Amplificateur Bass Boost

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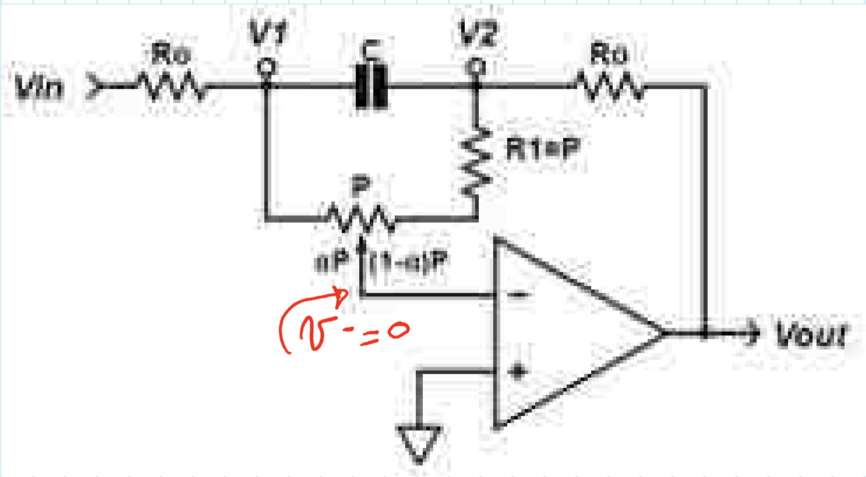

Mise en équation : Application du Théorème de Millmann

$$V_1 = \frac{\frac{V_e}{R_0} + V_2 jC\omega}{\frac{1}{R_0} + \frac{1}{\alpha P} + jC\omega} \quad (1) \qquad V_2 = \frac{\frac{V_s}{R_0} + V_1 jC\omega}{\frac{1}{R_0} + \frac{1}{P(2-\alpha)} + jC\omega} \quad (2) \qquad v^- = 0 = \frac{\frac{V_1}{\alpha P} + \frac{V_2}{P(2-\alpha)}}{\frac{1}{\alpha P} + \frac{1}{P(2-\alpha)}} \quad (3)$$

NB : $R_1 + P(1-\alpha)$ or $R_1 = P$!

Calcul de la Fonction de transfert :

$$(3) \Rightarrow \quad \frac{V_1}{\alpha P} + \frac{V_2}{P(2-\alpha)} = 0 \quad \text{donc} \quad V_1 = \frac{\alpha}{\alpha - 2} V_2 \quad (4)$$

$$(1) \Rightarrow \quad \frac{V_e}{R_0} = V_1 \left(\frac{1}{R_0} + \frac{1}{\alpha P} + jC\omega \right) - V_2 jC\omega$$

$$(2) \Rightarrow \quad \frac{V_s}{R_0} = V_2 \left(\frac{1}{R_0} + \frac{1}{P(2-\alpha)} + jC\omega \right) - V_1 jC\omega$$

(4)

$$\frac{V_e}{R_0} = \left[\frac{\alpha}{\alpha - 2} \left(\frac{1}{R_0} + \frac{1}{\alpha P} + jC\omega \right) - jC\omega \right] \cdot V_2 \quad (5)$$

$$\frac{V_s}{R_0} = \left[\left(\frac{1}{R_0} + \frac{1}{P(2-\alpha)} + jC\omega \right) - \frac{\alpha}{\alpha - 2} jC\omega \right] \cdot V_2 \quad (6)$$

donc $\frac{(6)}{(5)} \Rightarrow \frac{V_s}{V_e} = \dfrac{\frac{1}{R_o} + \frac{1}{P(2-\alpha)} + jC\omega\left(1 - \frac{\alpha}{\alpha-2}\right)}{\frac{\alpha}{\alpha-2}\left(\frac{1}{R_o} + \frac{1}{\alpha P}\right) + jC\omega\left(\frac{\alpha}{\alpha-2} - 1\right)}$

Mise sous une forme canonique :

$$\frac{V_s}{V_e} = \dfrac{\dfrac{P(2-\alpha)+R_o}{R_o \cdot P(2-\alpha)} + jC\omega \dfrac{2}{2-\alpha}}{\dfrac{\alpha(\alpha P + R_o)}{(\alpha-2)R_o \alpha P} + jC\omega \dfrac{2}{\alpha-2}}$$

$$\frac{V_s}{V_e} = \dfrac{\dfrac{P(2-\alpha)+R_o}{\cancel{R_o}\cancel{P}\cancel{(2-\alpha)}}\ {\scriptstyle \to -1}}{\dfrac{\cancel{\alpha}(\alpha P + R_o)}{\cancel{(\alpha-2)}\cancel{R_o}\cancel{\alpha}\cancel{P}}} \cdot \dfrac{1 + jC\omega \dfrac{2}{\cancel{2-\alpha}} \dfrac{R_o P \cancel{(2-\alpha)}}{P(2-\alpha)+R_o}}{1 + jC\omega \cdot \dfrac{2}{\cancel{\alpha-2}} \cdot \dfrac{\cancel{(\alpha-2)} R_o \alpha P}{\cancel{\alpha}(\alpha P + R_o)}}$$

$$\frac{V_s}{V_e} = -\left(\frac{P(2-\alpha)+R_o}{\alpha P + R_o}\right) \cdot \dfrac{1 + j\omega \dfrac{2R_oPC}{P(2-\alpha)+R_o}}{1 + j\omega \cdot \dfrac{2R_oPC}{\alpha P + R_o}}$$

de la forme $\dfrac{V_s}{V_e} = k \cdot \dfrac{1 + j\frac{\omega}{\omega_{c1}}}{1 + j\frac{\omega}{\omega_{c2}}}$

avec

$$k = -\left(\frac{P(2-\alpha)+R_o}{\alpha P + R_o}\right)$$

$$\omega_{c1} = \frac{P(2-\alpha)+R_o}{2R_oPC}$$

$$\omega_{c2} = \frac{\alpha P + R_o}{2R_oPC}$$

$2R_oPC$

Etude de la fonction de transfert :

si $\alpha = 1$ alors $\omega_{c1} = \omega_{c2}$ et $k = -1$

donc $\left|\frac{V_s}{V_e}\right| = 1 \quad \forall f$

si $\alpha = 0$ pour $f \to 0$ $\quad \left|\frac{V_s}{V_e}\right| = \frac{2P + R_o}{R_o}$

gain max

avec $R_o = 22 k\Omega$ $\quad P = 47 k\Omega$

$$G_{max} = 20 \log\left(\frac{2 \times 47 + 22}{22}\right) = 14,4 \, dB$$