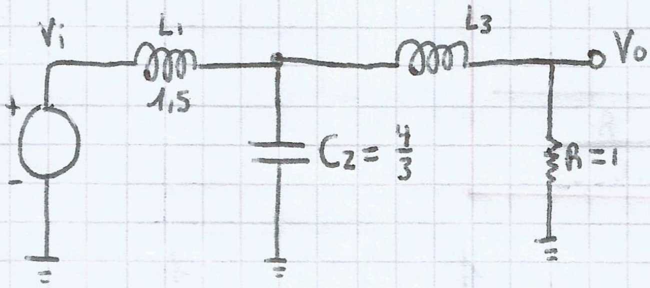
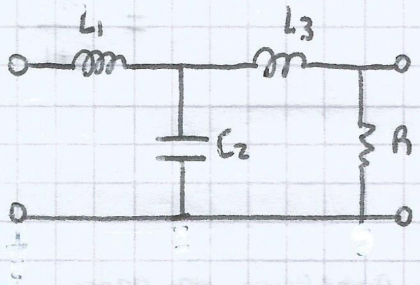
TS8 - MAI

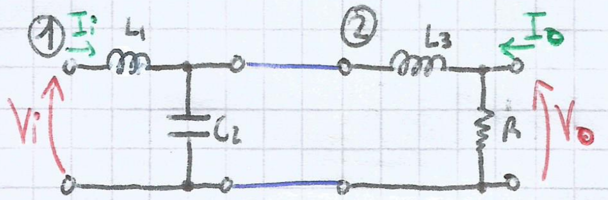


Análisis de Cuadripolos:

Lo separo al Cuadripolo



En dos Cuadripolos en cascada:



donde $T = T_1 \cdot T_2$

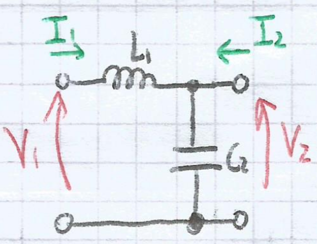
$$T = \begin{pmatrix} A & B \\ C & D \end{pmatrix} \quad \begin{cases} V_i = V_o A + (-I_o) B \\ I_i = V_o \cdot C + (-I_o) D \end{cases}$$

$$T = \begin{pmatrix} A_1 & B_1 \\ C_1 & D_1 \end{pmatrix} \cdot \begin{pmatrix} A_2 & B_2 \\ C_2 & D_2 \end{pmatrix} = \begin{pmatrix} A_1 A_2 + B_1 C_2 & -- \\ -- & -- \end{pmatrix}$$

$$A_1 A_2 + B_1 C_2 = A = \left.\frac{V_i}{V_o}\right|_{I_o=0} = \boxed{\left(\frac{V_o}{V_i}\right)^{-1}}$$

∴ Solo debo Calcular A_1, A_2, B_1, C_2

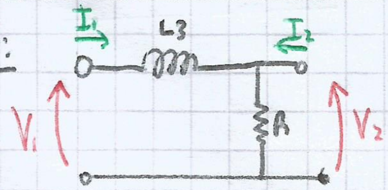
∴ T_1:



$$A_1 = \left.\frac{V_1}{V_2}\right|_{I_2=0} = \left(\frac{\frac{1}{SC_2}}{\frac{1}{SC_2} + SL_1}\right)^{-1} = \boxed{1 + S^2 L_1 C_2}$$

$$B_1 = -\left.\frac{V_1}{I_2}\right|_{V_2=0} = \boxed{S L_1}$$

T_2:



$$A_2 = \left.\frac{V_1}{V_2}\right|_{I_2=0} = \left(\frac{R}{SL_3 + R}\right)^{-1} = \boxed{1 + \frac{SL_3}{R}}$$

$$C_2 = \left.\frac{I_1}{V_2}\right|_{I_2=0} = \boxed{\frac{1}{R}}$$

$$∴ \ A = \left.\frac{V_i}{V_o}\right|_{I_o=0} = (1 + s^2 L_1 C_2) \cdot \left(1 + \frac{SL_3}{R}\right) + \frac{SL_1}{R} = 1 + \frac{SL_3}{R} + S^2 L_1 C_2 + \frac{S^3 L_1 C_2 L_3}{R} + \frac{SL_1}{R}$$

NOTA

$$\frac{V_i}{V_o} = \frac{R + sL_3 + s^2 L_1 C_2 R + s^3 L_1 C_2 L_3 + sL_1}{R}$$

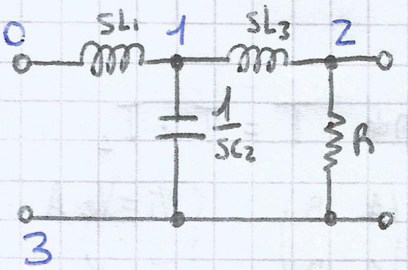
$$\boxed{\frac{V_o}{V_i} = \frac{\frac{R}{L_1 C_2 L_3}}{s^3 + s^2 \frac{R}{L_3} + s\,\frac{(L_1 + L_3)}{L_1 C_2 L_3} + \frac{R}{L_1 C_2 L_3}}}$$

$$\therefore \boxed{\frac{V_o}{V_i} = \frac{1}{s^3 + s^2 \cdot 2 + s \cdot 2 + 1}} = \frac{1}{s+1} \cdot \frac{1}{s + 0{,}5 - j0{,}86602} \cdot \frac{1}{s + 0{,}5 + j0{,}86602}$$

$$= \frac{1}{s+1} \cdot \frac{1}{s^2 + s + 1}$$

MAI

- Primero elijo la numeración de nodos:



$$\therefore Y = \begin{pmatrix} \frac{1}{sL_1} & -\frac{1}{sL_1} & 0 & 0 \\ -\frac{1}{sL_1} & \frac{1}{sL_1} + sC_2 + \frac{1}{sL_3} & -\frac{1}{sL_3} & -sC_2 \\ 0 & -\frac{1}{sL_3} & \frac{1}{sL_3} + \frac{1}{R} & -\frac{1}{R} \\ 0 & -sC_2 & -\frac{1}{R} & sC_2 + \frac{1}{R} \end{pmatrix}$$

$$\frac{V_o}{V_i} = \frac{V_2 - V_3}{V_0 - V_3} = \frac{Y^{03}_{23}}{Y^{03}_{03}} \cdot \overbrace{S(0-3)}^{-1} \cdot \overbrace{S(2-3)}^{-1}$$

$$Y^{03}_{23} = \det \begin{pmatrix} -\frac{1}{sL_1} & \frac{1}{sL_1} + sC_2 + \frac{1}{sL_3} \\ 0 & -\frac{1}{sL_3} \end{pmatrix} = \boxed{\frac{1}{s^2 L_1 L_3}}$$

HOJA Nº 2

FECHA

$$Y^{03}_{03} = \det \begin{pmatrix} \frac{1}{sL_1}+sC_2+\frac{1}{sL_3} & -\frac{1}{sL_3} \\ -\frac{1}{sL_3} & \frac{1}{sL_3}+\frac{1}{R}\end{pmatrix} = \frac{sL_3+s^3 L_1C_2L_3+sL_1}{s^2L_1L_3}\cdot\frac{R+sL_3}{sRL_3} - \frac{1}{s^2L_3^2}$$

$$Y^{03}_{03} = \frac{sL_3R + s^2L_3^2 + s^3RL_1C_2L_3 + s^4L_1C_2L_3^2 + sL_1R + s^2L_1L_3}{s^3RL_1L_3^2} - \frac{1}{s^2L_3^2}$$

$$Y^{03}_{03} = \frac{\cancel{s}\cancel{L_3}R + s^{\cancel{2}}L_3^{\cancel{2}} + s^{\cancel{3}2}R L_1C_2\cancel{L_3} + s^{\cancel{4}3}L_1C_2L_3^{\cancel{2}} + \cancel{sL_1R} + s^{\cancel{2}}L_1\cancel{L_3} - \cancel{sRL_1}}{s^{\cancel{3}2}RL_1L_3^{\cancel{2}}}$$

$$Y^{03}_{03} = \boxed{\frac{s^3L_1C_2L_3 + s^2RL_1C_2 + s(L_1+L_3)+R}{s^2RL_1L_3}}$$

$$\frac{V_o}{V_i} = \frac{\frac{1}{\cancel{s^2}\cancel{L_1}\cancel{L_3}}}{\frac{s^3L_1C_2L_3 + s^2RL_1C_2 + s(L_1+L_3)+R}{\cancel{s^2}R\cancel{L_1}\cancel{L_3}}} = \frac{R}{s^3L_1C_2L_3+s^2RL_1C_2+s(L_1+L_3)+R}$$

$$\boxed{\frac{V_o}{V_i}=\frac{\frac{R}{L_1C_2L_3}}{s^3+s^2\frac{R}{L_3}+s\frac{L_1+L_3}{L_1C_2L_3}+\frac{R}{L_1C_2L_3}}}$$

Misma Transferencia ✓

NOTA