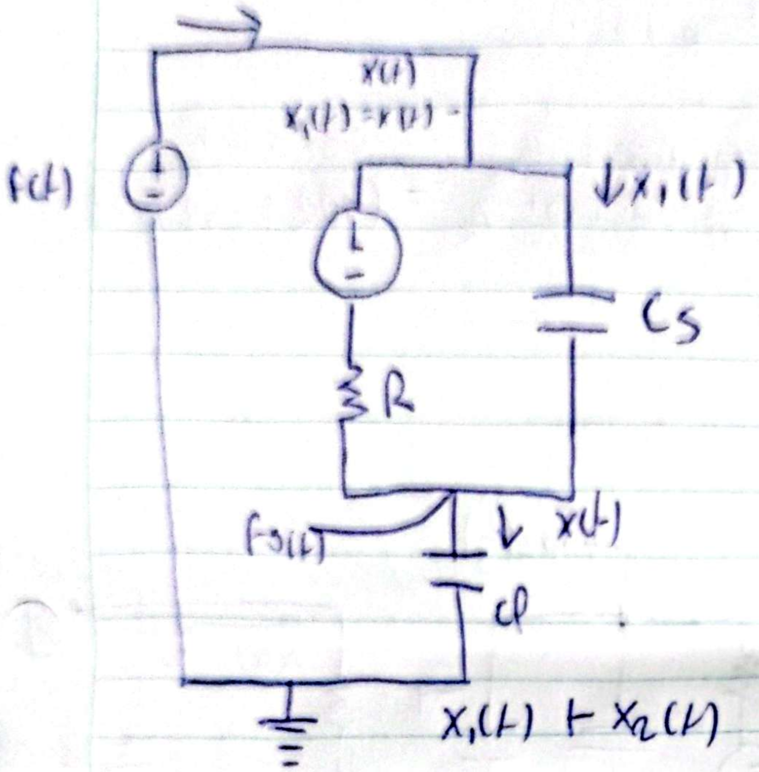
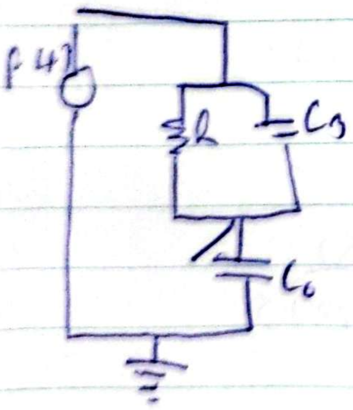
Circuito electrico



Función de transferencia
Analisis aterrando f(o)



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

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

$$x_1(t) = \frac{f(t) - f_s(t)}{R}$$

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

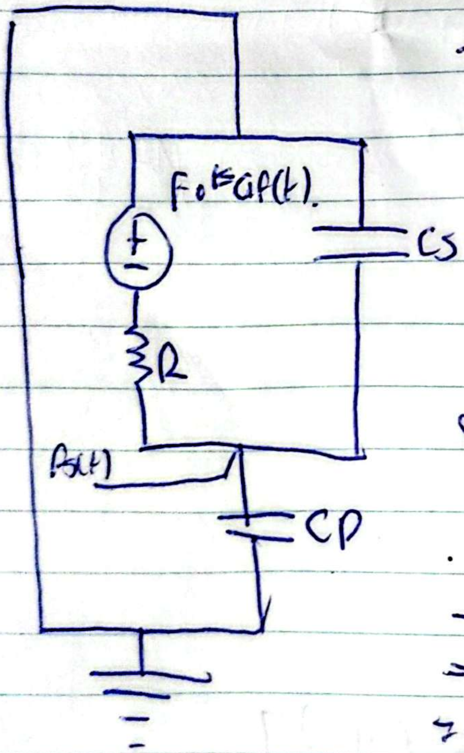
$$C_p \frac{d f_s(t)}{dt} = C_s \frac{d[f(t) - f_s(t)]}{dt} + \frac{f(t) - f_s(t)}{R}$$

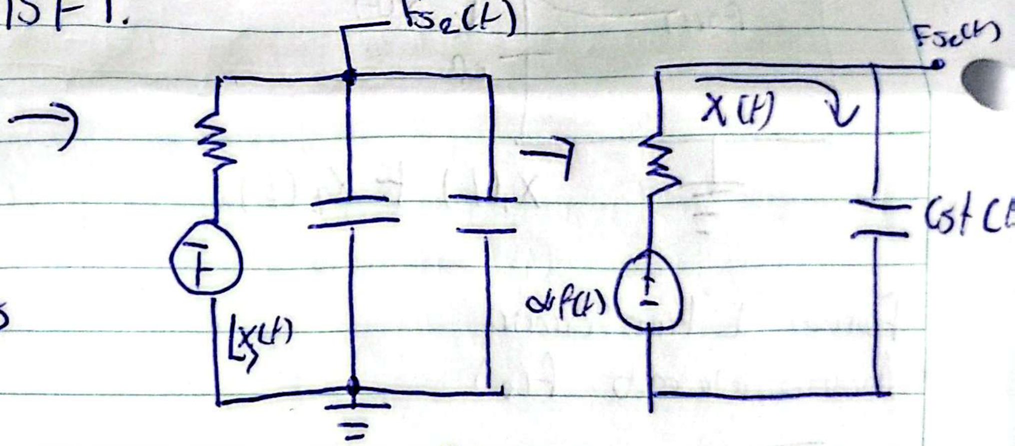
$$C_P s F_s(s) = C_s s\,[F(s) - F_s(s)] + \frac{F(s) - F_s(s)}{R}$$

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

$$\frac{F_s(s)}{F(s)} = \frac{\;\frac{C_s s + \frac{1}{R}}{C_P s + C_s s + \frac{1}{R}}\;}{\;\frac{C_P s + C_s s + \frac{1}{R}}{C_s s + \frac{1}{R}}\;} \qquad \frac{\;\frac{C_s s R + 1}{C_P s R + C_s s R + 1}\;}{\;\frac{C_P s R + C_s s R + 1}{C_s s R + 1}\;} \qquad \frac{C_s s + \frac{1}{R}}{C_P s + C_s s + \frac{1}{R}} = \frac{C_s R s + 1}{(C_P R + C_s R)s + 1}$$

$$F_{s1}(s) = \frac{(C_s R s + 1)\,F(s)}{R(C_s + C_P)s + 1}.$$





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

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

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

$$F_2(s) = \frac{X(s)}{(C_s + C_P)s}$$

$$F_s = \frac{R(C_s + C_P)s + 1}{\alpha\,((C_s + C_P)s)}$$

Estabilidad en lazo abierto

$$\lambda_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$a = CLRZ$
$b = LZ + RL$
$c = RZ$

$$\lambda_{1,2} = \frac{-(LZ+RL) \pm \sqrt{(LZ+RL)^2 - 4CLR^2Z^2}}{2CLRZ}$$

$= \frac{(-)(\ )}{+}$ respuesta estable $Re\lambda_{1,2} < \emptyset$

Ecuaciones integrodiferenciales.

$$P_1(t)\left(\frac{1}{R} + \frac{1}{Z}\right) = \left(\frac{P_a(t)}{Z}\right) + \frac{1}{L}\int\left[P_a(t) - P_1(t)\right] dt - \frac{C\,dP_1(t)}{dt}$$

$$P_1(t) = \left(\frac{P_a(t)}{Z} + \frac{1}{L}\int\left[P_a(t) - P_1(t)\right] dt - \frac{C\,dP_1(t)}{dt}\right)\frac{ZR}{Z+R}$$

Error de estado estacionario

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

$$\lim_{s \to 0} \left(s \cdot \frac{1}{s} \cdot \left(1 - \frac{CsRs+1-\alpha}{R(cp+cs)s+1}\right) \right) = 1 - 1 + \alpha$$

$$e(s) = \underline{+\alpha}$$

Estabilidad en lazo abierto

$R((cp+cs)s+1 = \emptyset$

$R(cp+cs)s = -1$

$$s = -\frac{1}{R(cp+cs)}.$$