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1 Análisis matemático

1.1 Circuito A

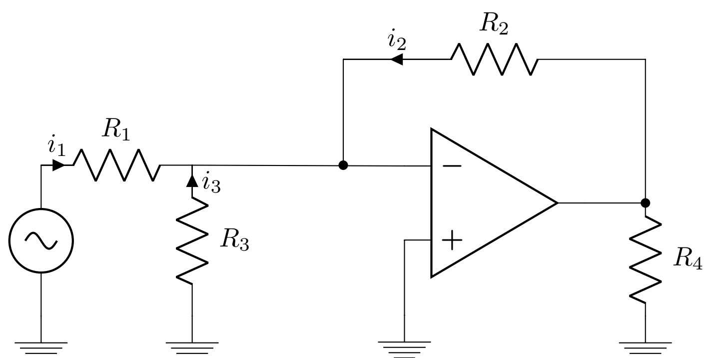

Figura 1: Esquematico del circuito A

1.1.1 Caso A_{vol} infinito

Como A_{vol} lo consideramos infinito entonces $V_i = 0$ $\big($ tierra virtual $\big)$.Por ende $i_3 = 0$ y $i_2 = -i_1$.

$$V_{out} = -\frac{i_1}{R_2} \tag{1}$$

$$i_1 = \frac{V_{in}}{R_1} \tag{2}$$

Reemplazando 2 en 1 y operando algebraicamente se obtine:

$$\frac{V_{out}}{V_{in}} = -\frac{R_2}{R_1} \tag{3}$$

1.1.2 Caso A_{vol} finito

$$V_{out} = -V_i \cdot A_{vol} \tag{4}$$
$$i_1 = \frac{V_{in} - Vi}{R_1} \tag{5}$$
$$i_2 = \frac{V_{out} - V_i}{R_2} \tag{6}$$
$$i_3 = \frac{-V_i}{R_3} \tag{7}$$
$$i_1 + i_2 + i_3 = 0 \tag{8}$$

Reemplazando 4,5,6,7 en 8, se obtiene:

$$\frac{V_{in}}{R_1} + \frac{V_{out}}{R_2} + \frac{V_{out}}{A_{vol}} \cdot \left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \right) = 0$$

Operando algebraicamente, se obtiene:

$$\frac{V_{out}}{V_{in}} = -\frac{A_{vol} \cdot R_2 \cdot R_3}{A_{vol} \cdot R_1 \cdot R_3 + R_2 \cdot R_3 + R_1 \cdot R_3 + R_1 \cdot R_2} \tag{9}$$

Observacion

$$\lim_{A_{vol} \to \infty} (9) = -\frac{R_2}{R_1}$$

La expresion se redujo a la ganancia del circuito, con el apmlificador operacional ideal (3).