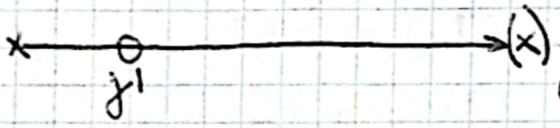
HOJA Nº

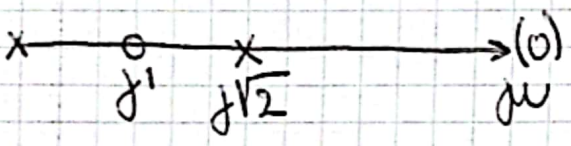
FECHA

GUIA DE EJERCICIOS CUADRIPOLOS

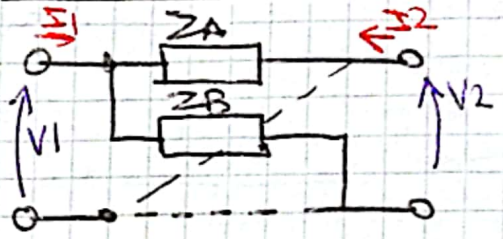
2) z_{11}



y_{11}



LATTICE SIMÉTRICO



$$\begin{cases} I_1 = y_{11} V_1 + y_{12} V_2 \\ I_2 = y_{21} V_1 + y_{22} V_2 \end{cases} \quad \ldots$$

$$Z = \begin{bmatrix} \frac{Z_A+Z_B}{2} & \frac{Z_B-Z_A}{2} \\ \frac{Z_B-Z_A}{2} & \frac{Z_A+Z_B}{2} \end{bmatrix}$$

$$y_{11} = \left.\frac{I_1}{V_1}\right|_{V_2=0} = \frac{Y_A+Y_B}{2}$$

$$y_{12} = \left.\frac{I_1}{V_2}\right|_{V_1=0} = \frac{Y_B-Y_A}{2}$$

$$Y = \begin{bmatrix} \frac{Y_A+Y_B}{2} & \frac{Y_B-Y_A}{2} \\ \frac{Y_B-Y_A}{2} & \frac{Y_A+Y_B}{2} \end{bmatrix}$$

$$z_{11} = \left.\frac{V_1}{I_1}\right|_{I_2=0} = \frac{s^2+1}{s} = \frac{Z_A+Z_B}{2}$$

$$y_{11} = \left.\frac{I_1}{V_1}\right|_{V_2=\infty} = \frac{s^2+1}{s(s^2+2)} = \frac{Y_A+Y_B}{2} = \frac{\frac{1}{Z_A}+\frac{1}{Z_B}}{2}$$

$$\begin{cases} \frac{Z_A+Z_B}{2} = \frac{s^2+1}{s} \\ \frac{1}{2\,Z_A/\!/Z_B} = \frac{s^2+1}{s(s^2+2)} \end{cases}$$

$$\frac{Z_A+Z_B}{\frac{1}{Z_A/\!/Z_B}} = s^2+2$$

$$(Z_A+Z_B)\,Z_A/\!/Z_B = s^2+2$$

$$(Z_A+Z_B)\frac{Z_A Z_B}{Z_A+Z_B} = s^2+2$$

$$\therefore Z_A Z_B = s^2+2$$

$$\frac{s^2+1}{s} = \frac{Z_A+Z_B}{2} \rightarrow Z_B = \frac{2(s^2+1)}{s} - Z_A$$

$$Z_A\left(\frac{2(s^2+1)}{s} - Z_A\right) = s^2+2$$

NOTA

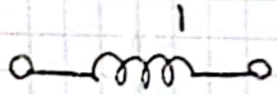
$Z_A \cdot 2\,\frac{s^2+1}{s} - Z_A^2 = s^2+2.$

Si $Z_A = s \Rightarrow 2s\,\frac{(s^2+1)}{s} - s^2 = s^2+2.$

$\therefore\ 2s^2+2-s^2 = s^2+2.$

$s^2+2 = s^2+2$ ✓

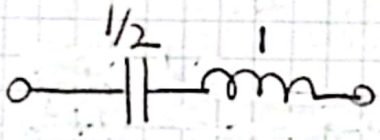
$\Rightarrow Z_A$

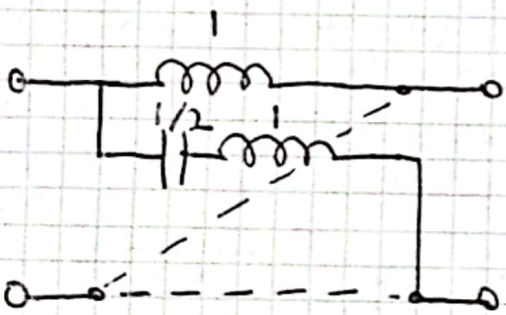


$$Z_B = \frac{2(s^2+1)}{s} - s = \frac{2s^2+2-s^2}{s} = \frac{s^2+2}{s} = \frac{K_0}{s} + K_\infty s.$$

$$K_0 = \lim_{s\to 0} s^2+2 = 2$$

$$K_\infty = \lim_{s\to\infty} \frac{s^2+2}{s^2} = 1$$





$$Z_{11} = \frac{Z_A+Z_B}{2} = \frac{s+\frac{2}{s}+s}{2} = \frac{s^2+2+s^2}{2s}$$

$$Z_{11} = \frac{2s^2+2}{2s} = \boxed{\frac{s^2+1}{s}}$$ ✓

$$Y_{11} = \frac{Y_A+Y_B}{2} = \frac{\frac{1}{s}+\frac{1}{2/s+s}}{2} = \frac{1}{2}\,\frac{1}{s} + \frac{s}{2+s^2}$$

$$Y_{11} = \frac{1}{2}\,\frac{2+s^2+s^2}{s(s^2+2)} = \frac{1}{2}\,\frac{2s^2+2}{s(s^2+2)}$$

$$\boxed{Y_{11} = \frac{s^2+1}{s(s^2+2)}}$$ ✓