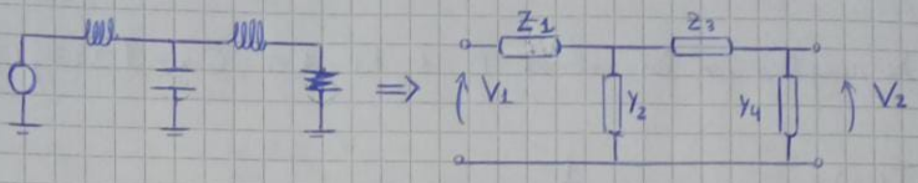
Ejercicio semanal 8



1 Hallar mediante cuadripolos la $T(S)$

siendo: $T_T = T_{z1} \cdot T_{y_2} \cdot T_{z_3} \cdot T_R$

$$T_T = \begin{pmatrix} 1 & SL_1 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ SC_2 & 1 \end{pmatrix} \begin{pmatrix} 1 & SL_3 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ 1/R & 1 \end{pmatrix}$$

$$T_T = \begin{pmatrix} 1+(S^2C_2L_1) & 0+SL_1 \\ 0+SC_2 & 0+1 \end{pmatrix} \begin{pmatrix} 1 & SL_3 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ 1/R & 1 \end{pmatrix}$$

$$T_T = \begin{pmatrix} S^2L_1C_2+1 & SL_3(S^2C_2L_1+1)+SL_1 \\ SC_2 & S^2C_2L_3+1 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ 1/R & 1 \end{pmatrix}$$

$$\begin{pmatrix} \frac{R(S^2L_1C_2+1) + SL_3(S^2C_2L_1+1)+SL_1}{R} & \dots \\ \dots & \dots \end{pmatrix}$$

Sabiendo que como $V_1 = V_2 \cdot A + (-I_2) \cdot B$ podemos decir que si $I_2 = 0$, $\frac{V_2}{V_1} = A^{-1}$

$$A^{-1} = \frac{R}{S^2(RL_1C_2)+R+S^3(L_1C_2L_3)+S(L_1+L_3)}$$

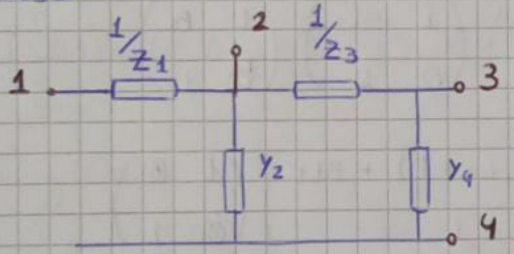
$$T(S) = \frac{\frac{R}{L_1 C_2 L_3}}{S^3 + S^2 \frac{R}{L_3} + S\frac{(L_1 + L_3)}{L_1 C_2 L_3} + \frac{R}{L_1 C_2 L_3}}$$

Si remplazo por los valores, $R = 1$, $L_1 = 1,5$, $C_2 = 1,333$ y $L_3 = 0,5$

$$T(S) = \frac{1}{S^3 + S^2 \cdot 2 + S \cdot 2 + 1}$$

Analisis matricial

1 Construya la matriz impedancia indefinida del circuito



$$\begin{array}{cccccc} & & 1 & 2 & 3 & 4 \\ y_{mai} = & \left(\begin{array}{c} \\ \\ \\ \\ \\ \end{array}\right. & \frac{1}{Z_1} & -\frac{1}{Z_1} + y_2 + \frac{1}{Z_3} & -\frac{1}{Z_3} + y_4 & -y_2 - y_4 \\ & & y_3 - y_1 + y_2 & y_1 + y_2 + y_3 & & \\ & & -y_3 + y_4 & & y_3 + y_4 & \\ & & -y_2 - y_4 & & & y_2 + y_4 \end{array}$$

$$
y_{mai} = \begin{pmatrix} y_1 & -y_1 & 0 & 0 \\ -y_1 & y_1 + y_2 + y_3 & -y_3 & -y_2 \\ 0 & -y_3 & y_3 + y_4 & -y_4 \\ 0 & -y_2 & -y_4 & y^2 + y_4 \end{pmatrix}
$$

$$
y_{mai} = \begin{array}{c} \begin{array}{cccc} 1 & 2 & 3 & 4 \end{array} \\ \begin{pmatrix} 1/z_1 & -1/z_1 & 0 & 0 \\ -1/z_1 & 1/z_1 + y_2 + 1/z_3 & -1/z_3 & -y_2 \\ 0 & -1/z_3 & \frac{1}{z_3} + 1/z_4 & -1/z \\ 0 & -y_2 & -1/z_4 & y_2 + 1/z_4 \end{pmatrix} \end{array} \begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \end{array}
$$

$$
A^{34}_{14} = \frac{V_{34}}{V_{14}} = \frac{\underline{Y}^{14}_{34}}{\underline{Y}^{14}_{14}} = \underline{\qquad\qquad}
$$

$$
\underline{Y}^{14}_{34} = -\begin{vmatrix} -1/z_1 & 1/z_1 + y_2 + 1/z_3 \\ 0 & -1/z_3 \end{vmatrix}
$$

$$Y^{14}_{14} = - \begin{vmatrix} \frac{1}{z_1} + y_2 + \frac{1}{z_3} & -\frac{1}{z_3} \\ -\frac{1}{z_3} & \frac{1}{z_3} + \frac{1}{z_4} \end{vmatrix}$$

$$Y^{14}_{14} = - | (y_1 + y_2 + y_3)(y_3 + y_4) + y_3^2$$

$$A^{34}_{14} = \frac{y_1 y_3}{(y_1 + y_2 + y_3)(y_3 + y_4) + y_3^2}$$