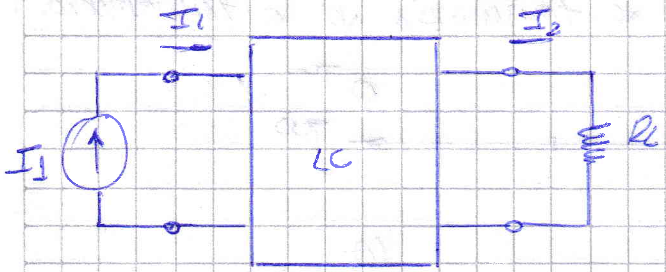
HOJA N°

FECHA

PUNTO 2




$$T(s) = \frac{V_2(s)}{I_1(s)}\Bigg|_{I_2 = -\frac{V_L}{R_L}} = \frac{K.(s^2+9)}{s^3+2s^2+2s+1}$$

Al igual que en el punto anterior debo hallar la forma de relacionar esta transferencia con una fracción del tipo $\frac{F.T}{F.R_s}$.

Utilizando los parámetros (Z):

$$V_2 = z_{21} . I_1 + z_{22} I_2$$

$$\frac{V_2}{I_1} = \frac{z_{21}}{1 + \frac{z_{22}}{R_L}} \quad y \ (\Omega z = R_L)$$

$$\frac{V_2}{I_1} = \frac{z_{21}}{1 + z_{22}}$$

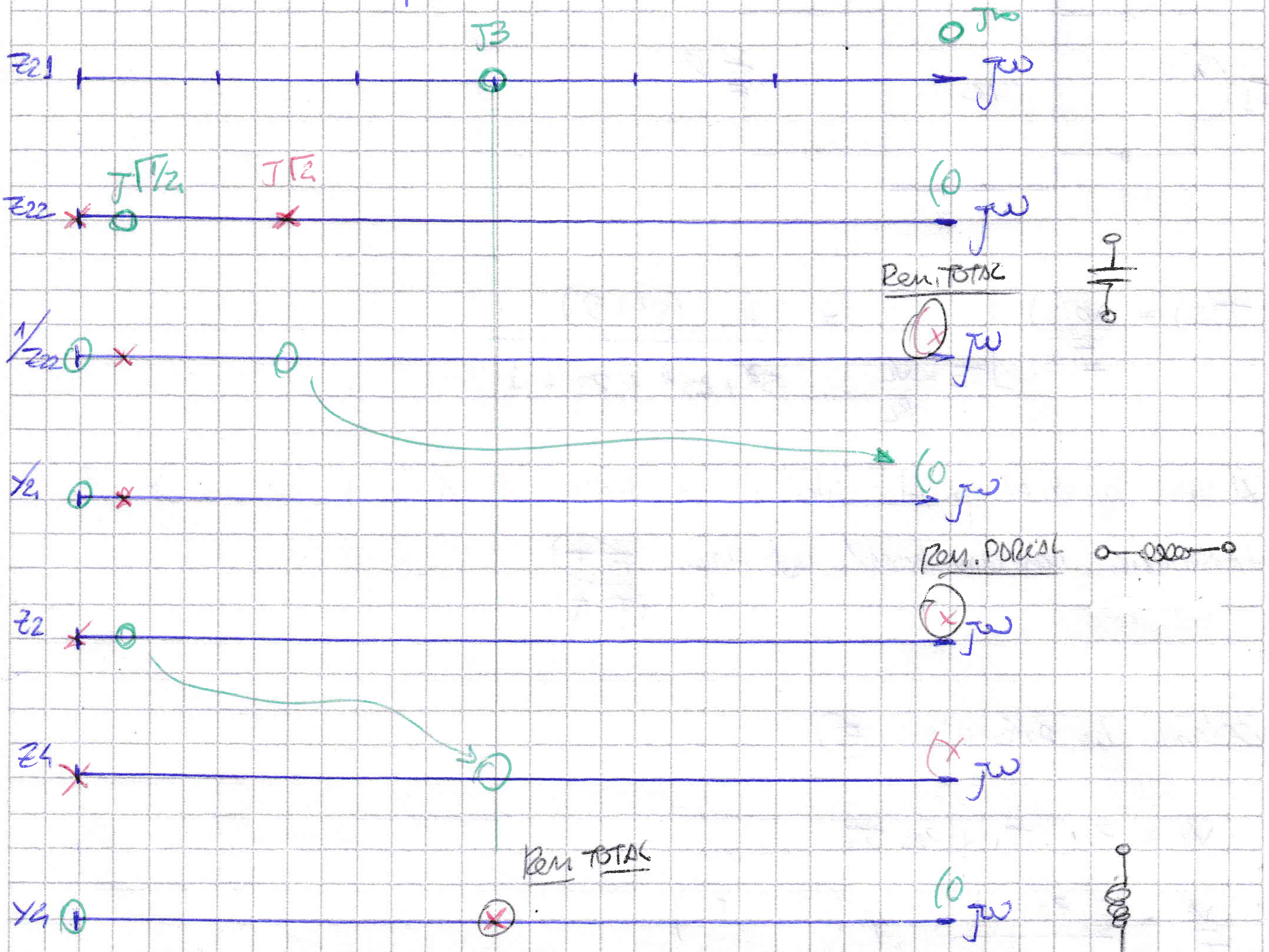
El numerador $(s^2+9)$ es PAR, por lo tanto debo hallar un denominador común IMPAR.

$$D = s^3 + 2s \Rightarrow T(s) = \frac{V_2}{I_1} = \frac{\overset{z_{21}}{K.\frac{(s^2+9)}{s^3+2s}}}{1 + \underset{z_{22}}{\frac{2s^2+1}{s^3+2s}}}$$

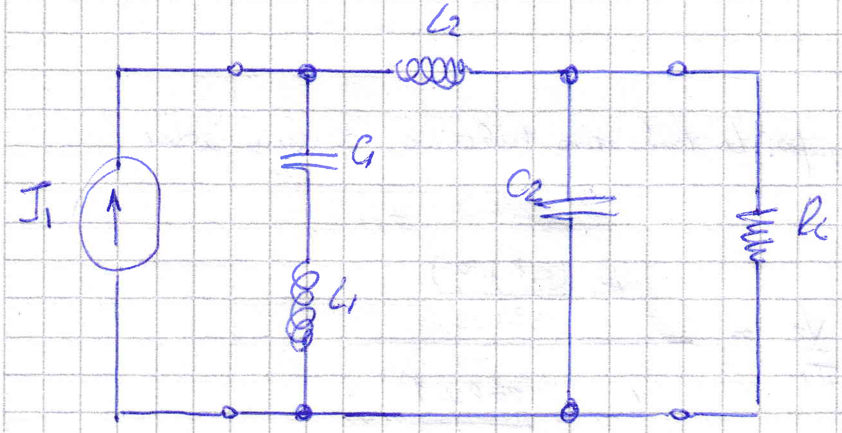
NOTA

$$Z_{22} = \frac{2s^2+1}{s^3+2s} = \frac{2.(s^2+1/2)}{s.(s^2+2)}$$

Sintetizo con $Z_{22}$ respetando los ceros de transmisión de la transferencia:




La red sin valores queda de la siguiente forma:



HOJA Nº

FECHA

$$\frac{1}{z_{22}} = \frac{s.(s^2+2)}{2(s^2+1/2)}$$

$$\cancel{Y}_2 = \frac{1}{z_{22}} - s.k_\infty$$

$$k'_\infty = \lim_{s\to\infty}\left(\frac{1}{z_{22}}\right)\cdot\frac{1}{s} = \lim_{s\to\infty}\frac{\cancel{s}.(s^2+2)}{2.(s^2+\frac{1}{2})}\cdot\frac{1}{\cancel{s}} = \lim_{s\to\infty}\frac{s^2+2}{2s^2+1}$$

$$\boxed{k_\infty = \frac{1}{2}} = \{Y(s)\} = sC \Rightarrow \boxed{C_2 = \frac{1}{2}}$$

$$Y_2 = \frac{s.(s^2+2)}{2.(s^2+1/2)} - \frac{1}{2}.s = \frac{s^3+2s-\frac{1}{\cancel{2}}s.\cancel{2}.(s^2+\frac{1}{2})}{2.(s^2+1/2)}$$

$$Y_2 = \frac{\cancel{s^3}+2s-\cancel{s^3}-\frac{1}{2}s}{2.(s^2+1/2)} = \frac{2s-\frac{1}{2}s}{2.(s^2+\frac{1}{2})} = \frac{\frac{3}{2}s}{2.(s^2+\frac{1}{2})}$$

$$z_4(s)\Big|_{s=j3} = z_2 - k'_\infty.s = 0$$

$$k'_\infty = \lim_{s\to j3}\frac{2(s^2+1/2)}{\frac{3}{2}s}\cdot\frac{1}{s} = \frac{2.(-9+1/2)}{\frac{3}{2}.(-9)} = \frac{34}{27} = \{L(s)\}$$

$$\boxed{L_2 = 34/27}$$

$$z_4(s) = \frac{2.(s^2+1/2)}{\frac{3}{2}s} - \frac{34}{27}.s = \frac{2s^2+1-\frac{\overset{17}{\cancel{34}}}{{}_{9}\cancel{27}}.\frac{\overset{1}{\cancel{3}}}{\cancel{2}1}.s^2}{(3/2)s}$$

$$z_4(s) = \frac{(1/9).s^2+1}{\frac{3}{2}s}$$

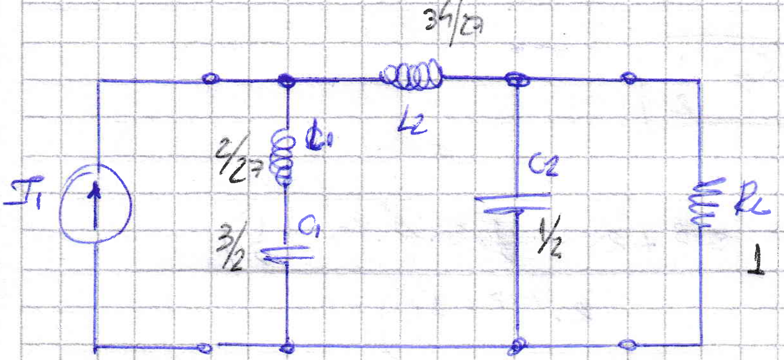
NOTA

$$Y_4 = \frac{1}{Z_4} = \frac{3/2 \cdot s}{\frac{1}{9}\cdot(s^2+9)} = \frac{3/2}{1/9} \cdot \frac{s}{s^2+9}$$

$$Y_4(s) = \frac{27}{2} \cdot \frac{s}{s^2+9} = \frac{1}{\underbrace{\frac{2}{27}s + \frac{1}{\frac{3}{2}s}}_{=Z(s)}}$$

$\boxed{L_1 = 2/27} \wedge \boxed{C_1 = \frac{3}{2}}$

La red final con valores quedaría de la siguiente forma:




Verificación

$$\frac{V_2}{I_1} = \frac{1}{C}$$

$$T_T = \begin{pmatrix} 1 & 0 \\ \frac{1}{sL_1 + \frac{1}{sC_1}} & 1 \end{pmatrix} \cdot \begin{pmatrix} 1 & sL_2 \\ 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} 1 & 0 \\ sC_2 & 1 \end{pmatrix} \cdot \begin{pmatrix} 1 & 0 \\ 1 & 1 \end{pmatrix}$$

Resolución simbólica / numérica.

NOTA