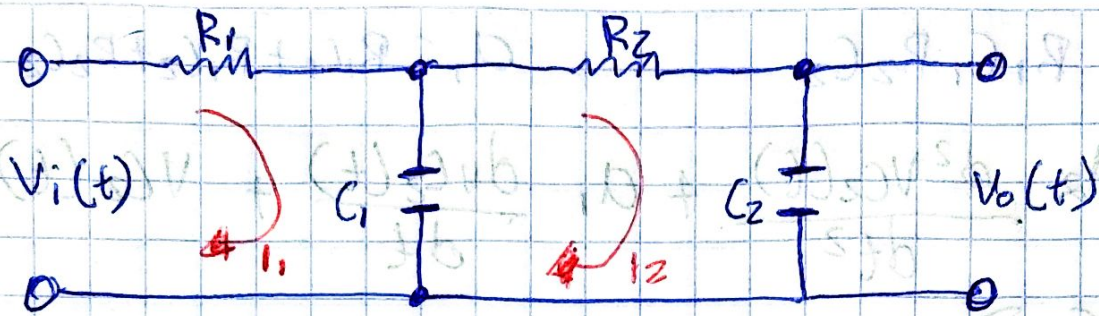


Circuito R_c de Segundo Orden

11/10/2023



$$V_{R_1}(t) = R_1 i_1(t)$$

$$V_{R_2}(t) = R_2 i_2(t)$$

$$i_1(t) - i_2(t) = C_1 \frac{dV_{C_1}(t)}{dt} \quad i_2(t) = C_2 \frac{dV_{C_2}(t)}{dt}$$

$$i_1(t) = C_2 \frac{dV_{C_2}(t)}{dt} + C_1 \frac{dV_{C_1}(t)}{dt}$$

$$V_{R_1}(t) = R_1 \left(C_2 \frac{dV_{C_2}(t)}{dt} + C_1 \left(R_2 C_2 \frac{d^2 V_{C_2}(t)}{dt^2} + \frac{dV_{C_2}(t)}{dt} \right) \right)$$

$$V_i(t) = V_{R_1}(t) + V_{R_2}(t) + V_{C_2}(t)$$

$$V_i(t) = R_1 C_1 R_2 C_2 \frac{d^2 V_{C_2}(t)}{dt^2} + (R_1 C_1 + R_1 C_2 + R_2 C_2)$$

$$\frac{dV_{C_2}(t)}{dt} + V_{C_2}(t)$$

$$a_2 = R_1 C_1 R_2 C_2$$

$$a_1 = R_1 C_1 + R_1 C_2 + R_2 C_2$$

$$V_i = a_2 \frac{d^2 V_{C2}(t)}{dt^2} + a_1 \frac{dV_{C2}(t)}{dt} + V_{C2}(t)$$

$$\Rightarrow \mathcal{L}\{ \} \Rightarrow$$

$$V_i(s) = a_2 [s^2 V_{C2}(s) + a_1 s V_{C2}(s) + V_{C2}(s)]$$

$$V_i(s) = a_2 s^2 V_{C2}(s) + a_1 s V_{C2}(s) + V_{C2}(s)$$

$$V_i(s) = (a_2 s^2 + a_1 s + 1) V_o(s) \quad \boxed{V_o(s) = V_{C2}(s)}$$

$$\frac{V_o(s)}{V_i(s)} = \frac{1}{a_2 s^2 + a_1 s + 1} \Rightarrow$$

$$\boxed{\frac{V_o(s)}{V_i(s)} = \frac{1}{(R_1 C_1 R_2 C_2) s^2 + (R_1 C_1 + R_1 C_2 + R_2 C_2) s + 1}}$$