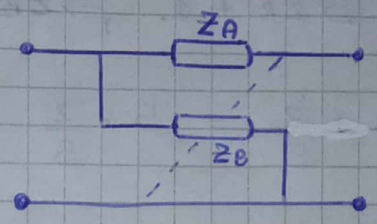
Ejercicio 3 (TP 4)

Obtener los componentes del cuadripolo lattice que la satisfagan

$$T = \begin{bmatrix} S^2+1 & B \\ S & D \end{bmatrix}$$



$$\begin{cases} V_1 = Z_{11} \cdot I_1 + Z_{12} \cdot I_2 \\ V_2 = Z_{21} \cdot I_1 + Z_{22} \cdot I_2 \end{cases}$$

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

Remplazo

$$V_1 = \frac{Z_A+Z_B}{2} I_1 + \frac{Z_A-Z_B}{2}(-I_2)$$

$$V_2 = \frac{Z_A-Z_B}{2} I_1 + \frac{Z_A+Z_B}{2}(-I_2)$$

$$A = \left.\frac{V_1}{V_2}\right|_{I_2=0} = S^2+1 = \frac{Z_{11}}{Z_{21}} = \frac{Z_A+Z_B}{Z_A-Z_B} \quad (I)$$

$$B = \left.\frac{V_1}{(-I_2)}\right|_{V_2=0} = \frac{Z_{11} \cdot Z_{22}}{Z_{21}} + Z_{12} = \frac{Z_A+Z_B}{2} \frac{Z_A+Z_B}{Z_A-Z_B} + \frac{Z_A-Z_B}{2}$$

$$C = \left.\frac{I_1}{V_2}\right|_{I_2=0} = \frac{2}{Z_A-Z_B} = S \Rightarrow Z_A = Z_B + \frac{2}{S} \quad (II)$$

$$D = \left.\frac{I_1}{(-I_2)}\right|_{V_2=0} = \frac{Z_A-Z_B}{Z_A+Z_B}$$

Remplazo II en I

$$S^2+1 = \frac{\left(z_B + \frac{2}{S}\right) + z_B}{\left(z_B + \frac{2}{S} - z_B\right)} = \frac{2\left(z_B + \frac{1}{S}\right)}{\frac{2}{S}} = S z_B + 1$$

$$S^2 + 1 = S z_B + 1 \Rightarrow z_B = S.$$

$$z_A = z_B + \frac{2}{S} = S + \frac{2}{S} = \frac{S^2+2}{S}.$$

$$D = \frac{\left(\frac{S^2+2}{S}\right) - S}{\frac{S^2+2}{S} + S} = \frac{S^2+2-S^2}{2S^2+2} = \frac{2}{2(S^2+1)}$$

$$\underbrace{D = \frac{1}{S^2+1}}$$

$$B = \frac{\left(\frac{S^2+2}{S} + S\right)}{2} \cdot \frac{\left(\frac{S^2+2}{S} + S\right)}{\frac{S^2+2}{S} - S} + \frac{\frac{S^2+2}{S} - S}{2}$$

$$B = \frac{(2S^2+2)}{2} \cdot \frac{S\,(2S^2+2)}{2} + \frac{2}{2S}$$

$$B = (S^2+1)(S^2+1) \cdot S + \frac{1}{S}$$

$$\underbrace{B = \frac{(S^2+1)(S^2+1)\,S^2 + 1}{S}}$$