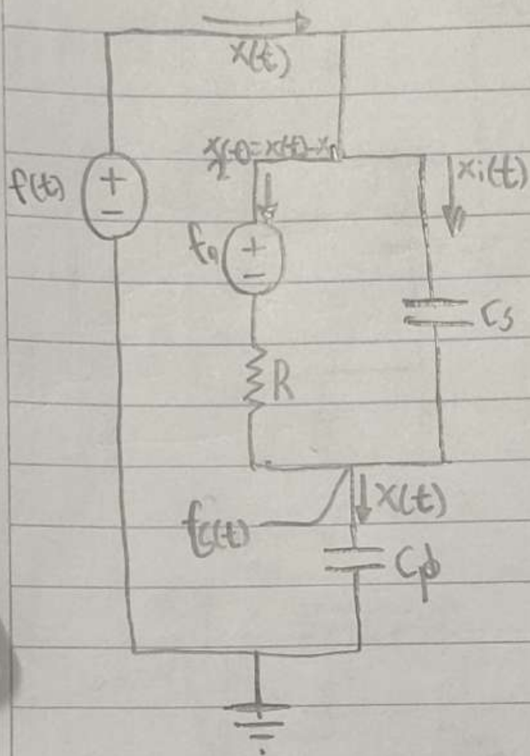
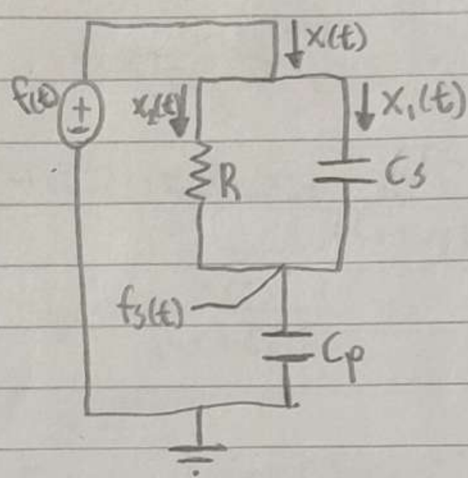
Circuito Electrico



$$x(t) = x_1(t) + x_2(t)$$

Funcion de transferencia

Analicis apagando Fo



$$X(t) = x_1(t) + x_2(t)$$

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

$$x_1(t) = C_s \frac{d[F(t) - F_s(t)]}{dt}$$

$$x_2(t) = \frac{F(t) - F_s(t)}{R}$$

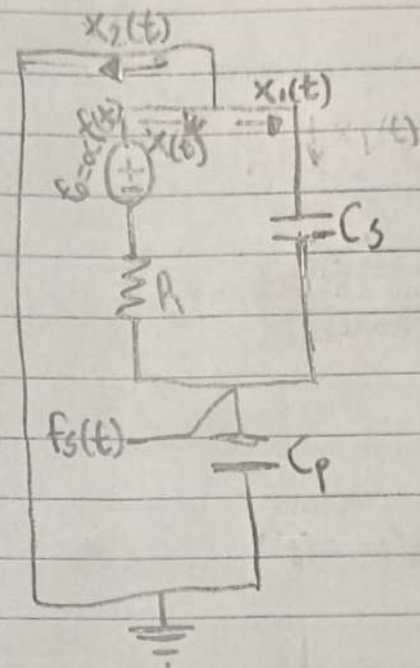
$$C_p \frac{dF_s(t)}{dt} = C_s \frac{d[F(t) - F_s(t)]}{dt} + \frac{F(t) - F_s(t)}{R}$$

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

$$\left(C_p S + C_s S + \frac{1}{R}\right) F_s(S) = \left(C_s S + \frac{1}{R}\right) F(S)$$

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

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



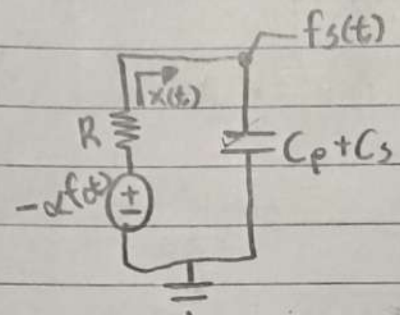
$$X(t) = X_1(t) + X_2(t)$$

$$-\alpha f(t) = R\,x(t) + \frac{1}{C_s + C_p}\int x(t)\,dt$$

$$f_S(t) = \frac{1}{C_p + C_s}\int x(t)\,dt$$

$$-\alpha F(s) = R\,X(s) + \frac{X(s)}{(C_s + C_p)s}$$

$$F_S(s) = \frac{X(s)}{(C_s + C_p)s}$$



$$F(s) = -\frac{R(C_p + C_s) + 1}{\alpha(C_s + C_p)s}\,X(s)$$

$$\frac{F_S(s)}{F(s)} = \frac{\dfrac{\cancel{X(s)}}{\cancel{(C_s + C_p)s}}}{\dfrac{R(C_s + C_p)s + 1}{\cancel{\alpha(C_s + C_p)s}}\,\cancel{X(s)}}$$

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

$$F_{S_2}(s) = \frac{-\alpha F(s)}{R(C_s + C_p)s + 1}$$

$$F_S(s) = F_{S_1}(s) + F_{S_2}(s)$$

$$F_S(s) = \frac{(C_s + Rs + 1)F(s) - \alpha F(s)}{R(C_p + C_s)s + 1}$$

$$\frac{F_S(s)}{F(s)} = \frac{C_s R s + 1 - \alpha}{R(C_p + C_s)s + 1}$$

Error en estado estacionario

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

$$e(s)=\cancel{s}\cdot\frac{1}{\cancel{s}}\left[1-\frac{\cancel{C_sRs}^{0}+1-\alpha}{\cancel{R(C_s+C_p)s}^{0}+1}\right]$$

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

$$e(s)=-\alpha \qquad e(t)=\alpha V=0.25\,V$$

Estabilidad en lazo abierto

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

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

$$Re\,\lambda<0$$

Se presenta una respuesta estable en el sistema