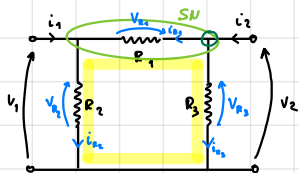


ESERCITAZIONE

ESERCIZIO 1 (8)



T = ?

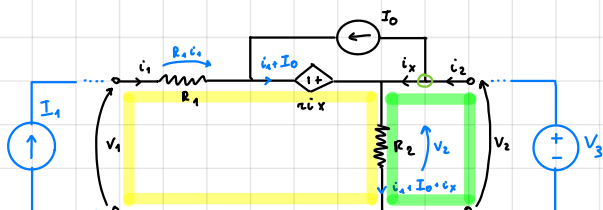
$$\text{D.B. lineare} \rightarrow \begin{bmatrix} V_1 \\ i_1 \end{bmatrix} = T \begin{bmatrix} V_2 \\ -i_2 \end{bmatrix}$$

in T la i_2 è uscente, da noi è entrante

$$\begin{aligned} V_1 &= -V_{R1} + V_2 = -R_1 i_{R1} + V_2 = \left(\frac{R_1}{R_3} + 1\right) V_2 - R_1 i_2 \Rightarrow i_1 = \frac{1}{R_2} \left[\left(\frac{R_1}{R_3} + 1\right) V_2 - R_1 i_2 \right] + \frac{V_2}{R_3} - i_2 = \dots = \left[\frac{1}{R_2} \left(\frac{R_1}{R_3} + 1\right) + \frac{1}{R_3} \right] V_2 - \left(\frac{R_1}{R_2} + 1\right) i_2 \\ i_1 + i_2 &= i_{R3} + i_{R2} = \frac{V_2}{R_3} + \frac{V_2}{R_2} \\ i_{R1} &= i_2 - \frac{V_2}{R_3} \end{aligned}$$

$$\rightarrow \begin{cases} V_1 = \left(\frac{R_1}{R_3} + 1\right) V_2 - R_1 i_2 \\ i_1 = \left[\frac{1}{R_2} \left(\frac{R_1}{R_3} + 1\right) + \frac{1}{R_3} \right] V_2 - \left(\frac{R_1}{R_2} + 1\right) i_2 \end{cases} \rightarrow \begin{bmatrix} \frac{R_1}{R_3} + 1 \\ \frac{1}{R_2} \left(\frac{R_1}{R_3} + 1\right) + \frac{1}{R_3} \end{bmatrix} \begin{bmatrix} R_1 \\ \frac{R_1}{R_2} + 1 \end{bmatrix} \xrightarrow{R_1=R_2=R_3=R} \begin{bmatrix} 2 & R \\ \frac{3}{R} & 2 \end{bmatrix}$$

ESERCIZIO 3



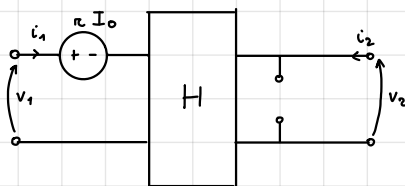
$$R_1 = R, R_2 = 2R$$

$$1) H = ? \quad \begin{bmatrix} V_1 \\ i_2 \end{bmatrix} = H \begin{bmatrix} V_2 \\ i_1 \end{bmatrix} + \begin{bmatrix} V_{01} \\ i_{02} \end{bmatrix}$$

$$\begin{aligned} V_1 &= V_{R1} - \pi i_x + V_2 \rightarrow V_1 = R i_1 - \pi \frac{V_2}{2R} + \frac{\pi R I_0}{2R} + \pi i_1 + V_2 = (R + \pi) i_1 + \left(1 - \frac{\pi}{2R}\right) V_2 + \pi I_0 \\ V_2 &= R_2 (i_1 + I_0 + i_x) \rightarrow i_x = \frac{V_2}{2R} - I_0 - i_1 \\ i_2 &= i_1 + I_0 = \frac{V_2}{2R} - I_0 - i_1 + I_0 = -i_1 + \frac{1}{2R} V_2 \end{aligned}$$

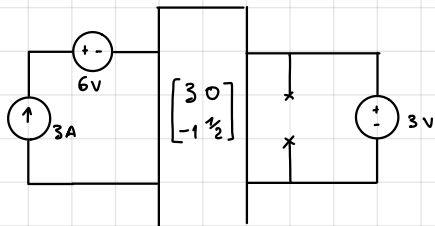
$$\rightarrow \begin{cases} V_1 = (R + \pi) i_1 + \left(1 - \frac{\pi}{2R}\right) V_2 + \pi I_0 \\ i_2 = -i_1 + \frac{1}{2R} V_2 \end{cases} \rightarrow H = \begin{bmatrix} R + \pi & 1 - \frac{\pi}{2R} \\ -1 & \frac{1}{2R} \end{bmatrix}$$

2)



$$3) \quad \pi = 2 \Omega, R_1 = R = 1 \Omega, R_2 = 2 \Omega, I_0 = 3A$$

$$I_1 = 3A, V_3 = 3V$$



$$\begin{aligned} i_1 &= I_1 = 3A \rightarrow \begin{cases} V_1 = 3 i_1 + V_{01} = 15V \\ V_2 = V_3 = 3V \end{cases} \rightarrow \begin{cases} i_2 = -i_1 + \frac{1}{2} V_2 = -\frac{3}{2}A \end{cases} \rightarrow p_a = 3 \cdot 15 + \left(-\frac{3}{2}\right) \cdot 3 = 40,5W \end{aligned}$$