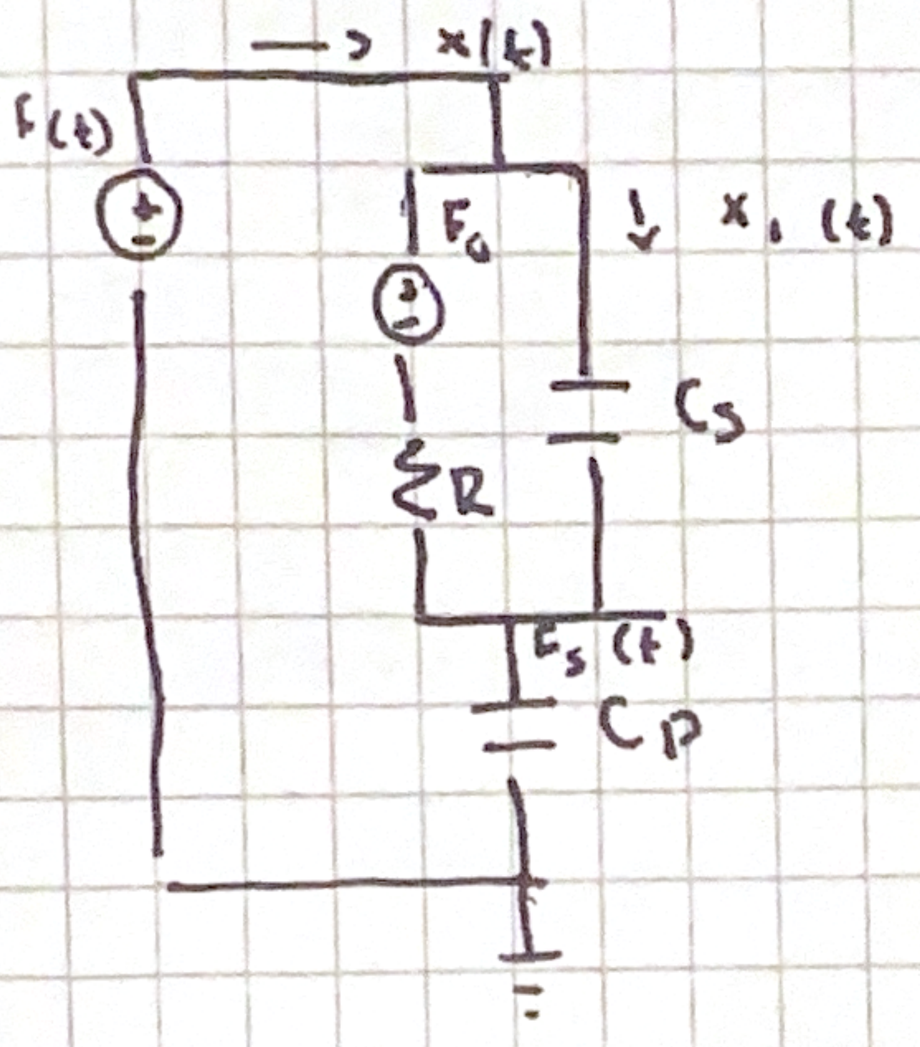
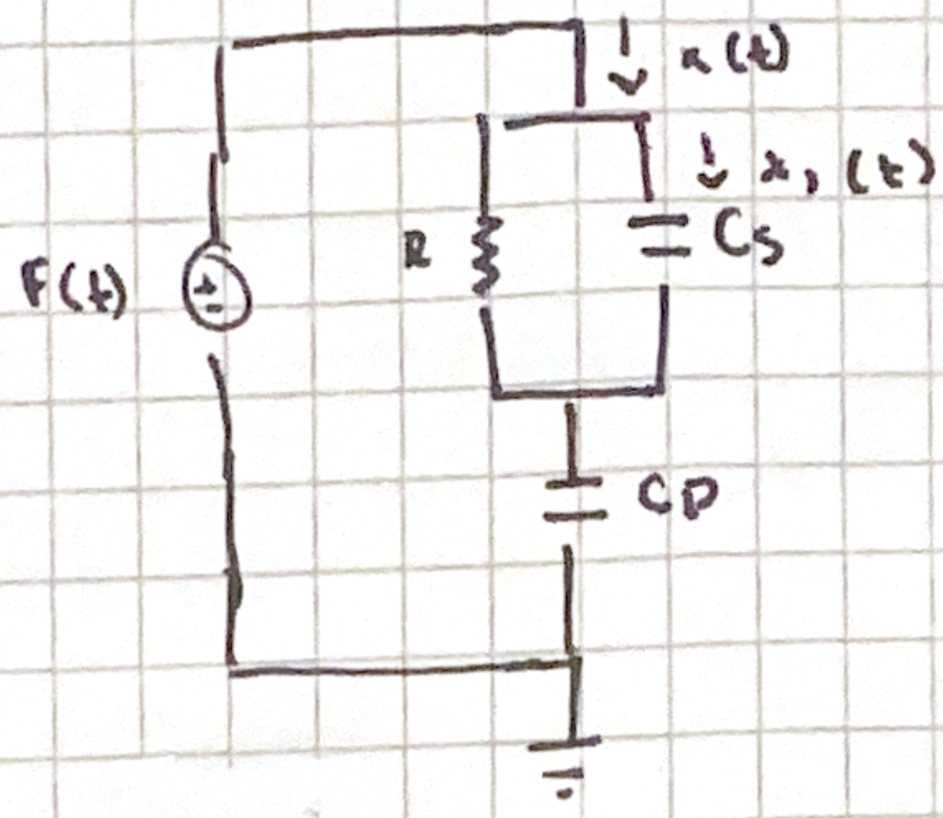
Función de transferencia



Análisis apagado F_0



Transformada

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

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

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

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

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

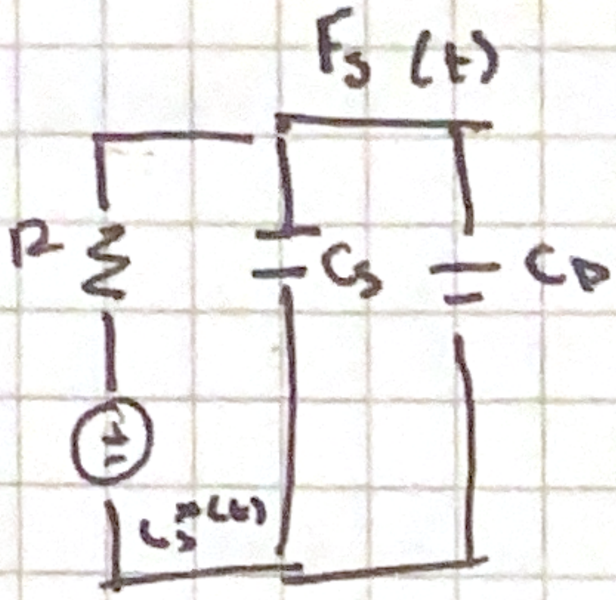
$$x_1(t) = C_s \frac{d[F(t) - F_s(t)]}{dt}$$

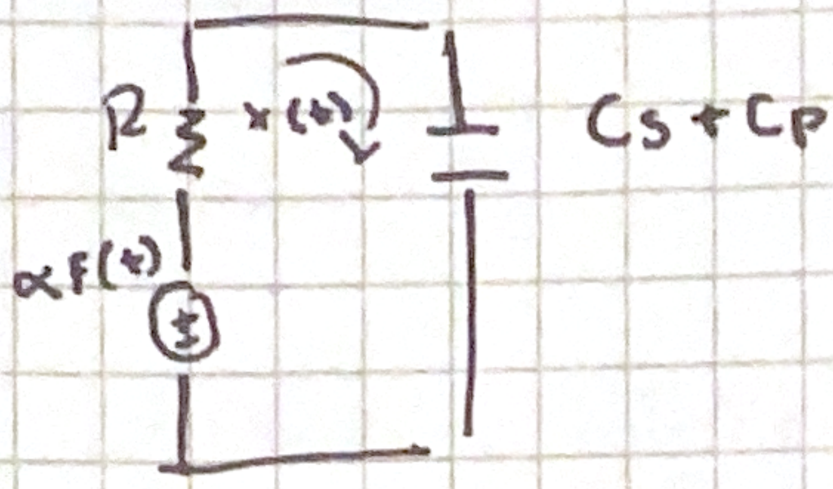
$$C_p \frac{dF_s(t)}{dt} = C_s \frac{d[F(t) - F_s(t)]}{dt} + \frac{F(t) - F_s(t)}{R}$$

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

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

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





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

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

$$F_s(s) = \frac{x(s)\cdot\frac{1}{s}}{(C_s + C_p)}$$

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

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

$$\frac{F_s(s)}{F(s)} = -\frac{\alpha F(s)}{12(C_s + C_p) + 1}$$

Error
Estabilidad

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

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

Error en estado estacionario

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

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

$$e(s) = 1 - \frac{1 + \alpha}{1} = \alpha \; 1 = 0.25V$$

Estabilidad

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

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

$F(t)$	1 V
α	0.25
C_s	10 μF
C_p	100 μF
R	100 Ω

Es estable
La respuesta es asintoticamente estable

Tratamiento = control