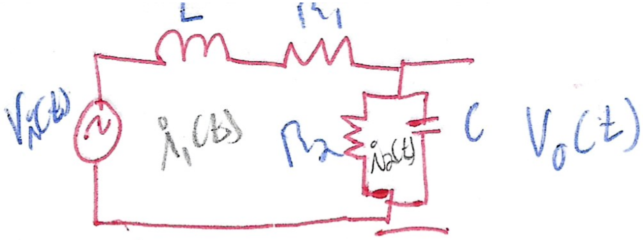


Determinamos las ecuaciones

$$V_i(t) = L\frac{di_1(t)}{dt} + R_1 i_1(t) + R_2 i_1(t) - R_2 i_2(t) \ldots (1)$$

$$0 = R_2 i_2(t) - R_2 i_1(t) + \frac{1}{C}\int i_2(t)\,dt \ldots (2)$$

$$V_0(t) = \frac{1}{C}\int i_2(t)\,dt \ldots (3)$$

Transformamos las ecuaciones

$$V_i(s) = sLI_1(s) + R_1 I_1(s) + R_2 I_1(s) - R_2 I_2(s) \ldots (4)$$

$$0 = R_2 I_2(s) - R_2 I_1(s) + \frac{1}{sC} I_2(s) \ldots (5)$$

$$\underbrace{V_0(s)}_{V.S} = \underbrace{\frac{1}{sC}}_{F.T} \underbrace{I_2(s)}_{V.E} \ldots (6)$$

Despejamos las variables dependientes de (4)

$$V_i(s) = I_1(s)[sL + R_1 + R_2] - R_2 I_2(s)$$

$$V_i(s) + R_2 I_2(s) = I_1(s)[sL + R_1 + R_2]$$

$$\underbrace{\frac{1}{sL+R_1+R_2}}_{F.T}\underbrace{V_i(s)}_{V.E} + \underbrace{\frac{R_2}{sL+R_1+R_2}}_{F.T} \underbrace{I_2(s)}_{V.E} = \underbrace{I_1(s)}_{V.S} \ldots (7)$$

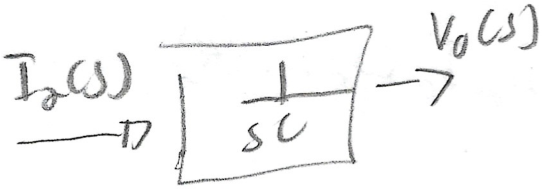
$$0 = I_2(s)\left[R_2 + \frac{1}{sC}\right] - R_2 I_1(s)$$

$$R_2 I_1(s) = I_2(s)\left[\frac{sCR_2+1}{sC}\right]$$

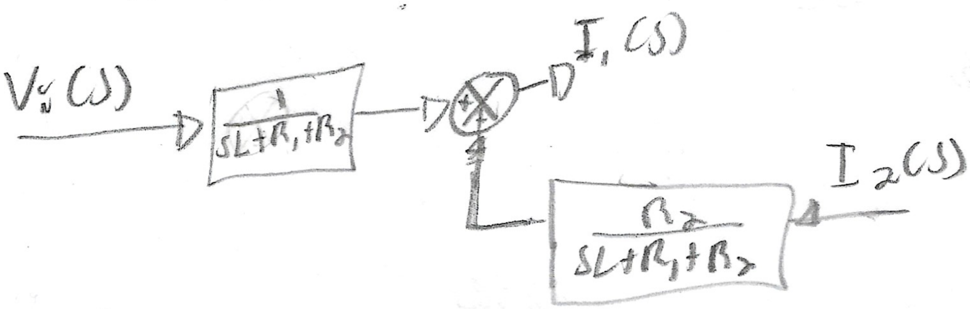
$$\underbrace{\left(\frac{sCR_2}{sCR_2+1}\right)}_{F.T}\underbrace{I_1(s)}_{V.E} = \underbrace{I_2(s)}_{V.S} \ldots (8)$$

Generaramos un diagrama de bloques particular para cada ecuación.

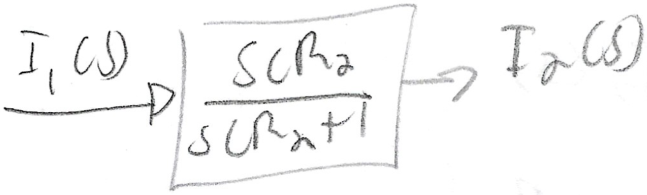
Para la ecuación (6)



Para la ecuación (7)



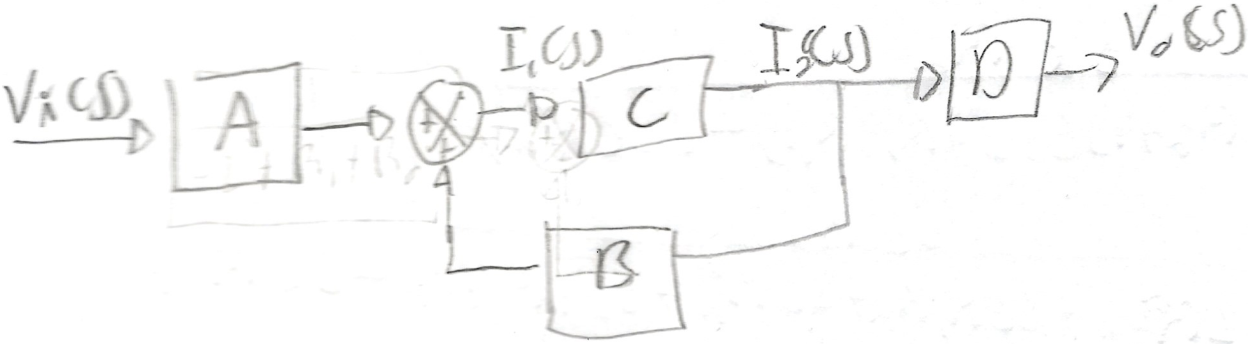
Para la ecuación (8)



Relacionamos los diagramas de bloques

Asignamos

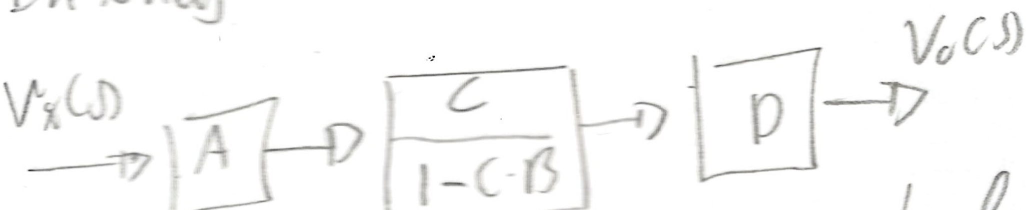
$A=\frac{1}{sL+R_1+R_2}$, $B=\frac{R_2}{sL+R_1+R_2}$, $C=\frac{sCR_2}{sCR_2+1}$, $D=\frac{1}{sC}$



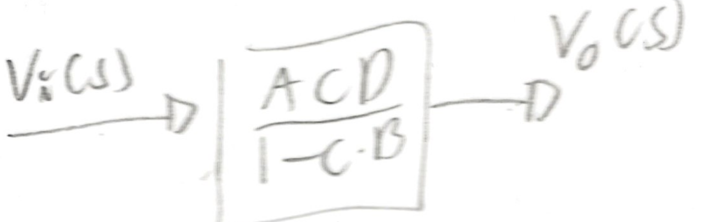
como

$$\frac{C(s)}{R(s)}=\frac{G(s)}{1-H(s)G(s)}$$

Entonces



Aplicando la Regla 4 de la tabla



Sustituyendo A, B, C y D en $\frac{ACD}{1-C\cdot B}$

$$\frac{ACD}{1-C\cdot B}=\frac{\left(\frac{1}{sL+R_1+R_2}\right)\left(\frac{sCR_2}{sCR_2+1}\right)\left(\frac{1}{sC}\right)}{1-\left(\frac{sCR_2}{sCR_2+1}\right)\left(\frac{R_2}{sL+R_1+R_2}\right)}$$

$$= \frac{\left(\frac{1}{sL+R_1+R_2}\right)\left(\frac{sCR_2}{sCR_2+1}\right)\left(\frac{1}{sC}\right)}{\frac{(sCR_2+1)(sL+R_1+R_2)-\boxed{(sCR_2)}R_2}{(sCR_2+1)(sL+R_1+R_2)}}$$

$$= \frac{sCR_2}{(sC)\left((sCR_2+1)(sL+R_1+R_2)-(sCR_2^2)\right)}$$

$$= \frac{\cancel{sC}R_2}{(\cancel{sC})\left(s^2CLR_2+sCR_1R_2+\cancel{sCR_2^2}+sL+R_1+R_2-\cancel{sCR_2^2}\right)}$$

$$= \frac{R_2}{s^2CLR_2+sCR_1R_2+sL+R_1+R_2}$$

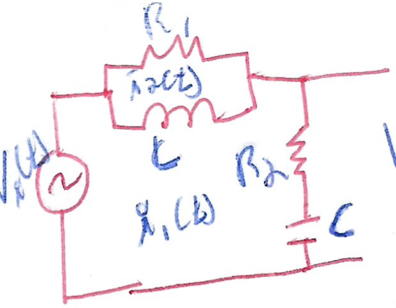
Evaluamo las [illegible]

$$K = \lim_{s \to 0} G(s) \simeq 0$$

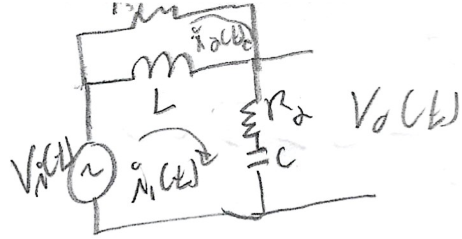
$$K = \lim_{s \to \infty} G(s) \approx 0$$

orden = segudo
exactitud = dos

Número de Polos = dos
Número de Ceros = ninguno



$\Rightarrow$



Determinamos las ecuaciones

$$V_i(t) = \frac{1}{C}\int i_1(t)\,dt + R_2 i_1(t) + L\frac{di_1(t)}{dt} - L\frac{di_2(t)}{dt} \dots (1)$$

$$0 = R_1 i_2(t) + L\frac{di_2(t)}{dt} - L\frac{di_1(t)}{dt} \dots (2)$$

$$V_o(t) = R_2 i_1(t) + \frac{1}{C}\int i_1(t)\,dt \dots (3)$$

Transformamos las ecuaciones

$$V_i(s) = \frac{1}{sC} I_1(s) + R_2 I_1(s) + sLI_1(s) - sLI_2(s) \dots (4)$$

$$0 = R_1 I_2(s) + sLI_2(s) - sLI_1(s) \dots (5)$$

$$\underbrace{V_o(s)}_{V.S} = R_2 I_1(s) + \frac{1}{sC} I_1(s) = \underbrace{I_1(s)}_{V.E}\underbrace{\left(\frac{sCR_2+1}{sC}\right)}_{F.T} \dots (6)$$

Despejamos las variables dependientes de (4)

$$V_i(s) = I_1(s)\left[\frac{1}{sC} + (R_2 + sL)\right] - sLI_2(s)$$

$$sLI_2(s) = I_1(s)\left(\frac{sCR_2 + s^2CL + 1}{sC}\right) - V_i(s)$$

$$\underbrace{I_2(s)}_{V.S} = \underbrace{I_1(s)}_{V.E}\underbrace{\left(\frac{s^2CL + sCR_2 + 1}{s^2CL}\right)}_{F.T} - \underbrace{\frac{1}{sL}}_{F.T}\underbrace{V_i(s)}_{V.E} \dots (7)$$

de (s)

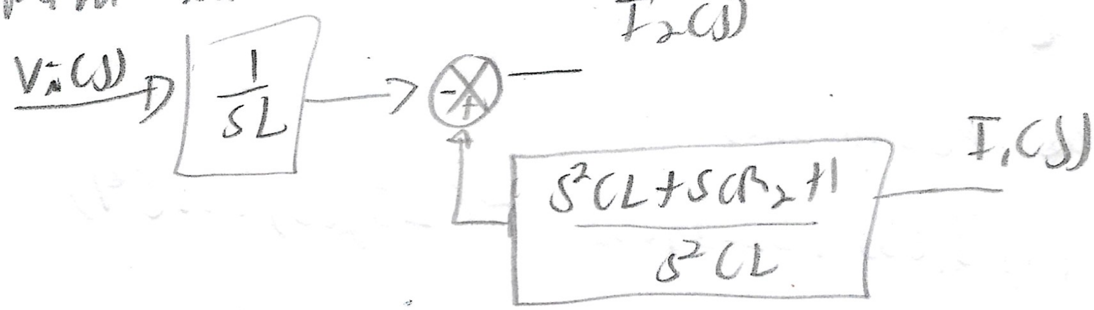
$$0 = I_2(s)(R_1+sL) - sL\,I_1(s)$$

$$sL\,I_1(s) = I_2(s)(R_1+sL)$$

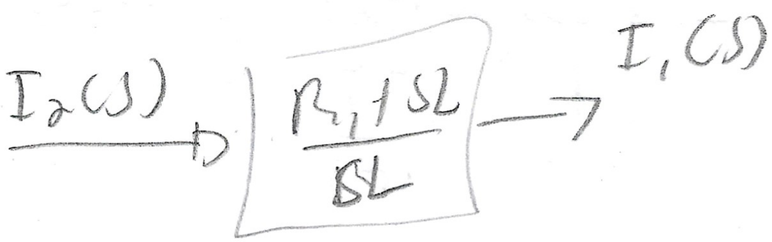
$$\underbrace{I_1(s)}_{V.S} = \underbrace{I_2(s)}_{V.E}\underbrace{\left(\frac{R_1+sL}{sL}\right)}_{F.T} \dots (8)$$

Generaremos un diagrama de bloque particular para cada ecuación.

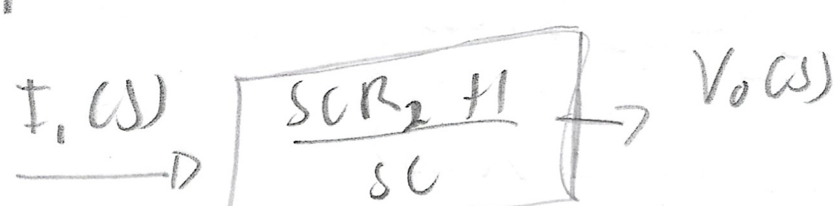
Para la ecuación (7)



Para la ecuación (8)



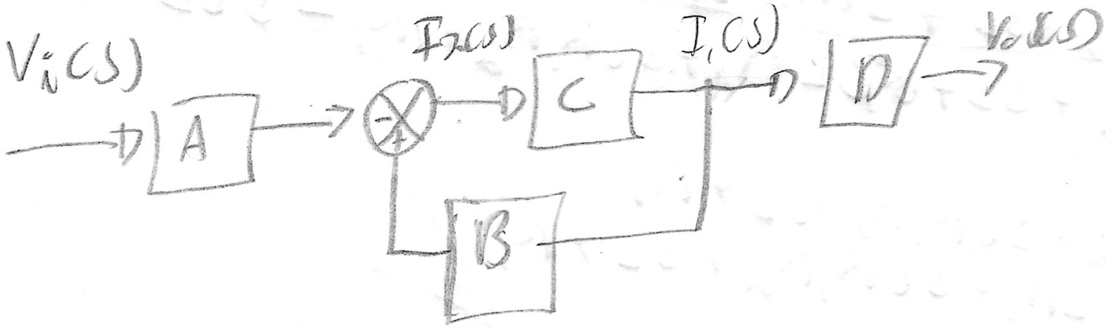
Para la ecuación (6)



Relucionamos los diagrama de bloques

Asignamos

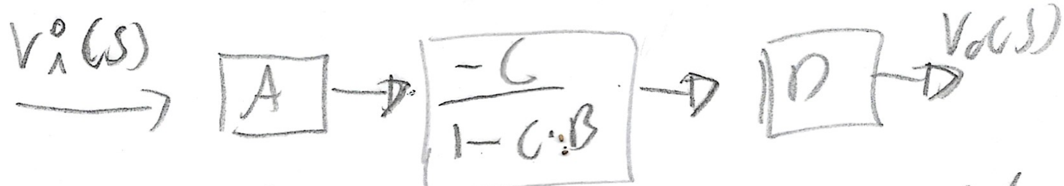
$$A = \frac{1}{sL}, \quad B = \frac{s^2CL + sCR_2 + 1}{s^2CL}, \quad C = \frac{R_1 + sL}{sL}, \quad D = \frac{sCR_2 + 1}{sC}$$



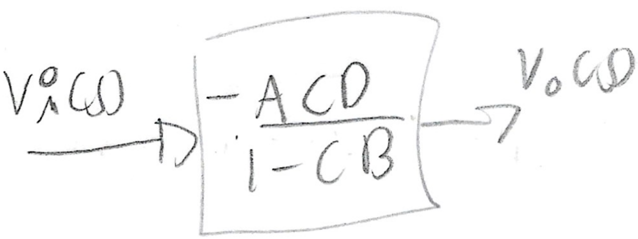
Como

$$\frac{C(s)}{R(s)} = \frac{-G(s)}{1 - H(s)G(s)}$$

Entonces



Aplicando la regla 4 de la tabla



Sustituyendo A, B, C y D en $-\frac{ACD}{1-CB}$

$$\frac{-ACD}{1-CB} = \frac{-\left(\frac{1}{sL}\right)\left(\frac{sL+R_1}{sL}\right)\left(\frac{sCR_2+1}{sC}\right)}{1 - \left(\frac{sL+R_1}{sL}\right)\left(\frac{s^2CL+sCR_2+1}{s^2CL}\right)}$$

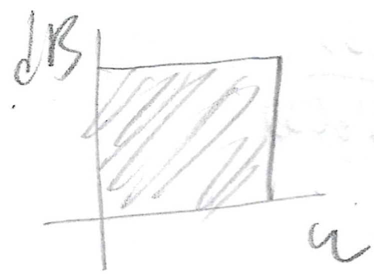
$$= \frac{-\left(\frac{1}{sL}\right)\left(\frac{sL+R_1}{sL}\right)\left(\frac{sCR_2+1}{sC}\right)}{\dfrac{(sL)(s^2CL)-(sL+R_1)(s^2CL+sCR_2+1)}{sL(s^2CL)}}$$

$$= \frac{s^2CLR_2 + sL + sCR_1R_2 + R_1}{\cancel{s^3CL^2} + s^2CLR_2 + sL + s^2CLR_1 + sCR_1R_2 + R_1 - \cancel{s^3CL^2}}$$

$$= \frac{s^2CLR_2 + sCR_1R_2 + sL + R_1}{s^2CLR_2 + s^2CLR_1 + sCR_1R_2 + sL + R_1}$$

$$K = \lim_{s \to 0} G(s) = 1$$

$$K = \lim_{s \to \infty} G(s) = 0$$



orden = segundo
exactitud = segundo

Número de polos = dos
Número de ceros = dos