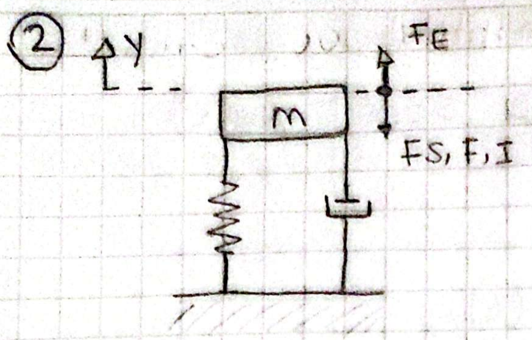
②



- m = masa
- resorte = K (constante)
- amortiguador = C (coeficiente)
- fuerza extrema = $F_E(t)$ ↑
- desplazamiento de la masa = $y(t)$ ↑

$$F_E(t) = f_S(t) + F_f(t) + F_I(t)$$

$F_E(t)$ = Fuerza externa

$f_{(s)}(t) = k\,y(t)$ → fuerza del resorte

$f_f(t) = \dfrac{c\,dy(t)}{dt}$ → fuerza de fricción

$f_I(t) = \dfrac{m\,d^2y(t)}{dt^2}$ → fuerza de inercia

$$\Rightarrow F_E(t) = k\,y(t) + \frac{c\,dy(t)}{dt} + \frac{m\,d^2y(t)}{dt^2}$$

⇒ aplico la transformada de laplace.

$$F_E(s) = K\,y(s) + C\,s\,y(s) + m\,s^2\,y(s)$$

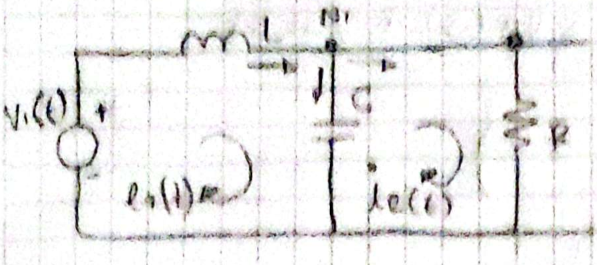
- FUNCIÓN DE TRANSFERENCIA.

$$H(s) = \frac{y(s)}{F_E(s)}$$

$$\Rightarrow F_E(s) = y(s)(K + Cs + ms^2)$$

$$\Rightarrow H(s) = \frac{Y(s)}{F_E(s)} = \frac{1}{ms^2 + Cs + K}$$

• calculo la función de transferencia del circuito RLC en paralelo



solución por nodos

$$i_L(t) = i_C(t) + i_R(t)$$

$$i_L(t) = \frac{C\,dv_C(t)}{dt} + \frac{1}{R}V_R(t)$$

$$v_C(t) = V_R(t) = V_o(t)$$

$$i_L(t) = \frac{C\,dV_o(t)}{dt} + \frac{1}{R}V_o(t)$$

$$V_L(t) = \frac{L\,di_L(t)}{dt} = V_i(t) - V_o(t)$$

$$\frac{di_L(t)}{dt} = \frac{V_i(t) - V_o(t)}{L}$$

aplicando derivada

$$\frac{di_C(t)}{dt} = \frac{C\,d^2V_o(t)}{dt} + \frac{1}{R}\frac{dV_o(t)}{dt}$$

Reemplazamos: $\frac{di_L(t)}{dt}$

$$\frac{V_i(t) - V_o(t)}{L} = \frac{C\,d^2V_o(t)}{dt^2} + \frac{1}{R}\frac{dV_o(t)}{dt}$$

$$V_i(t) - V_o(t) = CL\frac{d^2V_o(t)}{dt^2} + \frac{L}{R}\frac{dV_o(t)}{dt}$$

$$V_i(t) = CL\frac{d^2V_o(t)}{dt^2} + \frac{L}{R}\frac{dV_o(t)}{dt} + V_o(t)$$

Aplicando la transformada de laplace

$$V_i(s) = CLs^2 V_o(s) + \frac{L}{R} s V_o(s) + V_o(s)$$

$$V_i(s) = V_o(s)\left(CLs^2 + \frac{Ls}{R} + 1\right)$$

Función de transfarencia

- $H(s) = \dfrac{V_o(s)}{V_i(s)}$

$$\boxed{\frac{V_o(s)}{V_i(s)} = \frac{1}{CLs^2 + \frac{Ls}{R} + 1}}$$