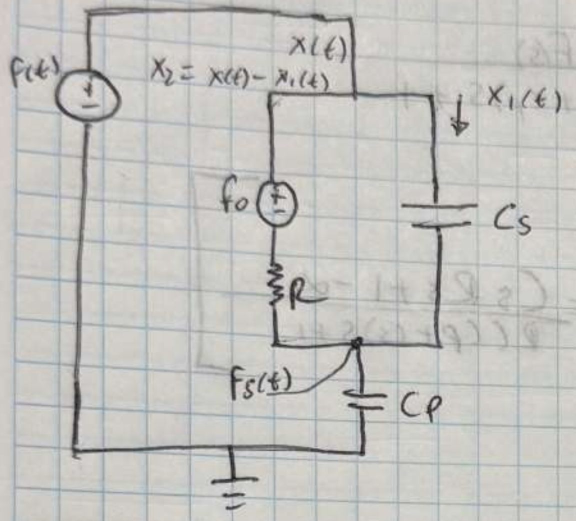
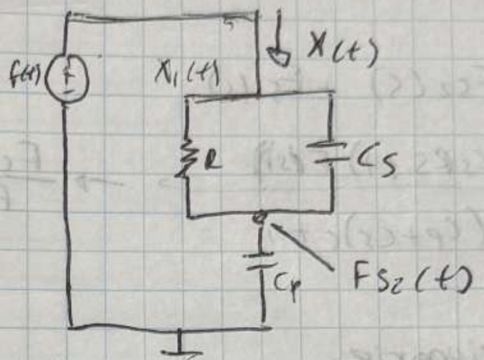
Circuito Electrico

nodos = derivadas para capacitor



Analisis Apagando F_o



$X(t) = X_1(t) + X_2(t)$

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$x(t) = C_p \dfrac{d[F_s(t)]}{dt}$

$X_2(t) = \dfrac{F(t) - F_s(t)}{R}$ $\quad X_1(t) = C_s \dfrac{d(F(t) - F_s(t))}{dt}$

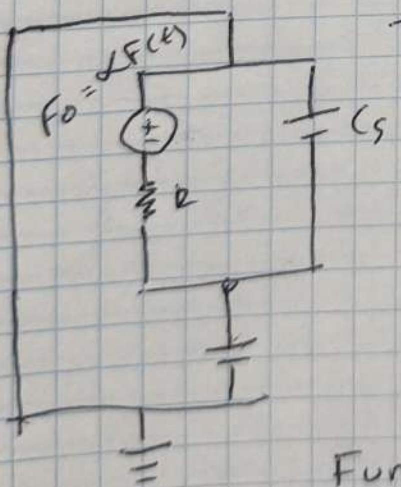
$C_p \dfrac{dF_s(t)}{dt} = C_s \dfrac{d[F(t) - F_s(t)]}{dt} + \dfrac{F(t) - F_s(t)}{R}$

$C_p s F(s) = C_s s [F(s) - F_s(s)] + \dfrac{F(s) - F_s(s)}{R}$

$(C_p s + C_s s + \frac{1}{R}) F_s(s) = (C_s s + \frac{1}{R}) F(s)$

$\dfrac{F_s(s)}{F(s)} = \dfrac{(C_s s + \frac{1}{R})}{C_p s + C_s s + \frac{1}{R}}$ $\qquad \dfrac{(C_p s + C_s s + \frac{1}{R}) F_s(s)}{F_s} = (C_s s + \frac{1}{R})$

$\dfrac{C_s R s + 1}{C_p R s + C_s R s + 1}$ $\qquad \dfrac{(C_s s + \frac{1}{R}) R}{(C_p s + C_s s) R} = \dfrac{C_s s R + 1}{C_p R s + C_s s + 1}$



Ecuaciones Principales

$-\alpha F(t) \cdot R x(t) + \dfrac{1}{C_s + C_p} \int x(t)\, dt$

$F_{s_2}(t) = \dfrac{1}{C_s + C_p} \int x(t)\, dt$

Funcion de Transferencia

$-\alpha F(s) = R x(s) + \dfrac{x(s)}{(C_s + C_p) s}$ $\qquad \dfrac{F_s(s)}{F_s} = \dfrac{\dfrac{X_s}{(C_s + C_p) s}}{\dfrac{R (C_s + C_p) s + 1}{\alpha (C_s + C_p) s} X_s} = \dfrac{\alpha}{R (C_s + C_p) s + 1}$

$F_s(s) = \dfrac{X(s)}{(C_s + C_p) s}$

$$F_s = \frac{R(C_s + C_P)S + 1}{\alpha (C_s + C_P) S} \qquad F_{s2}(s) = \frac{-\alpha F(s)}{R(C_s + C_p)S + 1}$$

$$\left[\begin{array}{l} F_s(s) = F_{s2}(s) + F_{s2}(s) \\ F_s(s) = \dfrac{(C_s R s + 1) F(s)}{R(C_p + C_s)s + 1} \rightarrow \dfrac{F_s(s)}{F(s)} = \dfrac{C_s R s + 1 - \alpha}{R((C_p + C_s)S + 1} \end{array} \right]$$

Error estacionario

$$e(s) = \lim_{s \to 0} \frac{1}{s} s \left[1 - \frac{F_s(s)}{F(s)} \right] = \left[1 - \frac{C_s R s + 1 - \alpha}{R((C_p + C_s)s + 1} \right] = \left[1 - \frac{1 - \alpha}{1} \right]$$

$$e(s) = 1 - 1 + \alpha = \alpha$$

$$e(t) = \alpha V$$

$$e(s) = \alpha$$

Estabilidad en lazo abierto

$$R(C_p + C_s)s + 1 = 0$$

$$\lambda = -\frac{1}{R(C_p + C_s)}$$

$$Re\, \lambda < 0$$

El sistema presenta una respuesta estable