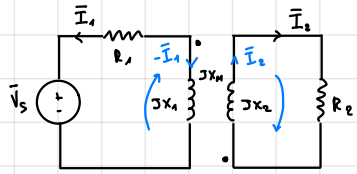
$v_s = \cos(100\,t)$

$R_1 = 200\ \Omega$ $\quad L_1 = L_2 = 4\ H$

$R_2 = 320\ \Omega$ $\quad K = 0{,}8$

$i_1(t)$? $\quad i_2(t)$?

Energia immagazzinata in $t = 2\,ms$?



$V_s = \frac{1}{\sqrt{2}}\ V_{RMS}$

$x_1 = \omega L_1 = 400\ \Omega$

$x_2 = \omega L_2 = 400\ \Omega$

$M = K\sqrt{L_1 L_2} = 3.2\ H \rightarrow x_M = \omega M = 320\ \Omega$

$$\begin{cases} \bar{V}_1 = -jx_1 \bar{I}_1 - jx_m \bar{I}_2 \\ \bar{V}_2 = -jx_m \bar{I}_1 + jx_2 \bar{I}_2 \end{cases}$$

$$\begin{cases} \bar{V}_s = -R_1 \bar{I}_1 + V_1 \\ \bar{V}_2 = -R_2 \bar{I}_2 \end{cases} \rightarrow \begin{cases} \bar{V}_s = -R_1 I_1 - jx_1 I_1 + jx_2 I_2 \\ -jx_m \bar{I}_1 + jx_2 I_2 = -R_2 \bar{I}_2 \end{cases} \Rightarrow$$

$$\bar{I}_1 = -\frac{\bar{V}_s}{R_1 + jx_1 + \frac{x_M^2}{R_2 + jx_2}} = 1{,}74\, e^{j148{,}1^\circ}\ mA_{RMS}$$

$$\bar{I}_2 = \frac{jx_M}{R_2 + jx_2} = 1{,}09\, e^{-j178{,}24^\circ}\ mA_{RMS}$$

$\Downarrow$

$i_1(t) = \sqrt{2}\ 1{,}74 \cos(100t + 148{,}1^\circ)\ mA$

$i_2(t) = \sqrt{2}\ 1{,}09 \cos(100t - 178{,}24^\circ)\ mA$

$E = \frac{1}{2} L_1 i_1(2\,ms)^2 + \frac{1}{2} L_2 i_2(2\,ms) + M\, i_1(2\,ms)\, i_2(2\,ms) = \dots =$