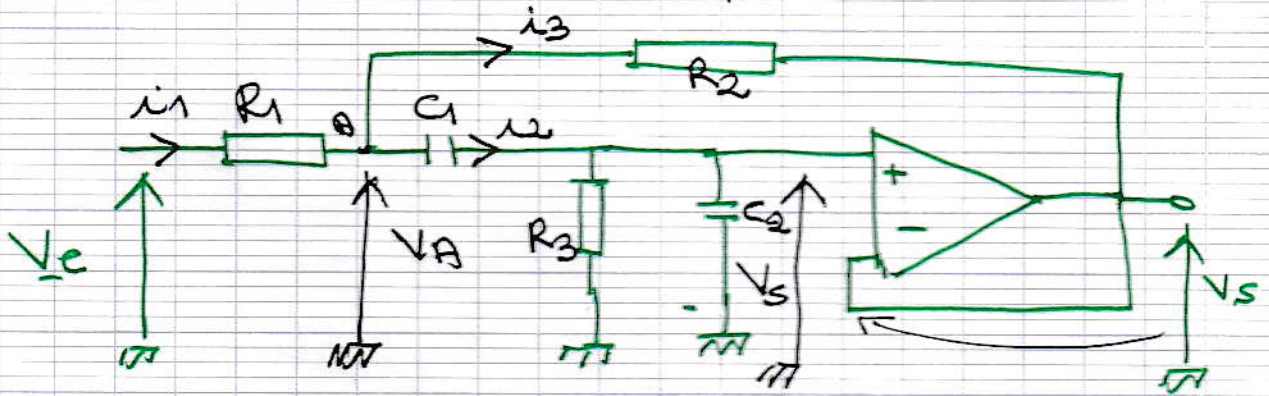


filtre passe bande

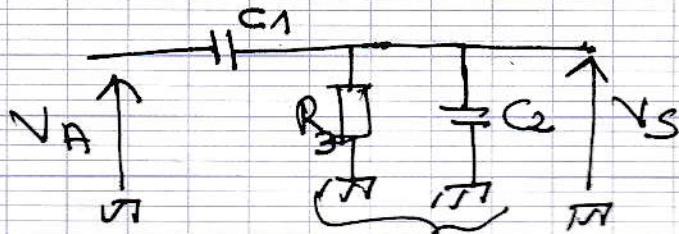


$$i_1 = \frac{V_e - V_A}{R_1} ; \quad i_2 = \frac{V_A - V_s}{Z_{C1}}$$

$$\text{et } i_3 = \frac{V_A - V_s}{R_2}$$

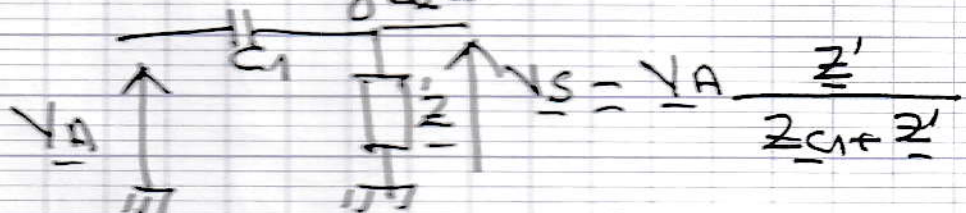
$$i_1 = i_2 + i_3$$

$$\frac{V_e - V_A}{R_1} = \frac{V_A - V_s}{Z_{C1}} + \frac{V_A - V_s}{R_2} \quad (1)$$



$$Z' = \frac{R_3 \times Z_{C2}}{R_3 + Z_{C2}} = \frac{R_3 \times \frac{1}{jC_2\omega}}{R_3 + \frac{1}{jC_2\omega}}$$

$$Z' = \frac{R_3}{jC_2\omega(R_3 + \frac{1}{jC_2\omega})} = \frac{R_3}{1 + jR_3C_2\omega}$$



$$\Rightarrow V_A = V_s \left(\frac{Z_{C1} + Z'}{Z'} \right) = V_s \left(1 + \frac{Z_{C1}}{Z'} \right)$$

$$\underline{V_A} = \underline{V_S} \left(1 + \frac{Z_{C1}}{Z'} \right) \quad (2)$$

$$(1) \rightarrow \frac{V_e}{R_1} = V_A \left(\frac{1}{R_1} + \frac{1}{Z_{C1}} + \frac{1}{R_2} \right) - V_S \left(\frac{1}{Z_{C1}} + \frac{1}{R_2} \right)$$

(3)

(2) dans (3) :

$$\frac{V_e}{R_1} = V_S \left(1 + \frac{Z_{C1}}{Z'} \right) \left(\frac{1}{R_1} + \frac{1}{Z_{C1}} + \frac{1}{R_2} \right) - V_S \left(\frac{1}{Z_{C1}} + \frac{1}{R_2} \right)$$

$$\frac{V_e}{R_1} = V_S \left[\frac{1}{R_1} + \frac{1}{Z_{C1}} + \frac{1}{R_2} + \frac{Z_{C1}}{Z'R_1} + \frac{1}{Z'} + \frac{Z_{C1}}{Z'R_2} - \frac{1}{Z_{C1}} - \frac{1}{R_2} \right]$$

$$\frac{V_e}{R_1} = V_S \left[\frac{1}{R_1} + \frac{Z_{C1}}{Z'R_1} + \frac{1}{Z'} + \frac{Z_{C1}}{Z'R_2} \right]$$

$$\underline{V_e} = \underline{V_S} R_1 \left[\frac{1}{R_1} + \frac{Z_{C1}}{Z'} \left(\frac{1}{R_1} + \frac{1}{R_2} \right) + \frac{1}{Z'} \right]$$

$$\underline{V_e} = \underline{V_S} \left[1 + \frac{Z_{C1}}{Z'} \left(1 + \frac{R_1}{R_2} \right) + \frac{R_1}{Z'} \right]$$

$$T_2(j\omega) = \frac{V_e}{V_S} = \frac{1}{1 + \frac{Z_{C1}}{Z'} \left(1 + \frac{R_1}{R_2} \right) + \frac{R_1}{Z'}}$$

$R_1 = R_2 = R_3 = 10k\Omega$; $C_1 = C_2 = 15nF$
 $Z' = \frac{R}{1+j\omega RC}$; $Z_{C1} = \frac{1}{j\omega C}$

$$T_2(j\omega) = \frac{1}{1 + \frac{1/j\omega C}{R} (1+1) + \frac{R}{R}} = \frac{1}{1 + \frac{2}{j\omega RC} + 1}$$

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$$T_2(j\omega) = \frac{1}{1 + \frac{2(1+jRC\omega)}{jRC\omega} + 1 - jRC\omega}$$

$$T_2(j\omega) = \frac{1}{2 + \frac{2(1+jRC\omega)}{jRC\omega} + jRC\omega}$$

$$T_2(j\omega) = \frac{jRC\omega}{2jRC\omega + 2 + 2jRC\omega + (jRC\omega)^2}$$

$$T_2(j\omega) = \frac{jRC\omega}{2 + 4jRC\omega + (jRC\omega)^2}$$

$$T_2(j\omega) = \frac{1}{2} \times \frac{jRC\omega}{(1 + 2jRC\omega + \frac{(jRC\omega)^2}{\sqrt{2}})}$$

$$T_2(j\omega) = \frac{1}{2} \frac{jRC\omega}{1 + j \frac{2\sqrt{2}\omega}{\sqrt{2}RC} + \left(j \frac{\omega}{\omega_0}\right)^2}$$

$$\omega_0 = \frac{\sqrt{2}}{RC}$$

$$T_2(j\omega) = \frac{1}{2} \frac{\sqrt{2}j \frac{\omega}{\sqrt{2}RC}}{1 + j \frac{2\sqrt{2}\omega}{\omega_0} + \left(j \frac{\omega}{\omega_0}\right)^2}$$

$$T_2(j\omega) = \frac{1}{\sqrt{2}} \frac{j\omega/\omega_0}{1 + j \frac{2\sqrt{2}\omega}{\omega_0} + \left(j \frac{\omega}{\omega_0}\right)^2}$$

$$\omega_0 = \frac{\sqrt{2}}{RC}$$

forme canonique

$$T(j\omega) = A \frac{2jm\omega/\omega_0}{1 + 2j\omega/\omega_0 + (\omega/\omega_0)^2}$$

$$m = \sqrt{2}$$

$$A = 1/4$$

$$\omega_0 = \frac{\sqrt{2}}{10 \cdot 10^3 \times 15 \cdot 10^{-9}} = 9426 \text{ rad/s}$$

$$f_0 = \frac{\omega_0}{2\pi} = 1500 \text{ Hz}$$