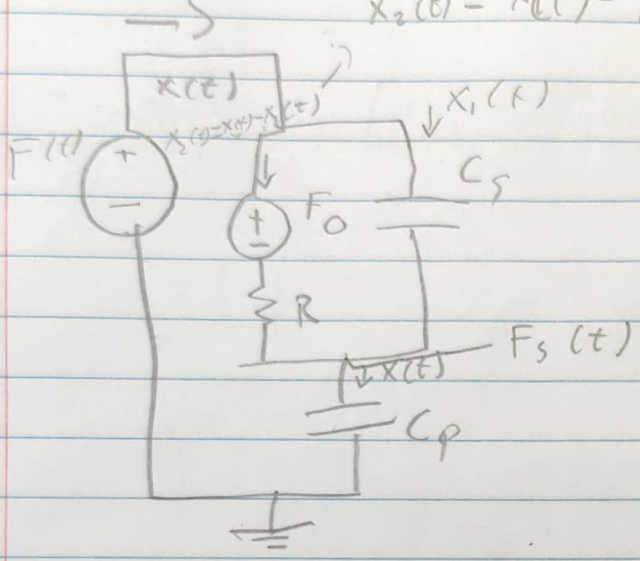
Circuito eléctrico

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



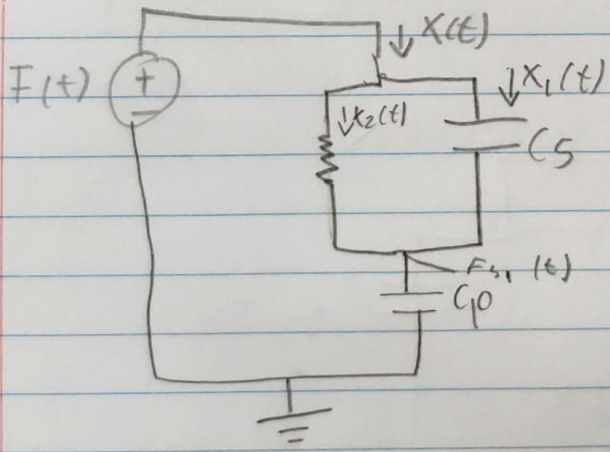
$X(t) = X_1(t) + X_2(t)$

Mayas → Integral Cap

Nodos → derivada Cap

Función de transferencia

Analisis ap agando f_0



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

$$X(t) = \frac{d[F_S(t)]}{dt} \cdot C_P$$

$$X_2(t) = \frac{F(t) - F_S(t)}{R}$$

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

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

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

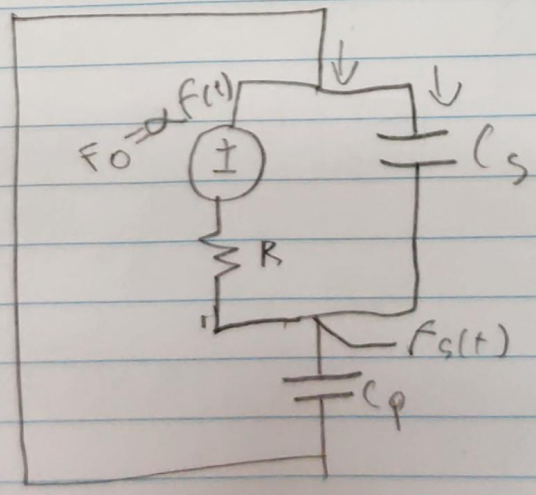
$$\left(C_p S + C_s S + \frac{1}{R}\right) F_s(s) = \left(C_s S + \frac{1}{R}\right) F(s)$$

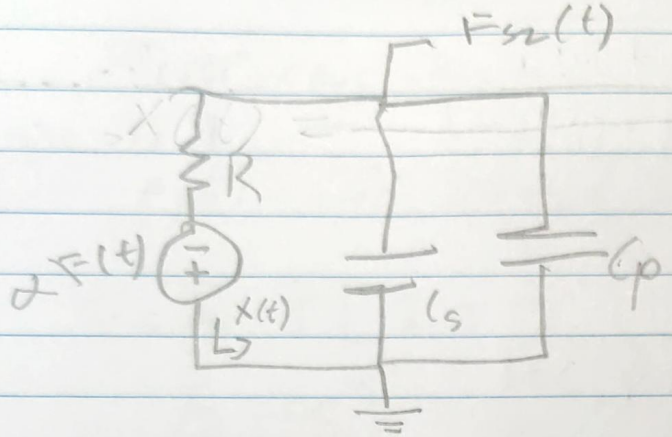
$$\frac{F_s(s)}{F(s)} = \frac{C_s S + \frac{1}{R}}{C_p S + C_s S + \frac{1}{R}}$$

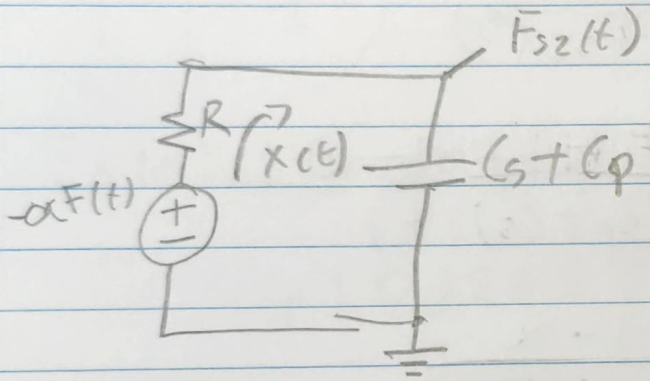
$$\frac{F_s(s)}{F(s)} = \frac{C_s R S + 1}{C_p R S + C_s R S + 1}$$

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

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







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

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

$$-\alpha f(s) = RX(s) + \frac{X(s)}{(C_s+C_p)s}$$

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

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

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

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

$$F_s(s) = F_{s1}(s) + F_{s2}(s)$$

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

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

Error en estado estacionario

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

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

$$e(s) = 1 - \left(\frac{1 - \alpha}{1} \right) = 1 \alpha \qquad e(t) = \alpha V = 0.25V$$

Estabilidad Lazo abierto

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

S. 1er orden una raíz

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

Respuesta asintonicamente estable