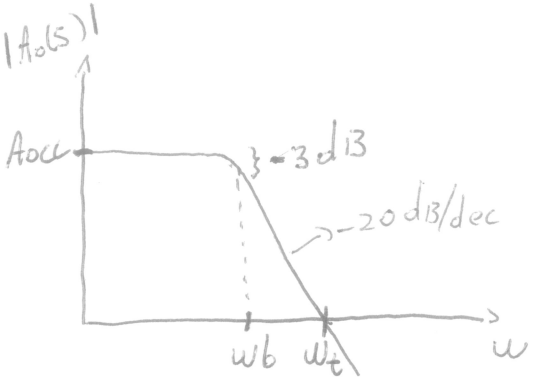
• Largura de Banda Finita (Pedra)



$$A_o(s) = \frac{A_{occ}}{1 + \frac{s}{\omega_b}} \Rightarrow \text{polo } s_p = -\omega_b$$

↓ corresponde a uma queda de 3dB em A_{oCC}

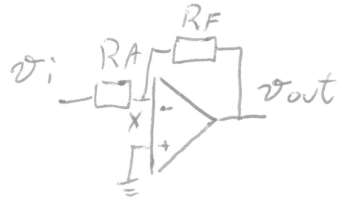
• p/ $\omega \gg \omega_b$

$$A_o(s) \cong \frac{A_{occ}}{\frac{s}{\omega_b}} \Rightarrow A_o(j\omega) \cong \frac{A_{occ}}{\frac{j\omega}{\omega_b}} \Rightarrow A_o(j\omega) \cong \frac{A_{occ}\,\omega_b}{j\omega} \quad (A)$$

$$|A_o(j\omega)| = \frac{A_{occ}\,\omega_b}{\omega} \Rightarrow |A_o(j\omega_t)| = 1 \Rightarrow \boxed{\omega_t \cong A_{occ}\,\omega_b} \quad (B)$$

$$(A)\text{-}(B) \Rightarrow \boxed{A_o(j\omega) \cong \frac{\omega_t}{j\omega}}$$

• Amplificador inversor



- $v_+ = 0$
- $v_- = v_x$

$\Rightarrow (0 - v_x).A_o = v_{out}$ (1) $\quad v_x = -\frac{v_{out}}{A_o}$

- $\frac{v_i - v_x}{RA} = \frac{v_x - v_{out}}{RF} \Rightarrow RF\,v_i - RF\,v_x = RA\,v_x - RA\,v_{out}$

(1) $\Rightarrow RF\,v_i + RF\frac{v_{out}}{A_o} = -RA\frac{v_{out}}{A_o} - RA\,v_{out} \Rightarrow RF\,v_i = -v_{out}\left(\frac{RF}{A_o} + \frac{RA}{A_o} + RA\right)$

$$A_v = \frac{v_{out}}{v_i} = \frac{-RF}{\frac{RF}{A_o} + \frac{RA}{A_o} + RA} \cdot RA^{-1} = \frac{-RF/RA}{\frac{1}{A_o}\frac{RF}{RA} + \frac{1}{A_o} + 1} \Rightarrow \boxed{A_v = \frac{-RF/RA}{1 + \frac{(RF/RA + 1)}{A_o}}} \Rightarrow A_{v,d}$$

$\Rightarrow$ Fazendo $A_o = A_o(s)$

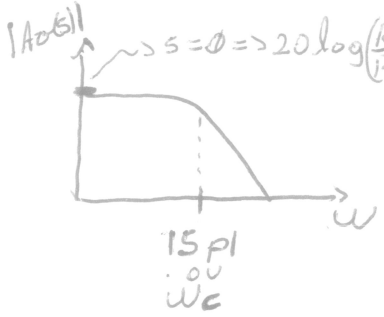
$$A_v(s) = \frac{-RF/RA}{1 + \frac{(RF/RA + 1)}{\frac{A_{occ}}{1 + \frac{s}{\omega_b}}}} = \frac{-RF/RA}{1 + \frac{(RF/RA+1)}{A_{occ}} \cdot \left(1 + \frac{s}{\omega_b}\right)} = \frac{-RF/RA}{1 + \frac{(RF/RA+1)}{A_{occ}} + \frac{(RF/RA+1).s}{A_{occ}\omega_b}}$$

(B) $\Rightarrow \boxed{A_v(s) = \frac{-RF/RA}{1 + \frac{(RF/RA+1)}{A_{occ}} + \frac{(RF/RA+1)\,s}{\omega_t}}}$

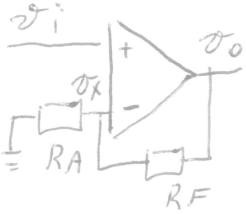
$A_o \gg \left(\frac{RF}{RA} + 1\right) \Rightarrow \boxed{A_v(s) \cong \frac{-RF/RA}{1 + \frac{(RF/RA+1).s}{\omega_t}}}$

• Pólo $\Rightarrow \boxed{s_p = \frac{-\omega_t}{(RF/RA+1)}}$

$\hookrightarrow = \omega_{corte}$



Amp. não inversor



$\left.\begin{array}{l} \circ\ v_+ = v_i \\ \circ\ v_- = v_x \end{array}\right\} A_0 \cdot (v_i - v_x) = v_0 \Rightarrow v_i = \frac{A_0 v_i - v_0}{A_0}$ (A)

$\circ\ \frac{v_x}{R_A} = \frac{v_0}{R_F + R_A} \Rightarrow v_x = v_0 \cdot \frac{R_A}{R_F + R_A}$ (B)

(B)->(A) => $A_0 \left(v_i - \frac{v_0 R_A}{R_F + R_A} \right) = v_0 \Rightarrow A_0 v_i = v_0 \left(1 + A_0 \frac{R_A}{R_F + R_A} \right)$

$$A_v = \frac{A_0}{1 + A_0 \frac{R_A}{R_F + R_A} \cdot A_0^{-1}} = \frac{1}{\frac{1}{A_0} + \frac{R_A}{R_F + R_A} \cdot \frac{R_F + R_A}{R_A}} \Rightarrow A_v = \frac{1 + \frac{R_F}{R_A}}{\frac{1}{A_0}\left(1 + \frac{R_F}{R_A}\right) + 1}$$

=> Fazendo $A_0 = A_0(s)$

$$A_v(s) = \frac{1 + \frac{R_F}{R_A}}{\frac{1}{A_{0cc}} \cdot \left(1 + \frac{R_F}{R_A}\right) + 1} \Rightarrow A_v(s) = \frac{1 + \frac{R_F}{R_A}}{\left(\frac{1 + s/\omega_b}{A_{0cc}}\right)\left(1 + \frac{R_F}{R_A}\right) + 1} = \frac{1 + R_F/R_A}{\frac{1 + R_F/R_A}{A_{0cc}} + \frac{(1 + R_F/R_A)\, s}{A_{0cc}\, \omega_b} + 1}$$

$\omega_b \cdot A_{0cc} = \omega_t$

$$A_v(s) = \frac{A_{vid}}{1 + \frac{1 + R_F/R_A}{A_{0cc}} + \frac{(1 + R_F/R_A)\, s}{\omega_t}}$$

$A_{0cc} \gg 1 + \frac{R_F}{R_A}$

$$\Rightarrow A_v(s) \approx \frac{1 + R_F/R_A}{\left(\frac{1 + R_F/R_A}{\omega_t}\right) \cdot s + 1}$$

- Pólo => $s_p = \frac{-\omega_t}{1 + R_F/R_A}$ => $= \omega_{corte}$

obs: $A_{vid} \cdot \omega_{corte} = \omega_t$ ($A_{vid} = 1 + \frac{R_F}{R_A}$)