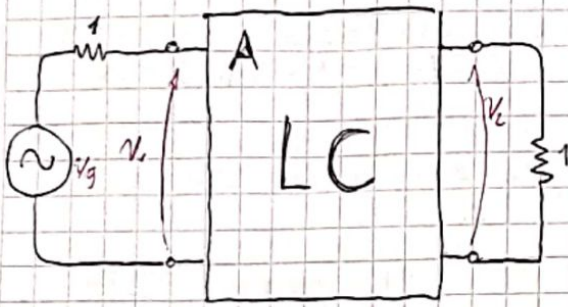


# Tarea Semanal #13



$$T(s) = \frac{v_L}{v_g} = \text{bessel de 3}^{\text{er}} \text{ orden}$$

Recordando:

$$\text{Bessel: } B(s) = \frac{P(s)}{Q(s)} = \frac{1}{2sh(s) + \cosh(s)}$$

$$\cosh(s) = \frac{1}{s} + \frac{1}{\frac{3}{s} + \frac{1}{\frac{5}{s} + \dots}} \Rightarrow \text{orden } 3 = \frac{1}{s} + \frac{1}{\frac{3}{s} + \frac{1}{5/s}}$$

$$\cosh(s) = \frac{1}{s} + \frac{5s}{15 + s^2} = \frac{15 + 6s^2}{s^3 + 15s} = \frac{\cosh(s)}{2sh(s)}$$

0 dB en continuo

$$\text{Bessel de 3}^{\text{er}} \text{ orden: } B_3(s) = \frac{15}{s^3 + 6s^2 + 15s + 15} = S_{21}(s)$$

$$\|S_{21}(s)\|^2 = S_{21}(s) \cdot S_{21}(-s) = \frac{15}{s^3 + 6s^2 + 15s + 15} \cdot \frac{15}{-s^3 + 6s^2 - 15s + 15}$$

$$\frac{225}{-s^6 + 6s^4 - 45s^2 + 225} = \|S_{21}(s)\|^2$$

No disipativo

$$\|S_{11}\|^2 = 1 - \|S_{21}\|^2 \Rightarrow \|S_{11}\|^2 = \frac{-s^6 + 6s^4 - 45s^2 + 225 - 225}{-s^6 + 6s^4 - 45s^2 + 225}$$

$$S_{11}(s) = \frac{As^3 + Bs^2 + Cs + D}{s^3 + 6s^2 + 15s + 15}, \quad \frac{-As^3 + Bs^2 - Cs + D}{-s^3 + 6s^2 - 15s + 15}$$

$$D^2 = 0 \Rightarrow D = 0$$

$$-A^2 = -1 \Rightarrow A = 1$$

$$-2AC + B^2 = 6 \Rightarrow B = \sqrt{6 + 2C}$$

$$-C^2 + 2DB = -45 \Rightarrow C = 3\sqrt{5}$$

$$B = 4.406405322$$

$$\sqrt{6 + 6\sqrt{5}} = \sqrt{6(1 + \sqrt{5})} = \sqrt{2} \cdot \sqrt{3} \cdot \sqrt{1 + \sqrt{5}}$$

$$S_{11}(s) = \frac{s^3 + B s^2 + C s}{s^3 + 6 s^2 + 15 s + 15} = \frac{P}{Q}$$

$$Z_1 = \frac{1 + S_{11}}{1 - S_{11}} = \frac{1 + \frac{P}{Q}}{1 - \frac{P}{Q}} = \frac{P+Q}{Q-P} = \frac{2s^3 + (6+B)s^2 + (15+C)s + 15}{(6-B)s^2 + (15-C)s + 15}$$

Realizo Caver removiendo en inf. de  $Z_1$  para obtener pasd-bajos

$Z_1(s) =$

$$\begin{array}{r} 2s^3 + 10,4064s^2 + 21,7082s + 15 \quad | \quad 1,5936s^2 + 8,2918s + 15 \\ 2s^3 + 10,4064s^2 + 18,8536s + 15 \quad | \quad 2,8528s + 15 \\ \hline (6-B)s^2 + (15-C)s + 15 \quad | \quad 2,8528s + 15 \\ 1,5936s^2 + 8,2918s \quad | \quad 0,5527s \\ \hline 2,8828s + 15 \quad | \quad 15 \\ 2,8828s \quad | \quad 0,1925 \text{ amho} \\ \hline 15 \quad | \quad 15 \\ \hline 0y \end{array}$$

