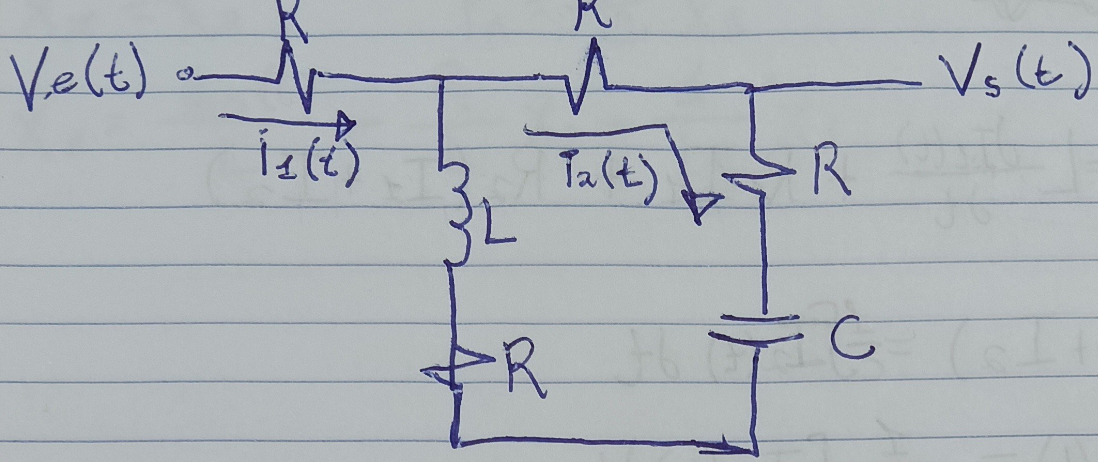


Ecuaciones Principales

$2R\,i_1(t)$ $\qquad$ $R i_1(t) - R i_2(t)$

$$V_e(t) = R\, i_1(t) + \frac{L\, d\left[i_1(t) - i_2(t)\right]}{dt} + R\left[i_1(t) - i_2(t)\right]$$

$R i_1(t) - R i_2(t)$

$$\frac{L\, d\left[i_1(t) - i_2(t)\right]}{dt} + R\left[i_1(t) - i_2(t)\right] = R i_2(t) + \frac{1}{C}\int i_2(t)\,dt$$

$3R i_2(t)$

$$V_s(t) = R i_2(t) + \frac{1}{C}\int i_2(t)\,dt$$

$$i_1(t) = \left[V_e(t) - \frac{L\, d\left[i_1(t) - i_2(t)\right]}{dt} + R i_1(t) - \frac{1}{C}\int i_2(t)\,dt\right]\frac{1}{2R}$$

$$i_2(t) = \left[\frac{L\, d\left[i_1(t) - i_2(t)\right]}{dt} + R i_1(t) - \frac{1}{C}\int i_2(t)\,dt\right]\frac{1}{3R}$$

$$V_s(t) = R\, i_2(t) + \frac{1}{C}\int i_2(t)\,dt$$

Transformada de laPlace

$$V(s) = R\,i_1(s) + Ls\left[I_1(s) - I_2(s)\right] + R\left[i_1(s) - i_2(s)\right]$$

$$= 2R\,i_1(s) + Ls\,i_1(s) - Ls\,I_2(s) - R\,i_2(s)$$

$$= (2R + Ls)\,i_1(s) - (Ls + R)\,i_2(s)$$

$$Ls\left[I_1(s) - i_2(s)\right] + R\left[i_1(s) - i_2(s)\right] = 2R\,i_2(s) + \frac{i_2(s)}{Cs}$$

$$Ls\,i_1(s) - Ls\,i_2(s) + R\,i_1(s) - R\,i_2(s) = 2R\,i_2(s) + \frac{i_2(s)}{Cs}$$

$$Ls\,i_1(s) + R\,i_1(s) = Ls\,i_2(s) + 3R\,i_2(s) + \frac{i_2(s)}{Cs}$$

$$(Ls + R)\,i_1(s) = \left(Ls + 3R + \frac{1}{Cs}\right) i_2(s)$$

$$i_1(s) = \frac{CLs^2 + 3CRs + 1}{Cs(Ls + R)}\,i_2(s)$$

$$V_0(s) = \left(R + \frac{1}{Cs}\right) i_2(s)$$

$$= \frac{CRs + 1}{Cs}\,i_2(s)$$

Procedimiento algebraico

$$V_e(s) = (2R + Ls)\left[\frac{CLs^2 + 3CRs + 1}{Cs(Ls + R)} - (Ls + R)\right] i_2(s)$$

⋮

$$V_e(s) = \frac{3CLRs^2 + (5CR^2 + L)s + 2R}{Cs(Ls + R)}\, i_2(s)$$

Función de transferencia

$$\frac{V_s(s)}{V_e(s)} = \frac{CLRs^2 + (CR^2 + L)s + R}{3CLRs^2 + 5(CR^2 + L)s + 2R}$$

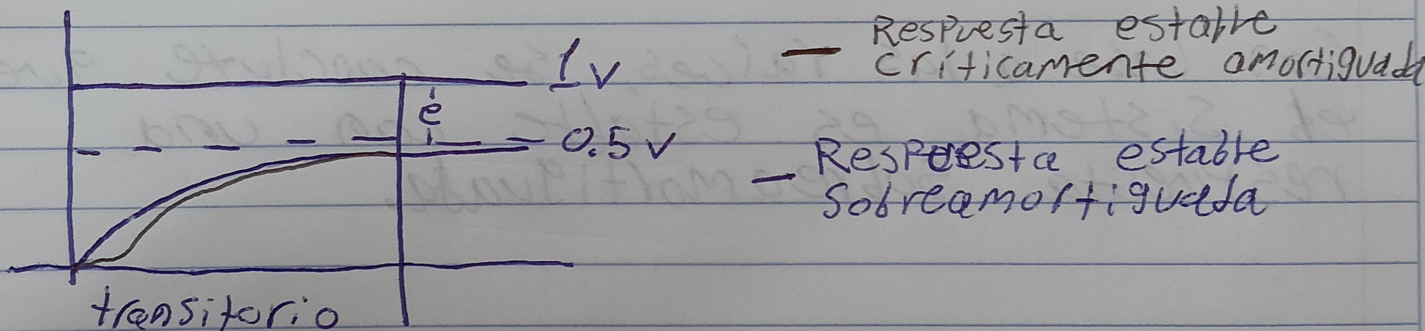
Error en estado estacionario [escalón unitario]

$$e(s) = \lim_{s\to 0} s\, V_e(s)\left[1 - \frac{V_s(s)}{V_e(s)}\right]$$

$$= \lim_{s\to 0} s \times \frac{1}{s}\left[1 - \frac{CLRs^2 + (CR^2+L)s + R}{3CLRs^2 + (5CR^2+L)s + 2R}\right]$$

$$= \frac{R}{2R} = \frac{1}{2}\,V$$

Bosquejo



Estabilidad en lazo abierto

- Calcular las raíces del denominadas [Polos]

$$3CLRS^2 + (5CR^2 + L)S + 2R = 0$$

$C = ?$

$L = ?$

$R = ?$

Polos:

-4.46428571e+07

-7.84313726e-02

den = [3*C*L*R, 5*C*R**2+L, 2*R]

Con base a las raíces, se conclute que el sistema es estable con una respuesta sobreamortiguada.