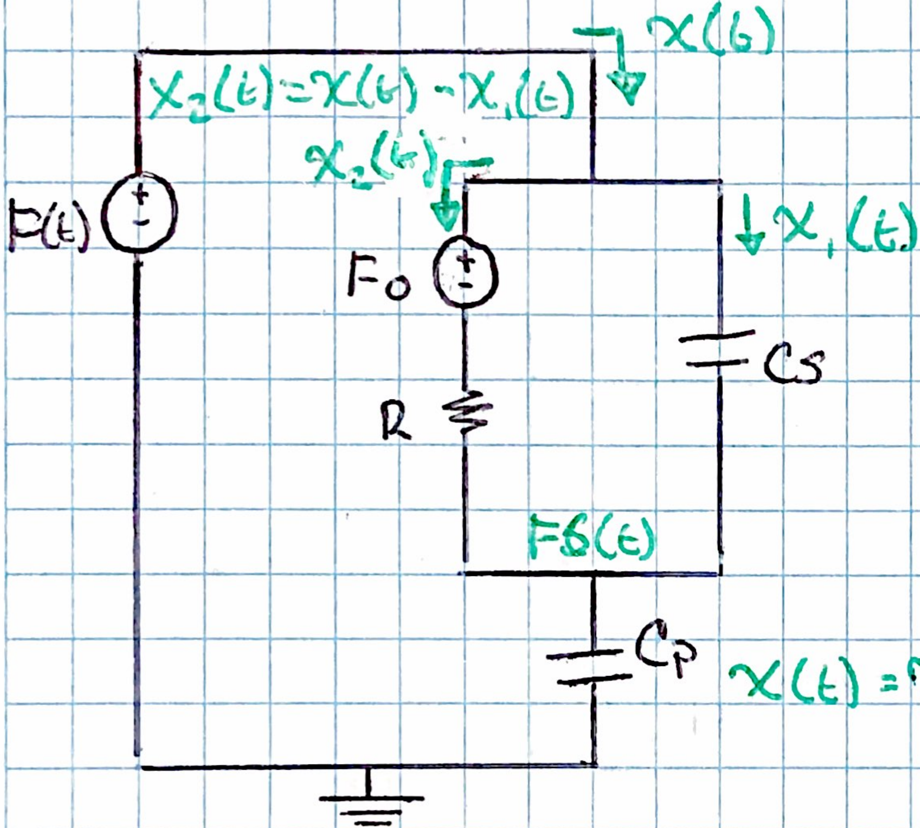
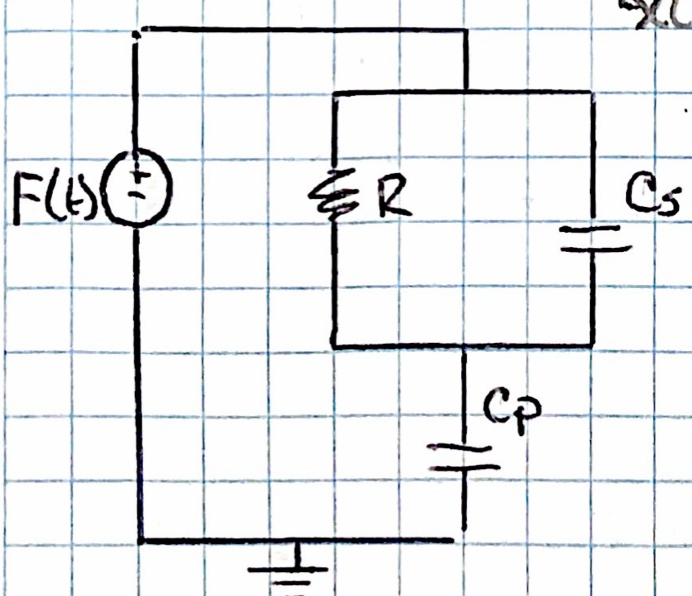
Circuito electrico



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

-Analisis apagado Fo-



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

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

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

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

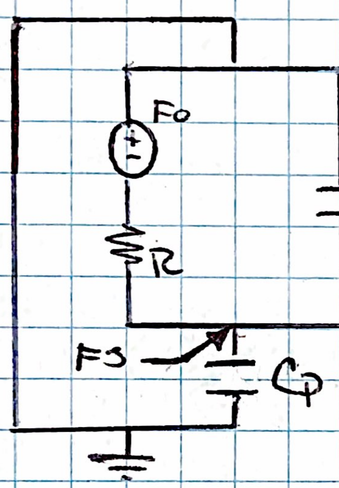
$$C_p \frac{dF_s(t)}{dt} = C_s \frac{d[F(t) - F_s(t)]}{dt} + F(t) - F_s(t)$$

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

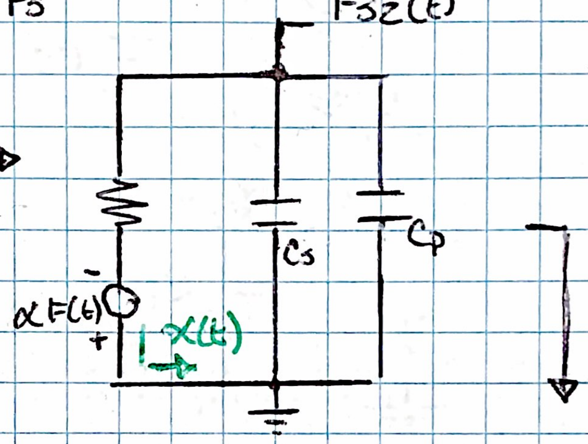
$$(C_p S + C_s S + 1/R) F_s(S) = (C_s S + 1/R) F(S)$$

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

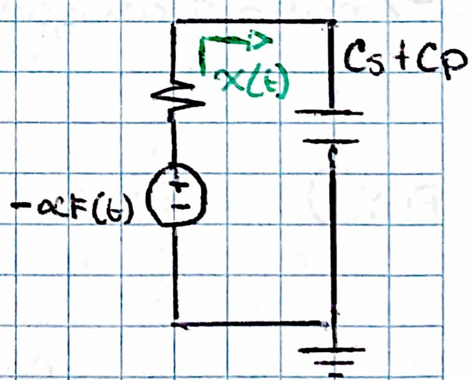
-Analisis F(t) apagado-



Fo = αFs



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



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

$$-\alpha F(S) = Rx(S) + \frac{x(S)}{(C_s+C_p)S}$$

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

$$\frac{F_s(S)}{F(S)} = \frac{\dfrac{\cancel{x(S)}}{\cancel{(C_s+C_p)S}}}{\dfrac{R(C_s+C_p)S+1}{\alpha\cancel{(C_s+C_p)S}}\,\cancel{x(S)}}$$

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

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

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

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

- Error de estado estacionario

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

$$= \lim_{S \to 0}\left(S \cdot 1/S \cdot \left(1 - \frac{C_s RS + 1 - \alpha}{R(C_p + C_s)S + 1}\right)\right)$$

$$= 1 - 1 + \alpha$$

$$e(S) = +\alpha = \alpha V = 0.25V$$

- Estabilidad en lazo abierto

$$R(C_p + C_s)S + 1 = 0 \qquad x = -\frac{1}{R(C_p + C_s)}$$

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

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

→ La respuesta es estable

→ Es asintóticamente estable