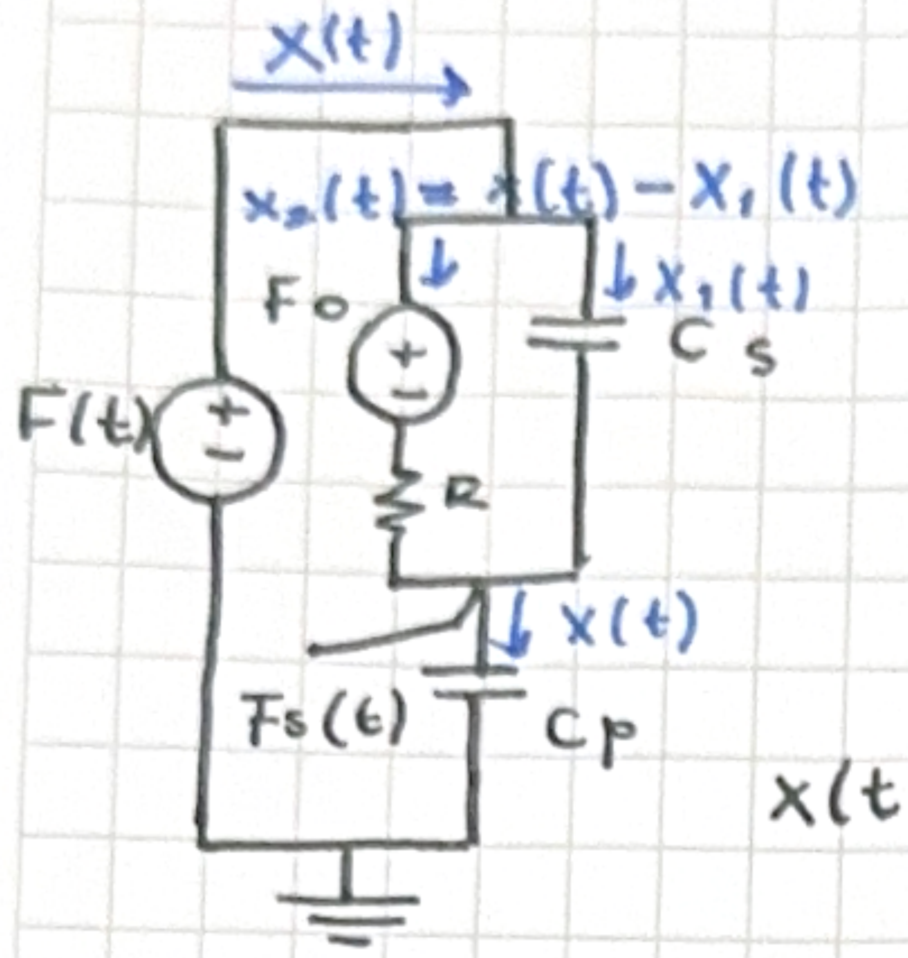
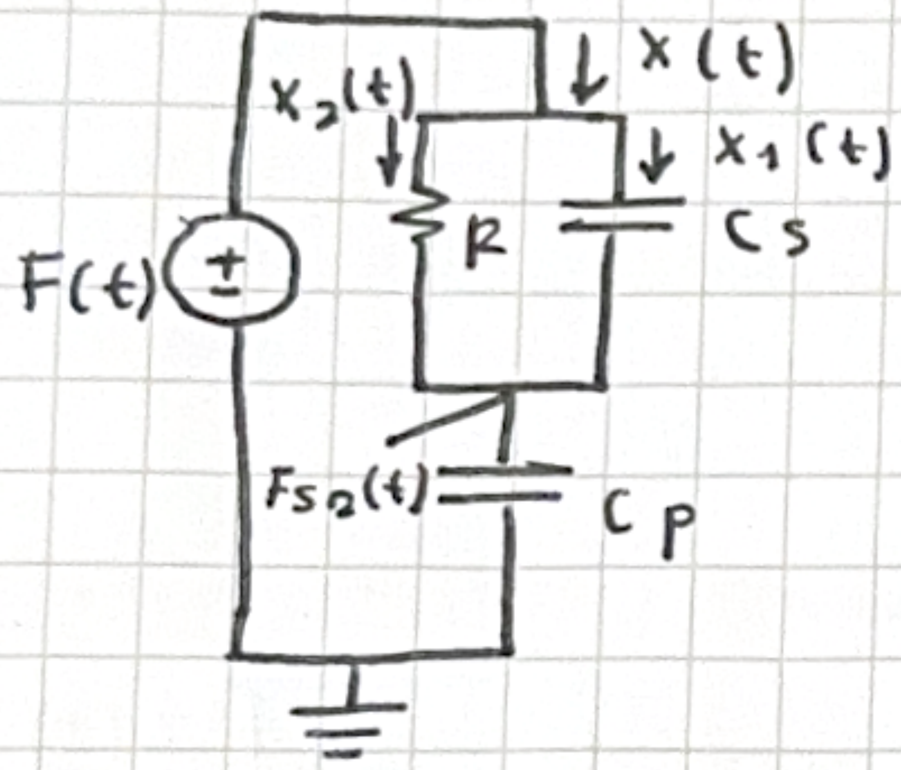


$$x(t) = X_1(t) + X_2(t)$$

- Función de transferencia

Analisis apagando F_o



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

$$x(t) = C_p \frac{d[F_s(t)]}{dt} \qquad X_2(t) = \frac{F(t) - F_s(t)}{R}$$

$$X_1(t) = C_s \frac{d[F(t) - F_s(t)]}{dt}$$

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

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

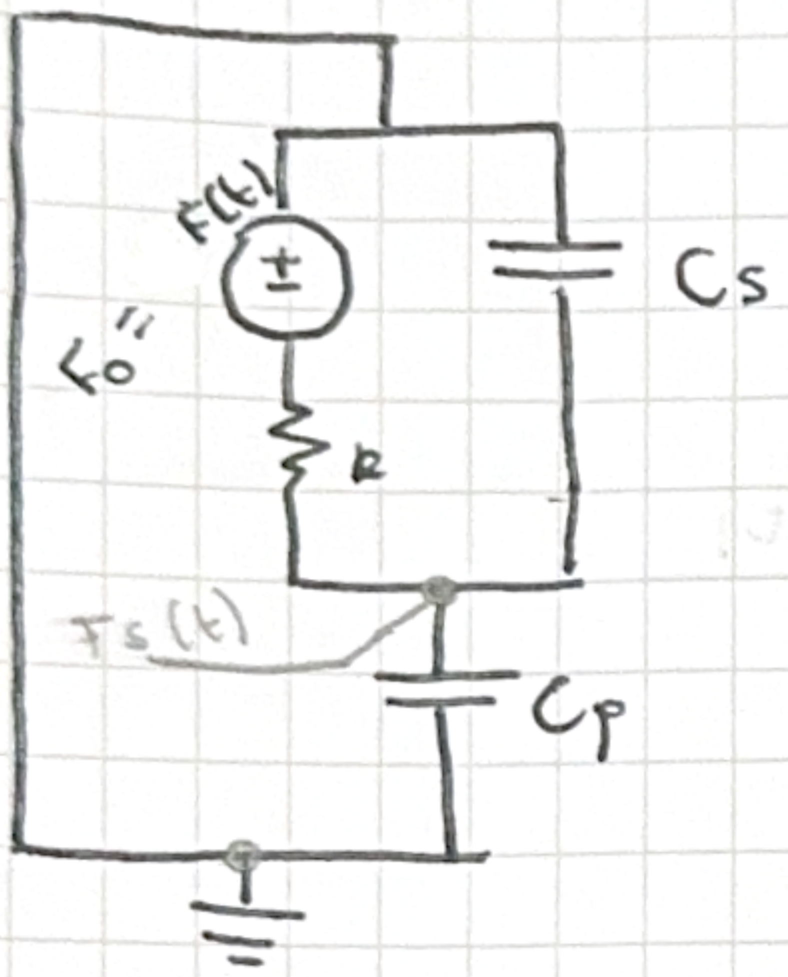
$$\left(C_p S + C_s S + \frac{1}{R}\right) F_s(s) = \left(C_s S + \frac{1}{R}\right) F(s)$$

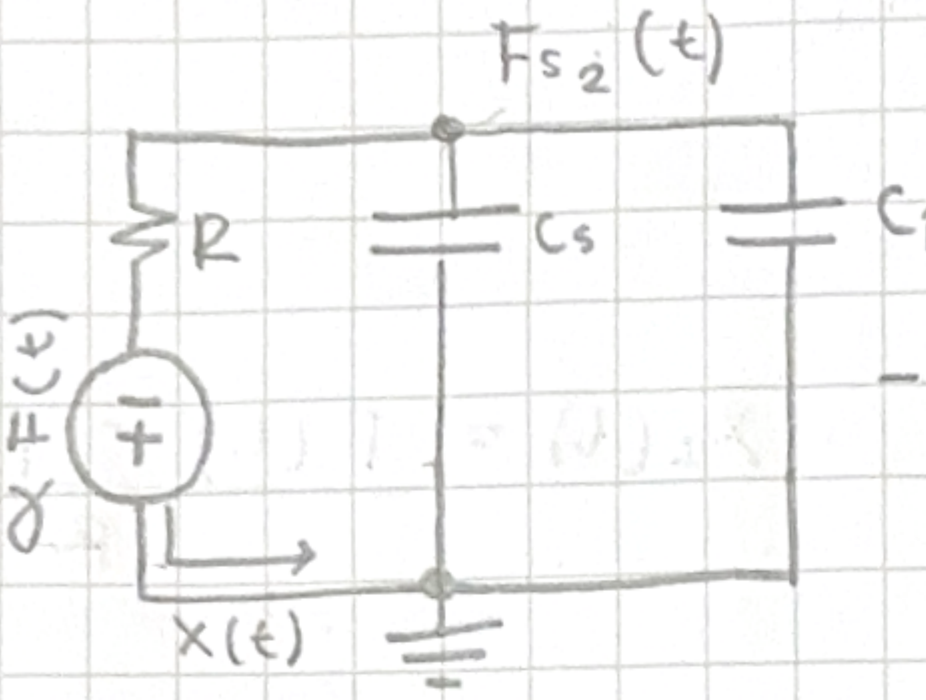
$$\frac{F_s(s)}{F(s)} = \frac{C_s S + \frac{1}{R}}{C_p S + C_s S + \frac{1}{R}}$$

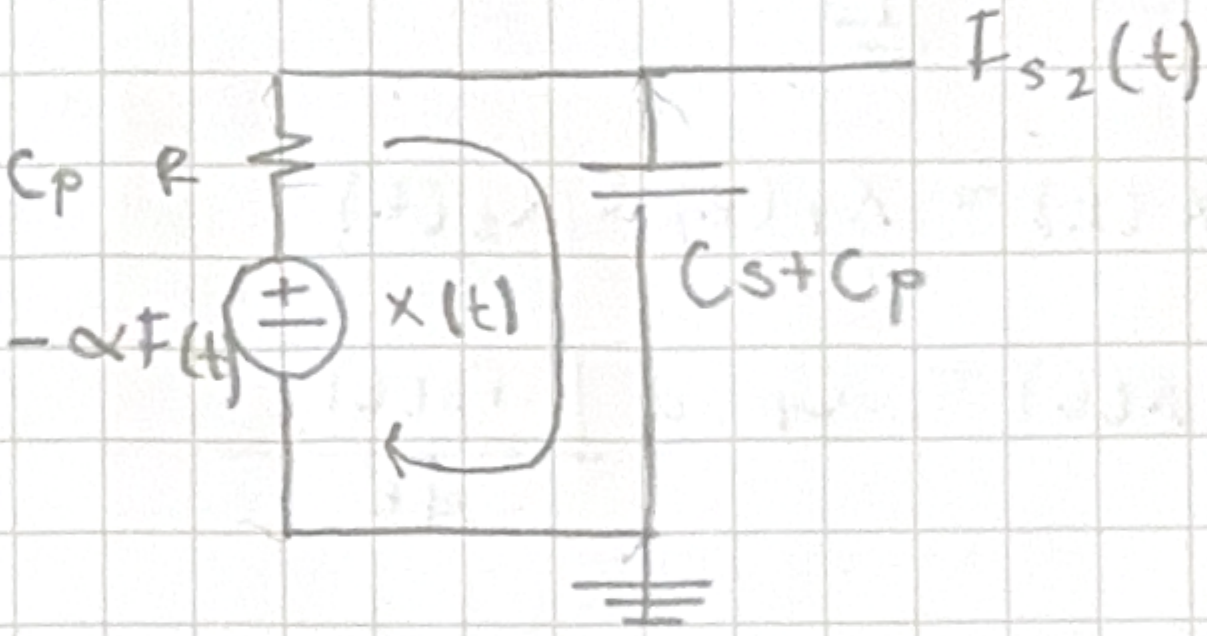
$$\frac{F_s(s)}{F_s} = \frac{C_s S + \frac{1}{R}}{(C_p + C_s) S + \frac{1}{R}}$$

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

$$F_s(s) = \frac{\frac{C_s S + 1}{R}}{\frac{C_p S R + C_s S R + 1}{1}} = \frac{C_s S R + R}{C_p S R^2 + C_s S R^2 + R}$$







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

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

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

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

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

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

$$F_{s_2}(S) = \frac{-\alpha F(s)}{R((C_s+C_p)S+1}$$

$$F_s(S) = F_{s_1} + F_{s_2}(S)$$

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

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

error en estado estacionario

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

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

$e(s) = \alpha$

$e(t) = \alpha V$

estabilidad en lazo abierto

$R(C_p+C_s)S+1 = 0$ $\quad R_e\,\lambda < 0$

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