Ejercicio 4

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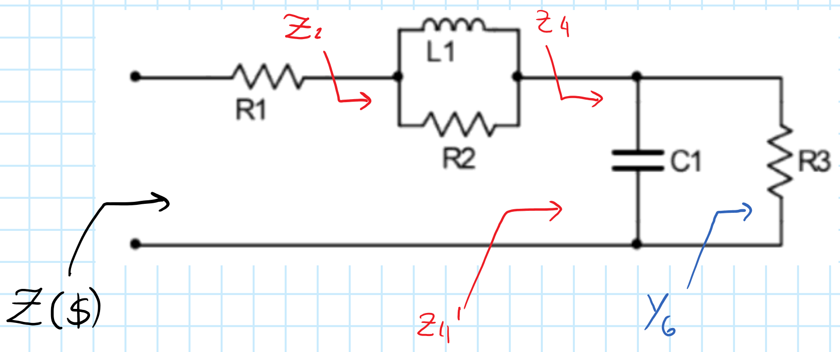
Ejercicio #4

Encuentre el valor de los elementos que integran el siguiente dipolo y que satisface la función de excitación propuesta: $Z_{(s)} = \dfrac{s^2+10s+24}{s^2+12s+20}$



$$Z_2(s) = Z(s) - K_\infty = 0 \rightarrow K_\infty = \lim_{s\to\infty} Z(s) \rightarrow \boxed{K_\infty = 1}$$

$$Z_2(s) = \frac{s^2+10s+24}{s^2+12s+20} - 1 = \frac{s^2+10s+24-s^2-12s-20}{s^2+12s+20} = \frac{-2s+4}{s^2+12s+20} \quad ? \quad \times$$

Prueba de retirar el tanque RL primero

$$Z(s) = \frac{(s+4)(s+6)}{(s+2)(s+10)} \qquad \sigma_1 = 2 \text{ y } \sigma_2 = 10$$

$$Z_4'(s) = Z(s) - \frac{sK_1}{(s+2)} = 0 \rightarrow K_1 = \lim_{s\to -2} \frac{Z(s)(s+2)}{s} = \lim_{s\to -2} \frac{(s+4)(s+6)}{\cancel{(s+2)}(s+10)} \frac{\cancel{(s+2)}}{s}$$

$$K_1 = \frac{(2)(4)}{(8)(-2)} = \frac{8}{-16} \quad \times$$

Asumo que RL remueva en $\sigma = 10$

$$Z_4'(s) = Z(s) - \frac{sK_1}{(s+10)} = 0 \rightarrow K_1 = \lim_{s\to -10} \frac{Z(s)(s+10)}{s} = \lim_{s\to -2} \frac{(s+4)(s+6)}{(s+2)\cancel{(s+10)}} \frac{\cancel{(s+10)}}{s}$$

$$K_1 = \frac{(-6)(-4)}{(-8)(-10)} \rightarrow \boxed{K_1 = \frac{3}{10}}$$

$$Z_4'(s) = \frac{(s+4)(s+6)}{(s+2)(s+10)} - \frac{3}{10}\frac{s}{(s+10)} = \frac{(s+4)(s+6) - \frac{3}{10}s\cdot(s+2)}{(s+2)(s+10)} = \frac{s^2+10s+24 - \frac{3}{10}s^2 - \frac{6}{10}s}{(s+2)(s+10)}$$

$$Z_4'(\$) = \frac{\frac{7}{10}\$^2 + \frac{47}{5}\$ + 24}{(\$+2)(\$+10)} = \frac{7}{10}\,\frac{\left(\$+\frac{24}{7}\right)\cancel{(\$+10)}}{(\$+2)\cancel{(\$+10)}} = \frac{7}{10}\,\frac{\left(\$+\frac{24}{7}\right)}{(\$+2)}$$

Retiro R_1

$$Z_2(\$) = Z_4(\$) - K_1^\infty = 0 \to K_1^\infty = \lim_{\$\to\infty} Z_4(\$) \to \boxed{K_1^\infty = \frac{7}{10}}$$

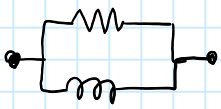
$$Z_2(\$) = \frac{7}{10}\left[\frac{\left(\$+\frac{24}{7}\right)}{(\$+2)} - 1\right] = \frac{7}{10}\left[\frac{\cancel{\$}+\frac{24}{7}-\cancel{\$}-2}{(\$+2)}\right] = \frac{7}{10}\,\frac{\frac{10}{7}}{(\$+2)} = \frac{1}{\$+2}$$

Retiro el Capacitor en derivación

$$Y_6(\$) = Y_2(\$) - \$K_2^\infty = 0 \to K_2^\infty = \lim_{\$\to\infty}\frac{Y_2(\$)}{\$} = \lim_{\$\to\infty}\frac{(\$+2)}{\$} \to \boxed{K_2^\infty = 1}$$

$$Y_6(\$) = \cancel{\$}+2-\cancel{\$} = 2 = G_3 \to \boxed{R_3 = \frac{1}{2}}$$

Tanque Serie



Forma residuo. $\frac{\$K_i}{\$+\nu}$

$$Z_{RL} = \frac{1}{G_i + \frac{1}{\$L_i}} = \frac{\$L_i}{\$G_iL_i+1} = \frac{\$\frac{1}{G_i}}{\$+\frac{1}{G_iL_i}}$$

$$\therefore\quad K_i = \frac{1}{G_i} = R_i \quad\wedge\quad \nu = \frac{1}{G_iL_i} = \frac{R_i}{L_i}$$

Componentes

$\boxed{R_2 = K_1 = \frac{3}{10}}$ $\boxed{L_1 = \frac{R_2}{\nu} = \frac{3}{20}}$ $\boxed{R_1 = K_1^\infty = \frac{7}{10}}$ $\boxed{C_1 = K_2^\infty = 1}$