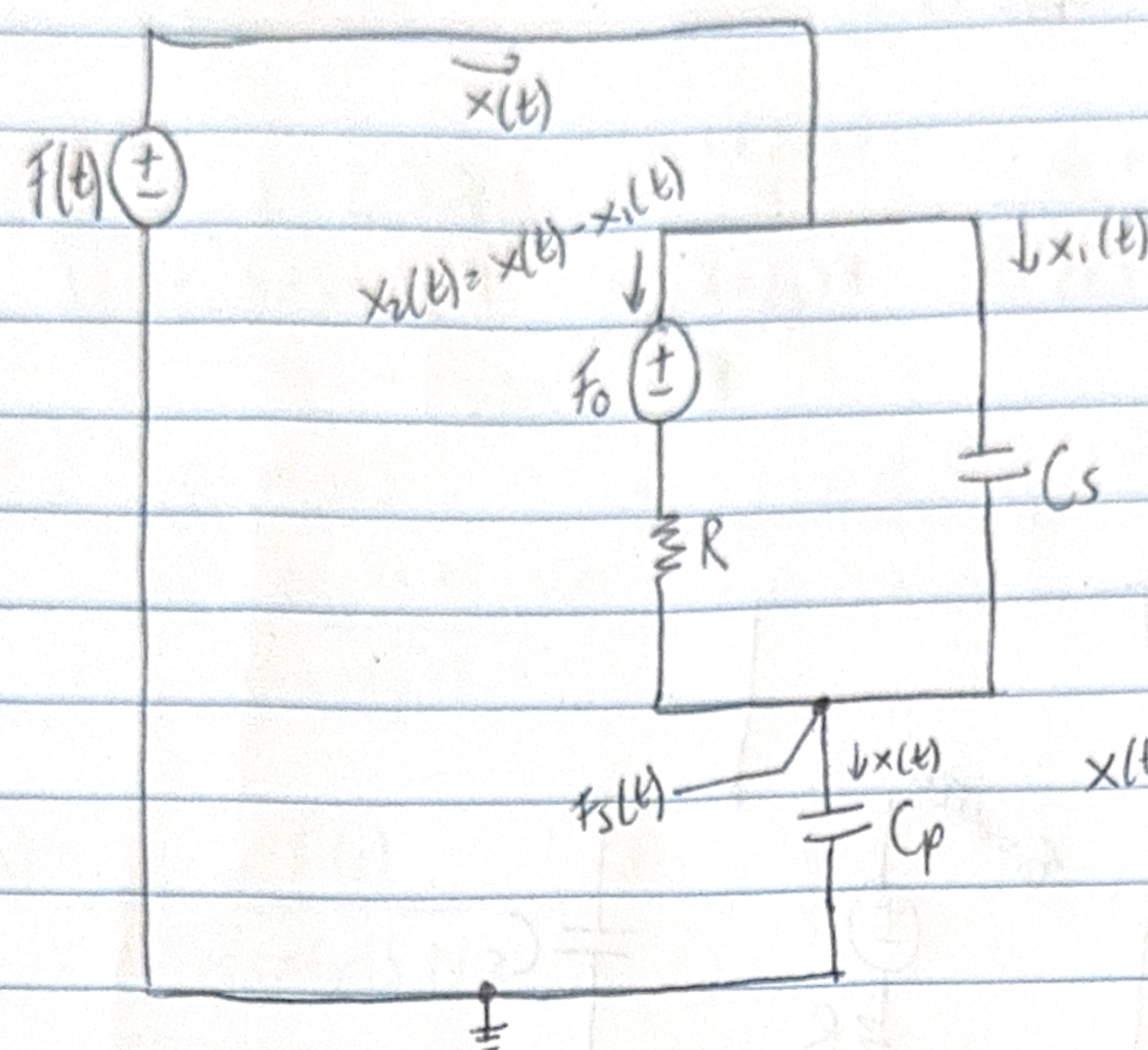
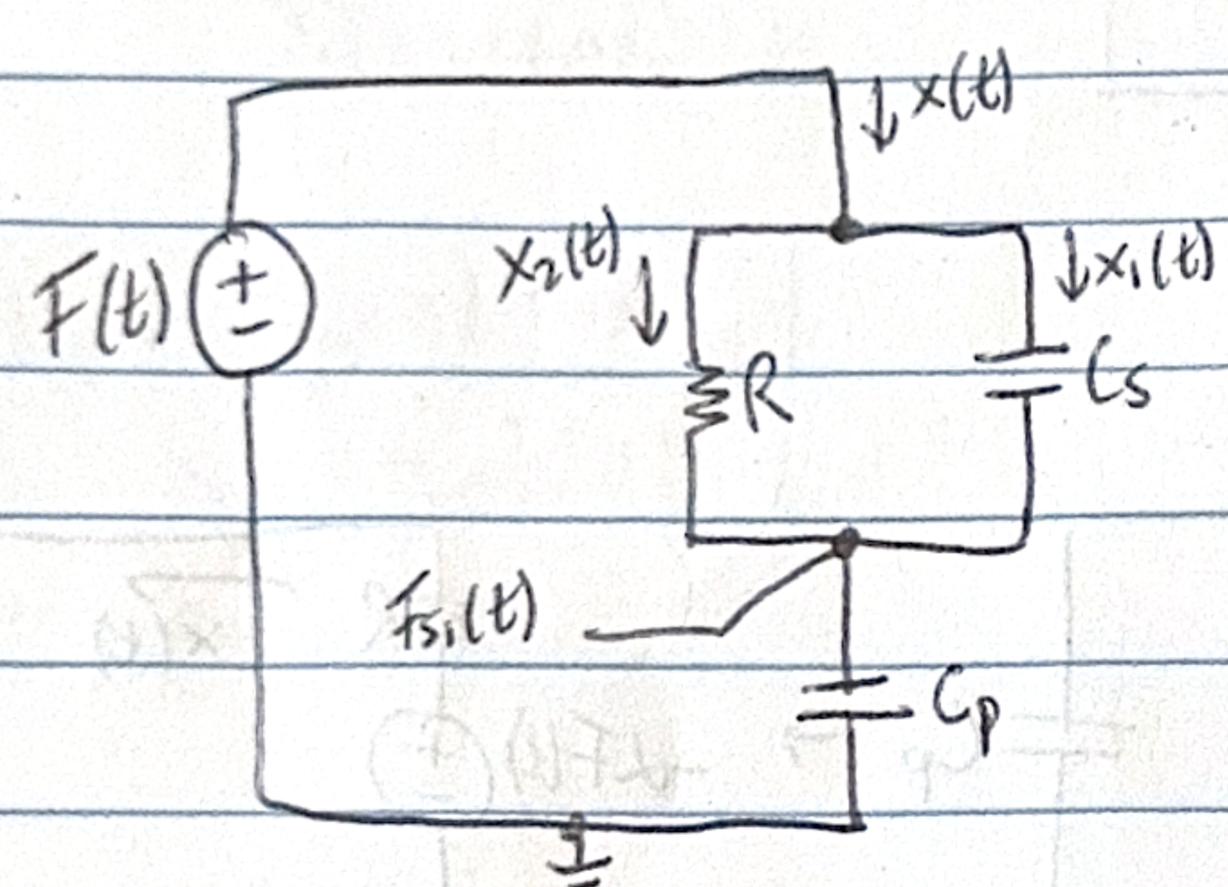


$x(t)=x_1(t)+x_2(t)$

Función de transferencia

*Análisis apagando Fo

*mallas integrales Cap.
nodos derivadas Cap



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

$x(t)=C_p\dfrac{d[F_s(t)]}{dt}$ $\quad x_2(t)=\dfrac{F(t)-F_s(t)}{R}$ $\quad x_1(t)=C_s\dfrac{d[F(t)-F_s(t)]}{dt}$

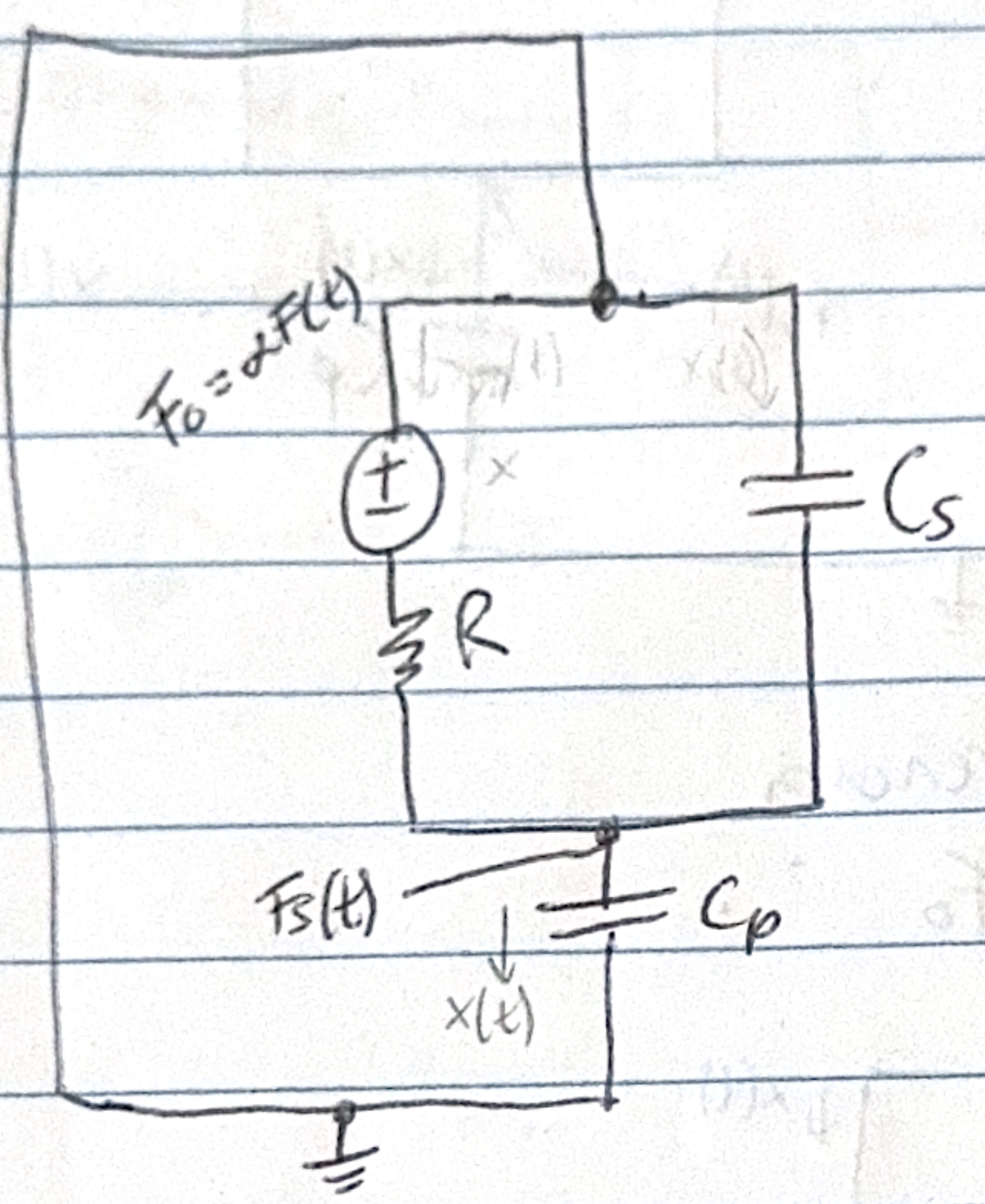
$$C_p\frac{dF_s(t)}{dt}=C_s\frac{d[F(t)-F_s(t)]}{dt}+\frac{F(t)-F_s(t)}{R}$$

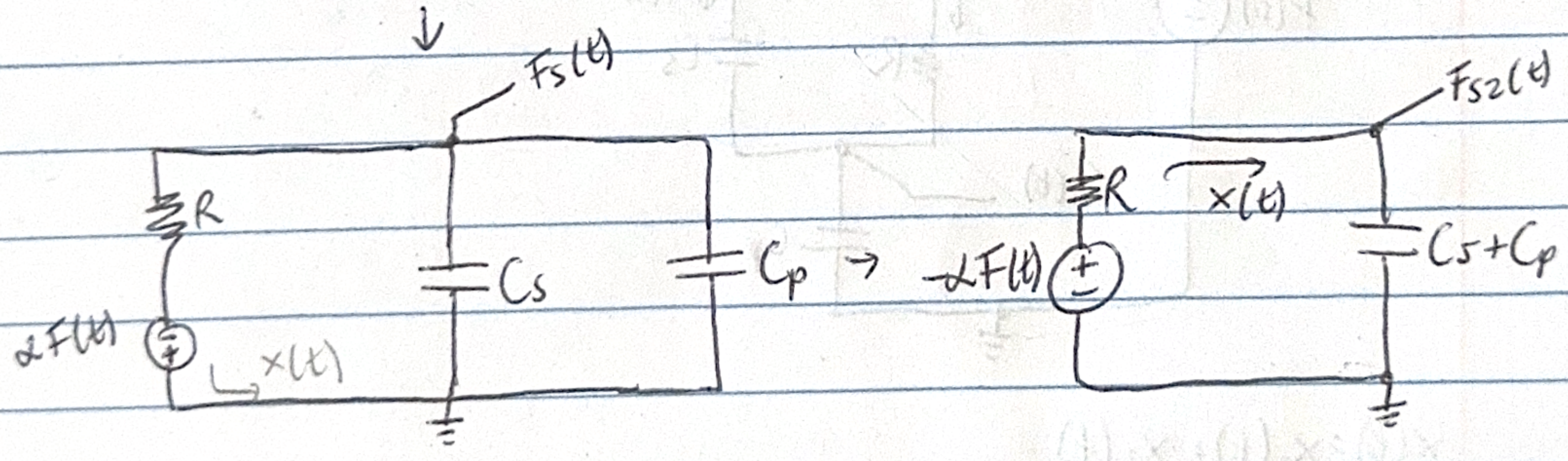
$$C_pSF_s(s)=C_sS[F(s)-F_s(s)]+\frac{F(s)-F_s(s)}{R}$$

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

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

$$\frac{F_s(s)}{F(s)} = \frac{C_sS+\frac{1}{R}}{C_pS+C_sS+\frac{1}{R}} = \frac{\frac{RC_sS+1}{R}}{\frac{RC_pS+RC_sS+1}{R}} = \boxed{\frac{RC_sS+1}{RC_pS+C_sRS+1}}$$





$$x(t) = (C_s+C_p)\frac{d[F_{s2}(t)+\alpha F(t)]}{dt} + \frac{[-\alpha F(t) - F_{s2}(t)]}{R}$$

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

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

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

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

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

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

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

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

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

*Error estado estacionario

*Estabilidad lazo abierto

- Error en estado estacionario

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

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

$e(s) = \alpha$ $\quad e(t) = 0.25V$

- Estabilidad en lazo abierto

$R(C_s+C_p)S+1 = 0 \qquad \lambda = -\dfrac{1}{R(C_s+C_p)} \qquad \mathrm{Re}\,\lambda < 0$

El sistema es estable si $\lambda < 0$ Respuesta asintóticamente estable.