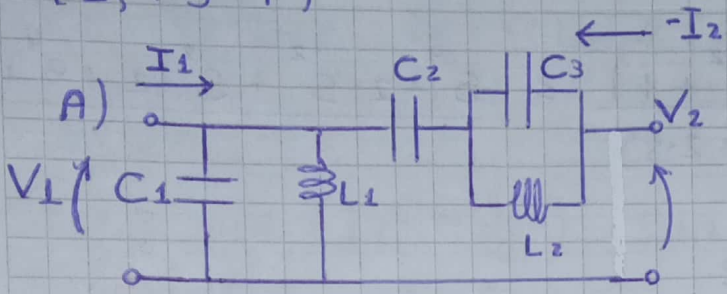
Trabajo 4 (Parametros de Cuadrupolos)

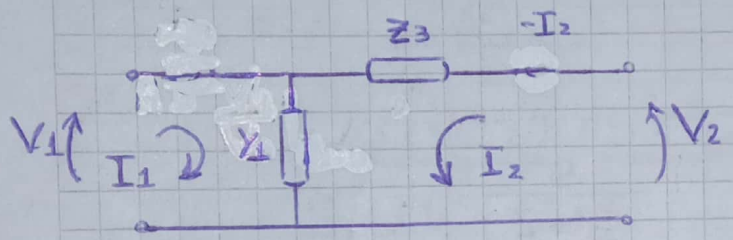
Hacer 1, 2, 3, 7 y 8

1 Obtener un solo juego de parametros de Cuadrupolo (Z, Y y T)

A)



$$T\begin{cases} V_1 = V_2 \cdot A + (-I_2)\cdot B \\ I_1 = V_2 \cdot C + (-I_2)\cdot D \end{cases}$$



$$Y_1 = \frac{1}{SL_1} + SC_1$$

$$Y_2 = \frac{1}{SL_2} + SC_3$$

$$Z_3 = \frac{1}{SC_2} + \underbrace{Y_2^{-1}}_{Z_2}$$

Parametro Z

$$V_1 = I_1\cdot(1/Y_1) + I_2(1/Y_1)$$

$$V_2 = I_2(Z_3 + 1/Y_1) + I_1(1/Y_1)$$

$$\begin{cases} Z_{11} = 1/Y_1 = Z_1 \\ Z_{22} = 1/Y_1 \\ Z_{12} = 1/Y_1 \\ Z_{21} = Z_3 + 1/Y_1 \end{cases}$$

$$Y_1 = \frac{1 + S^2 L_1 C_1}{SL_1} \rightarrow Z_{11} = \frac{S\cdot L_1}{S^2 L_1 C_1 + 1}$$

$$Y_2 = \frac{1 + S^2 L_2 C_3}{SL_2} \rightarrow Z_2 = \frac{SL_2}{1 + S^2 L_2 C_3}$$

$$Z_3 = \frac{1}{SC_2} + \frac{SL_2}{1 + S^2 L_2 C_3} \rightarrow \frac{(1 + S^2 L_2 C_3) + S^2 L_2 C_2}{S^3 L_2 C_2 C_3 + SC_2}$$

$$Z_3 = \frac{1 + S^2}{S^3 + 2\cdot S} \qquad Z_1 = \frac{0{,}5\cdot S}{0{,}5\cdot S^2 + 1} = \frac{S}{S^2 + 2}$$

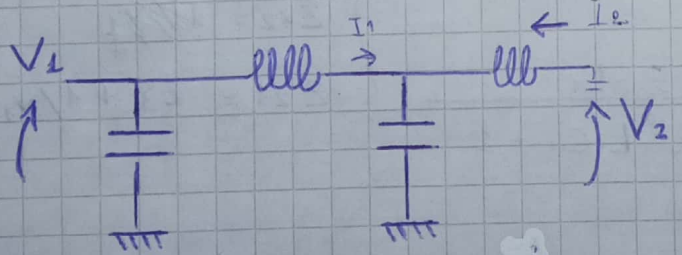
$$Z1 \quad \frac{0,25 \cdot S}{1 + 0,5 \cdot S^2} = \frac{S}{2 \cdot S^2 + 4}$$

$$Z = \begin{pmatrix} Z_{11} & Z_{12} \\ Z_{21} & Z_{22} \end{pmatrix} = \begin{pmatrix} Z_1 & Z_1 \\ Z_3 + Z_1 & Z_1 \end{pmatrix}$$

$$Z_3 + Z_1 = \frac{S}{S^2 + 2} + \frac{(S^2 + 1)}{(S^3 + 2 \cdot S)} = \frac{S^4 + 2 \cdot S^2 + S^2 + 2 + S^4 + 2S}{}$$

$$Z_{21} = \frac{2 \cdot S^4 + 3S^2 + 2 \cdot S + 2}{S^5 + 2S^3 + 4 \cdot S}$$

$$Z_n = \begin{pmatrix} \frac{S}{S^2+2} & \frac{S}{S^2+2} \\ \frac{2 \cdot S^4 + 3S^2 + 2 \cdot S + 2}{S^5 + 4S^3 + 4S} \rightleftarrows & \frac{S}{S^2+2} \end{pmatrix}$$

B) 

$$V_1 = V_2 \cdot A + -I_2 \cdot B$$

$$I_1 = V_2 \cdot C + -I_2 \cdot D$$

$$\frac{V_1}{V_2}\Big|_{I_2=0} = \frac{I_1(Z_{L1} + Z_{C2})}{I_1(Z_{L2} + Z_{C2})} = \frac{SL_1 + \frac{1}{SC_2}}{SL_2 + \frac{1}{SC_2}} = \frac{\frac{S^2L_1C_2 + 1}{SC_2}}{\frac{S^2C_2L_2 + 1}{SC_2}}$$

$$A = \frac{S^2 L_1 C_2 + 1}{S^2 L_2 C_1 + 1}$$

$$B = \frac{V_1}{(-I_2)}\Big|_{V_2=0} = \frac{V_1}{V_1 / Y_{L1}} = Y_{L1} = \frac{1}{SL_1} \quad ?$$

$$C = \frac{I_1}{V_2}\Big|_{I_2=0} = \frac{I_1}{I_1 \left(SL_1 \,//\, (z_{C1} + z_{C2}) \right) + SL_2}$$

$$C = \frac{1}{SL_1 \,//\, \left(\frac{1}{SC_1} + \frac{1}{SC_2} \right) + SL_2}$$

$$C = \frac{1}{SL_1} + \frac{S^2 C_1 C_2}{S(C_1 + C_2)}$$

$$C^{-1} = \frac{S(C_1 + C_2) + S^3 C_1 C_2 L_1}{S^2 L_1 (C_1 + C_2)} + SL_2$$

$$C^{-1} = \frac{S(C_1 + C_2) + S^3 C_1 C_2 L_1 + S^3 L_1 L_2 (C_1 + C_2)}{S^2 L_1 (C_1 + C_2)}$$

$$C = \frac{S^2 L_1 (C_1 + C_2)}{S^3 (C_1 C_2 L_1 + L_1 L_2 (C_1 + C_2)) + S(C_1 + C_2)} = \frac{S\left(\frac{17}{30}\right)}{+\frac{17}{5}}$$