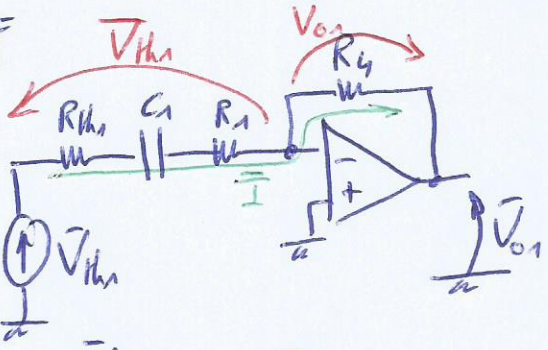
$\boxed{\overline{\overline{T}}_1 \ ?}$ en BF

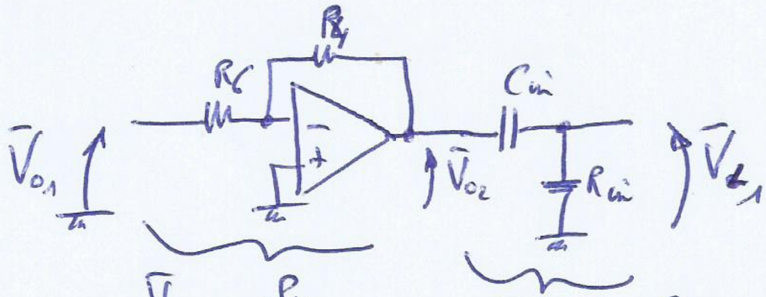
$$\begin{cases} \overline{V}_{H_1} = \dfrac{k_1 . P_1}{P_1 + R_{g_1}} . \overline{E}_1 \\ R_{H_1} = \dfrac{k_1 P_1 . ((1-k_1) P_1 + R_{g_1})}{P_1 + R_{g_1}} \end{cases}$$



$$\Rightarrow \frac{\overline{V}_{O_1}}{\overline{V}_{H_1}} = \frac{-R_4}{R_{H_1} + \overline{Z}_{C_1} + R_1}$$

$$\Rightarrow \frac{\overline{V}_{O_1}}{\overline{E}_1} = \frac{k_1 . P_1}{P_1 + R_{g_1}} . \frac{-R_4}{R_{H_1} + R_1} . \frac{1}{\left(1 - j \frac{f_{c_1}}{f}\right)}$$

avec $f_{c_1} = \dfrac{1}{2\pi (R_{H_1} + R_1) C_1}$



$$\frac{\overline{V}_{O_2}}{\overline{V}_{O_1}} = -\frac{P_4}{R_C}$$

$$\frac{\overline{V}_L}{\overline{V}_{O_2}} = \frac{R_{ci}}{R_{ci} + \overline{Z}_{ci}} = \frac{1}{1 - \frac{j}{\omega C_{ci} R_{ci}}} = \frac{1}{1 - j \frac{f'_{c_1}}{f}}$$

avec $f'_{c_1} = \dfrac{1}{2\pi R_{ci} C_{ci}}$

$$\Rightarrow \overline{\overline{T}}_1 = \frac{\overline{V}_{L_1}}{\overline{E}_1} = \frac{k_1 . P_1}{P_1 + R_{g_1}} . \frac{R_4}{R_{H_1} + R_1} . \frac{P_4}{R_6} . \frac{1}{\left(1 - j \frac{f_{c_1}}{f}\right)} . \frac{1}{\left(1 - j \frac{f'_{c_1}}{f}\right)}$$

Intérêt d'avoir $\begin{cases} R_{g_1} \overset{(0,12)}{<<} P_1 \\ R_{H_1} << R_1 \quad \Rightarrow R_{H_1 \, MAX} << R_1 \\ f_{c_1} = f'_{c_1} \end{cases}$

$\angle \dfrac{dR_{H_1}}{dk} = 0 \Rightarrow \ldots$

$$\Rightarrow \overline{\overline{T}}_1 \simeq \overbrace{\boxed{\underbrace{k_1}_{0 \ldots 100\%} . \underbrace{\frac{R_4}{R_1}}_{15} . \underbrace{\frac{P_4}{R_C}}_{10}}}^{G_{BP}} . \frac{1}{1 + \left(\frac{f_{c_1}}{f}\right)^2} \geq 0,95 . G_{BP}$$

(module)

$$\Rightarrow \frac{f_{c_1}}{f = 1 Hz} \leq \ldots$$

($f_{lim \, BF}$)

$\boxed{\text{Choix } R_4}$ ... et P_4 ... mais $P_4 = 10\,k\Omega$

$\simeq$ seule valeur existante

- $R_4 \leq \dfrac{Zd}{100 \cdot B}$ $\qquad B = \dfrac{Ri/3}{Ri/3 + R_4} = \dfrac{1}{1 + 3|G_1|}$

- $(\underbrace{R_4 \cdot I_{p-}} + V_{IO}) \cdot G_2 < 200\,mV$

$\hookrightarrow R_4 \, I_{p-_{MAX}} \ll V_{IO_{TYP}} \Rightarrow R_4 < \dots$

$\boxed{\overline{T_1} \text{ en HF}}$

Système bouclé linéaire (CR) $\Rightarrow \overline{T} = \dfrac{\overline{T_{idéal}}}{1 + \dfrac{1}{\overline{A}\,\overline{B}}}$

si $\begin{cases} \overline{\alpha} = \alpha \\ \overline{B} = B \end{cases}$

AOP réel $\Rightarrow \overline{A} = \dfrac{A_{DC}}{1 + j\, f/f_{cA}}$

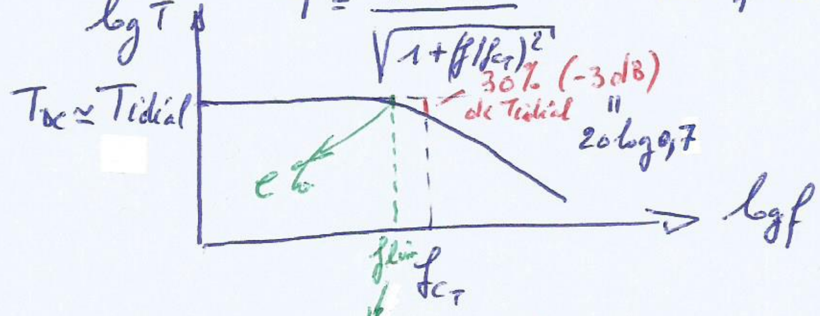
$\Rightarrow \overline{T} \simeq \dfrac{T_{idéal}}{1 + j\,\dfrac{f}{f_{cT}}}$

avec $f_{cT} = B\, f_{TA}$

$f_{TA} = A_{DC} \cdot f_{cA}$

$\hookrightarrow f$ lorsque $A = 1$

$T = \dfrac{T_{idéal}}{\sqrt{1 + (f/f_{cT})^2}}$



$f_{lim} = k \cdot f_{cT}$

$\hookrightarrow k \simeq 1,5 \cdot \sqrt{e}$

$T_{idéal}\left(\overbrace{1 - \dfrac{1}{\sqrt{1+k^2}}}^{e}\right)$

chute de T (ΔT) $= T_{idéal} - T$

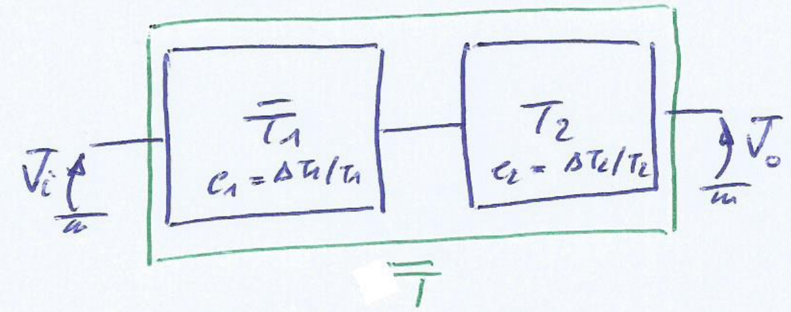
chute en dB $= 20 \log T_{idéal} - 20 \log T$

$= 20 \log \left(\dfrac{T_{idéal}}{T}\right)$

en $f = f_{cT}$: $T = \dfrac{T_{idéal}}{\sqrt{2}} = 0,7 \cdot T_{id}$

en $f = f_{lim}$: $\begin{array}{|l} \Delta T = e \\ T = \dfrac{T_{idéal}}{\sqrt{1+k^2}} \end{array}$

Si 2 étages



$$\overline{T} = \overline{T}_1 \cdot \overline{T}_2 \cong \frac{T_{1\,idéal}}{\left(1 + j\frac{f}{f_{cT_1}}\right)} \cdot \frac{T_{2\,idéal}}{\left(1 + j\frac{f}{f_{cT_2}}\right)}$$

$$\Longrightarrow T = T_1 \cdot T_2 \cong \frac{\overbrace{T_{1\,idéal}}^{= G_1}}{\sqrt{1 + \left(\frac{f}{f_{cT_1}}\right)^2}} \cdot \frac{\overbrace{T_{2\,idéal}}^{= G_2}}{\sqrt{1 + \left(\frac{f}{f_{cT_2}}\right)^2}}$$

$= G$ $(T_{idéal})$

$$\text{en } f = f_{lim} \quad \left\{ \begin{array}{l} f/f_{cT_1} = f_{lim}/f_{cT_1} = k_1 \\ f/f_{cT_2} = f_{lim}/f_{cT_2} = k_2 \end{array} \right\} \Longrightarrow T = \frac{T_{1\,idéal}}{\sqrt{1+k_1^2}} \cdot \frac{T_{idéal}}{\sqrt{1+k_2^2}}$$

$$\Longrightarrow \Delta T = T_{idéal} - T = \left(1 - \frac{1}{\sqrt{1+k_1^2}\,\sqrt{1+k_2^2}}\right) \cdot T_{idéal}$$

$$\Longrightarrow e = \frac{\Delta T}{T} = 1 - \frac{1}{\sqrt{1+k_1^2} \cdot \sqrt{1+k_2^2}} \simeq \frac{\Delta T_1}{T_1} + \frac{\Delta T_2}{T_2}$$

2 types de dimensionnement possibles

- Produit $G \cdot f_{lim}$ max $\Longrightarrow f_{cT_1} = f_{cT_2} \Rightarrow \left| \begin{array}{l} e_1 = e_2 \\ k_1 = k_2 \end{array} \right.$
- Maximiser G_1 pour réduire l'impact des bruits.