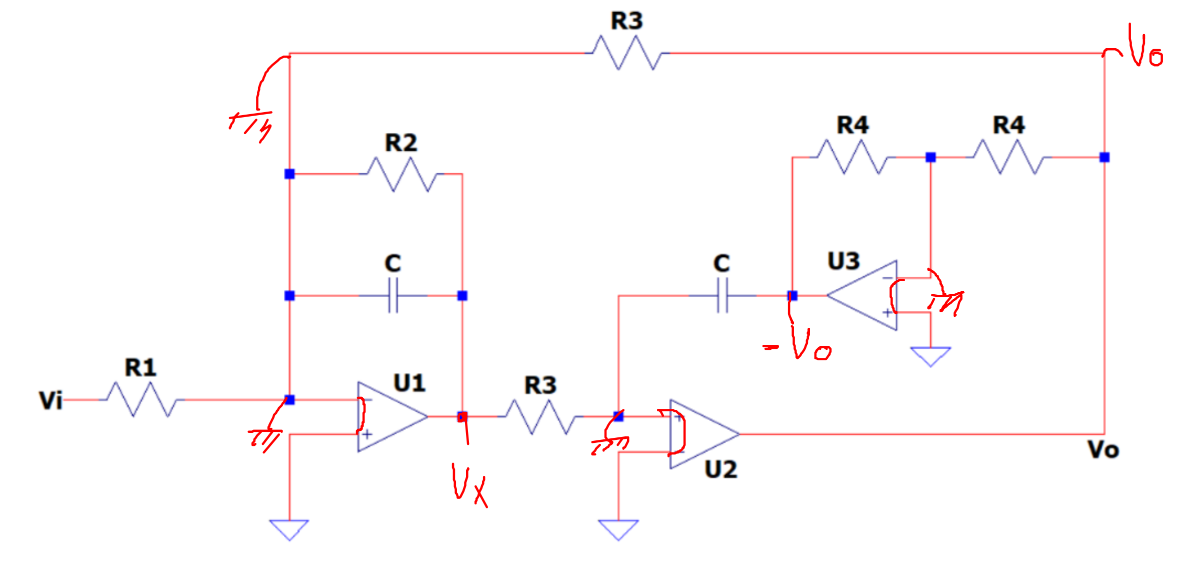

$$V_x G_3 = +V_o Y \qquad Y = sC$$

$$V_i . G_1 = -(V_o G_3 + V_x G_2 + V_x Y)$$

$$V_x = \frac{V_o Y}{G_3}$$

$$V_i . G_1 = -\left(V_o . G_3 + \frac{V_o Y G_2}{G_3} + \frac{V_o Y^2}{G_3}\right)$$

$$\frac{V_o}{V_i} = \frac{-G_1}{\frac{Y^2}{G_3} + \frac{G_2}{G_3} Y + G_3}$$

$$\frac{V_o}{V_i} = \frac{-G_1}{s^2 \frac{C^2}{G_3} + s \frac{C G_2}{G_3} + G_3}$$

$$\frac{V_o}{V_i} = \frac{-\frac{G_1 G_3}{C^2}}{s^2 + \frac{G_2}{C}\cdot s + \frac{G_3^2}{C^2}}$$

$$H(s) = \frac{-\frac{1}{R_1 R_3 C^2}}{s^2 + \frac{1}{R_2 C}\cdot s + \frac{1}{R_3^2 C^2}} = \frac{K\frac{\omega_0^2}{Q}}{s^2 + \frac{\omega_0}{Q}\cdot s + \omega_0^2}$$

$$\omega_0 = \sqrt{\frac{1}{R_3^2 C^2}} \qquad \frac{\omega_0}{Q} = \frac{1}{R_2 \cdot C} \rightarrow Q = R_2 \cdot C \cdot \omega_0$$

$$\omega_0 = \frac{1}{R_3 C}$$

$$Q = R_2 \cdot C \sqrt{\frac{1}{R_3^2 C^2}} \Rightarrow Q = \frac{R_2}{R_3}$$

$$-\frac{1}{R_1 R_3 C^2} = \frac{K \cdot \omega_0^2}{Q} \rightarrow K = -\frac{R_2 \cdot R_3^2 \cdot C^2}{R_1 R_3^2 C^2} = -\frac{R_2}{R_1}$$

3) $V_o = \frac{V_x G_3}{Y}$

$$V_i \cdot G_1 = -(V_o G_3 + V_x G_2 + V_x Y)$$

$$V_i \cdot G_1 = -V_x\left(\frac{G_3^2}{Y} + G_2 + Y\right)$$

$$V_i = -V_x \frac{\gamma^2 + G_2 \cdot \gamma + G_3^2}{G_1 \cdot \gamma}$$

$$\frac{V_x}{V_i} = \frac{-\frac{C}{R_1} \cdot S}{S^2 \cdot C^2 + S \cdot \frac{C^2}{R_2} + \frac{1}{R_3^2}}$$

$$T(s) = \frac{V_x}{V_i} = \frac{-\frac{1}{R_1 \cdot C} S}{S^2 + \frac{1}{R_2 \cdot C} \cdot S + \frac{1}{R_3^2 \cdot C^2}}$$

Saliendo por otro lado (V_x) tengo un filtro pasabanda con misma Q y W_0

$$W_0 = \frac{1}{R_3 C} \qquad Q = \frac{R_2}{R_3}$$

$$\frac{K \cdot W_0}{Q} = -\frac{1}{R_1 C}$$

GANANCIA ó Atenuanción en W_0

$$\frac{-\frac{1}{R_1 C}}{\frac{1}{R_2 \cdot C}} = K = -\frac{R_2}{R_1}$$

Bonus #1

$$H(s) = \frac{-\frac{1}{R_1 R_3 C^2}}{s^2 + \frac{1}{R_2 C} \cdot s + \frac{1}{R_3^2 C^2}} = \frac{K \frac{\omega_0^2}{Q}}{s^2 + \frac{\omega_0}{Q} \cdot s + \omega_0^2}$$

$$\Omega_\omega = \omega_0 = \frac{1}{R_3 C}$$

$$\omega_0 \$ = s$$

$$H(\$) = \frac{K \frac{1}{Q}}{\$^2 + \frac{1}{Q} \$ + 1} = \frac{-\frac{\cancel{R_2}}{R_1} \cdot \frac{R_3}{\cancel{R_2}}}{\$^2 + \frac{R_3}{R_2} \$ + 1}$$

$$H(\$) = \frac{-\frac{R_3}{R_1}}{\$^2 + \frac{R_3}{R_2} \$ + 1}$$

$$\Omega_Z = R_3 \qquad R_3' = 1 \qquad R_1' = \frac{R_1}{R_3}$$

$$R_2' = \frac{R_2}{R_3}$$

$$H(s) = \frac{-\frac{1}{R_1'}}{s^2 + \frac{s}{R_2'} + 1}$$

$$C = \frac{C_n}{\Omega_z \cdot \Omega_\omega}$$

Extra diseño de prueba

$Q = 10$ $f_0 = 10\,kHz$ GANANCIA $|10|$

$w_0 = 2\pi \cdot f_0 = 20 \cdot \pi \cdot kHz$

$Q = R_2' = 10$

$R_2' = 10$

$C_n = 1$ $C = 10\,nF$

$\Omega_z = R_3 = 1591{,}5\,\Omega$

$R_2 = 15915\,\Omega$

$$\frac{R_2'}{R_1'} = 10 \rightarrow R_1' = 1$$

$R_1' = R_3' = 1591{,}5\,\Omega$

Dio bien en LTSPICE!!