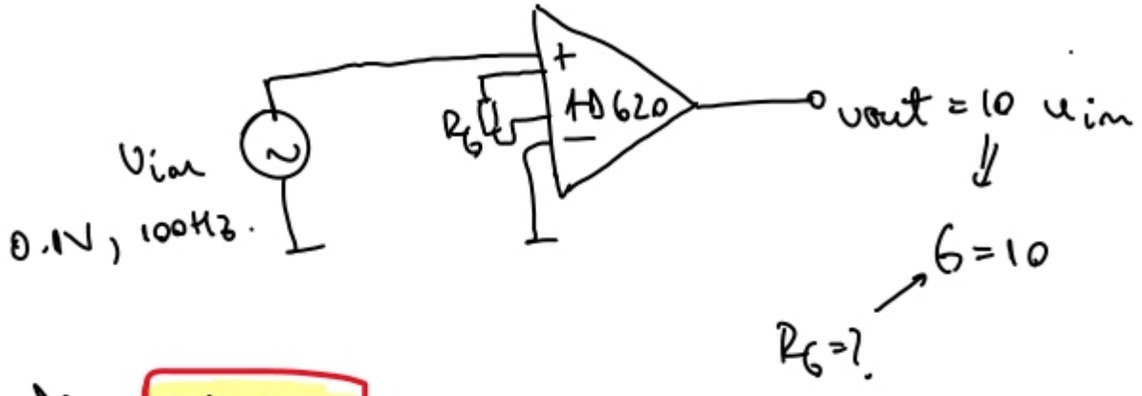
Curs 3 SIS:



Din datasheet:

$$G = \frac{49.4\,k\Omega}{R_G} + 1$$

$$R_G = \frac{49.4\,k\Omega}{G-1} \Bigg\} \Rightarrow R_G = \frac{49.4\,k\Omega}{9}$$

$$G = 10$$

$$= 5.49\,k\Omega$$

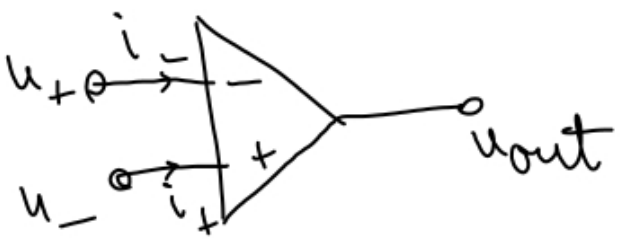
in comert $R = 5.6\,k\Omega \pm 5\%$ =>

=> $R_{min} = 5.32\ k\Omega$; $R_{max} = 5.88\ k\Omega$

$$G = 10.29 \rightarrow 9.40$$

Caracteristicile amplificatorului operational real:

A.O. ideal



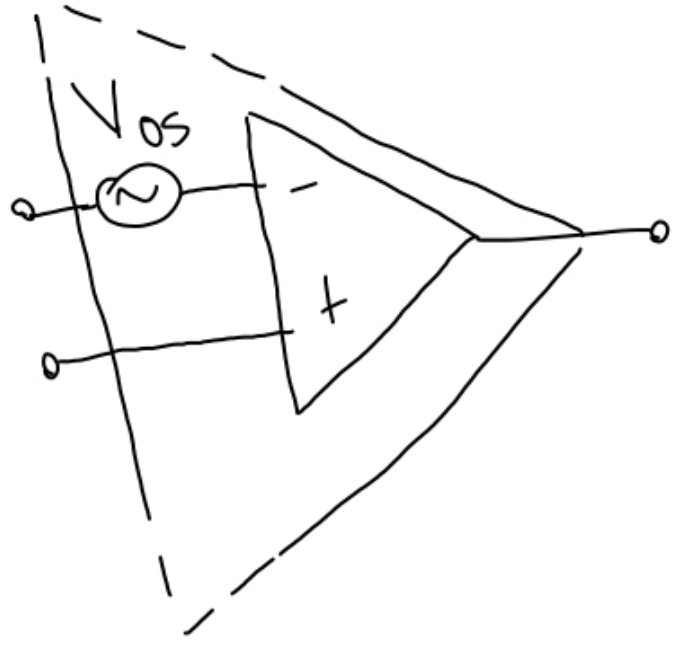
$$v_{out} = A_d (u_+ - u_-)$$

$A_d \to \infty$ $\quad i_+ = 0$

$z_{in} \to \infty$ $\quad i_- = 0$

$z_{out} = 0$

Input offset voltage:



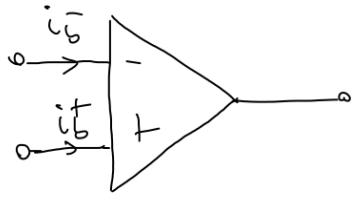
V_{os} - input offset voltage.

stabilitate (V/month)

(V/°C).

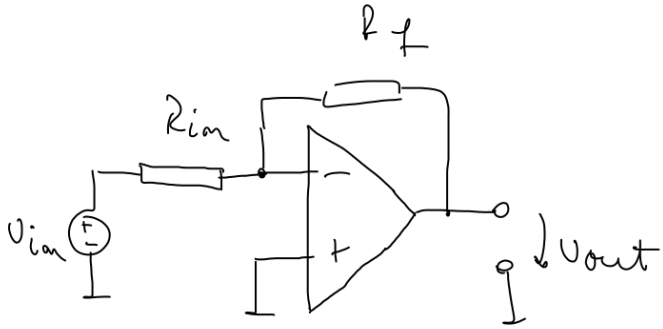
Input offset current

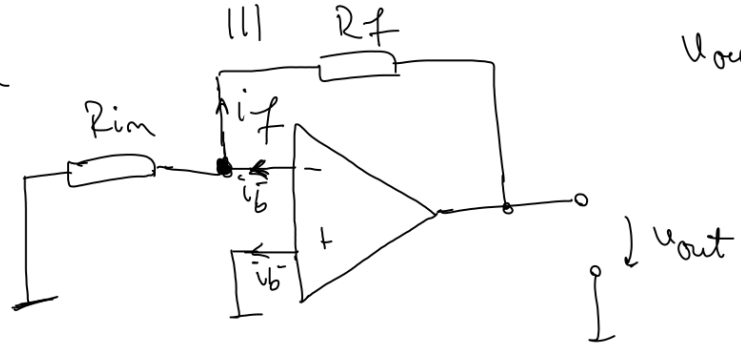
$i_b^{+,-}$ – bias currents



A.O cu TB → $i_b \sim mA$

A.O. cu TEC → $i_b \sim pA$





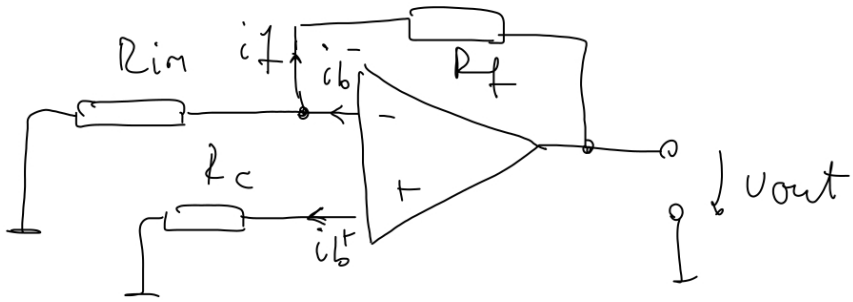
$v_{out} = i_b^- \cdot R_f$

paralel cu v_{in}

pentru minimizarea efectelor i_b^-, i_b^+

R_c – rezistor de compensare

$i_b^+ \simeq i_b^-$



$$R_c = R_{in} \| R_f$$

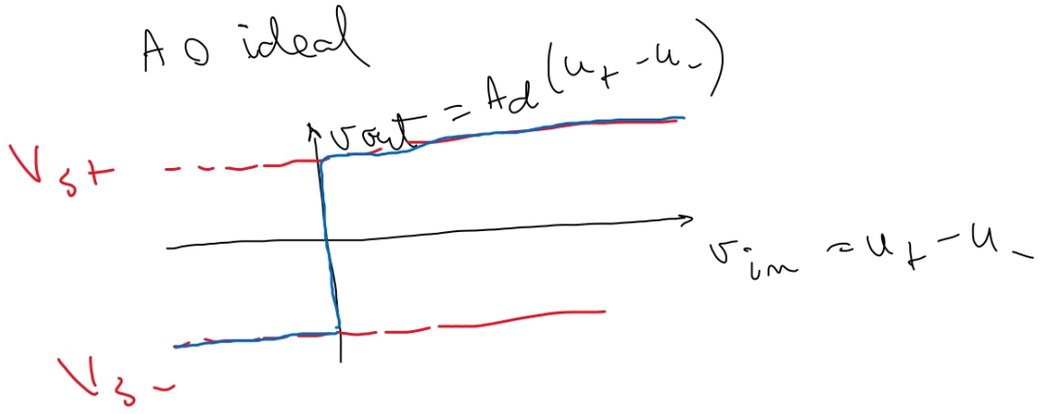
de regulă → „input offset current"

$$i_{off} = i_b^+ - i_b^-$$

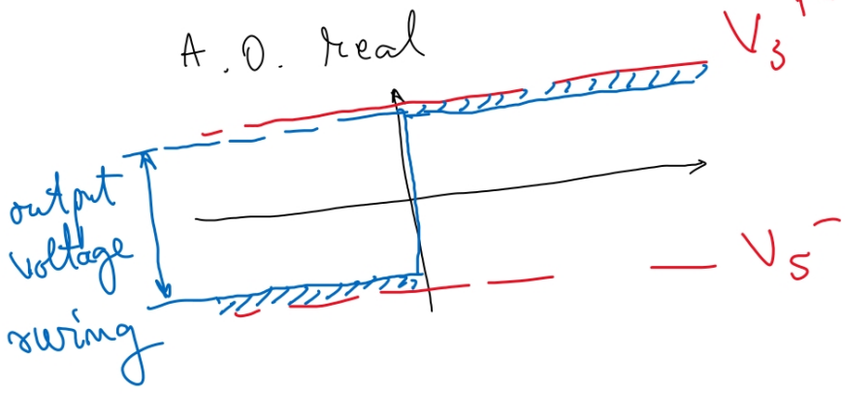
Dacă $v_{in} = 0 \Rightarrow v_{out} = I_{off} \cdot R_f = (i_b^+ - i_b^-) R_f$.

Output voltage swing:

A.O. ideal

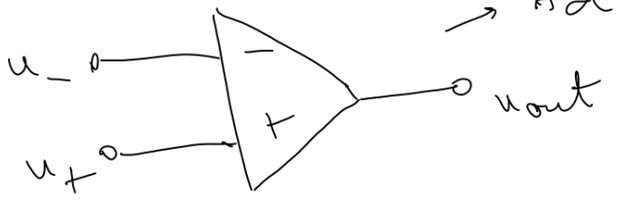


A.O. real



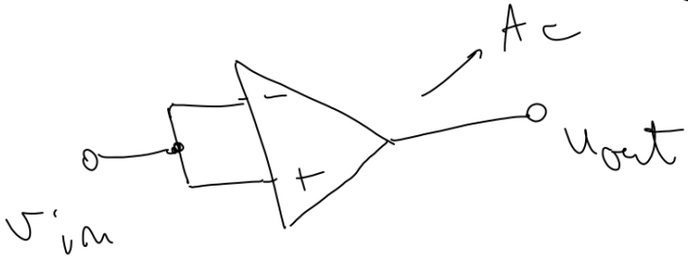
Common mode rejection ratio (CMRR, CMR):

Open-loop op-amp



(A_d (differential open-loop gain))

common mode



(A_c (common mode gain))

↗ dat la $f = 0$ (DC)

$$CMRR = \frac{A_d}{A_c} \quad (\text{ideal} \to \infty)$$

$$CMR = 20 \log_{10} CMRR$$

Supply voltage rejection ratio:

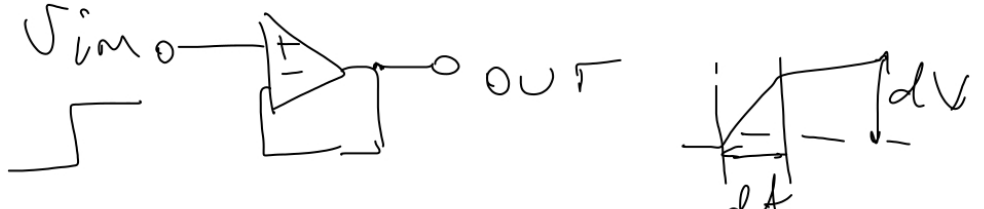
$$k_{SVR} = \frac{\Delta V_{DD}}{\Delta V_{OS}}$$

$PSRR = k_{SVR}$ → la $f = 0$ (DC) scade cu creșterea frecvenței)

$PSR = 20 \log_{10} k_{SVR}$

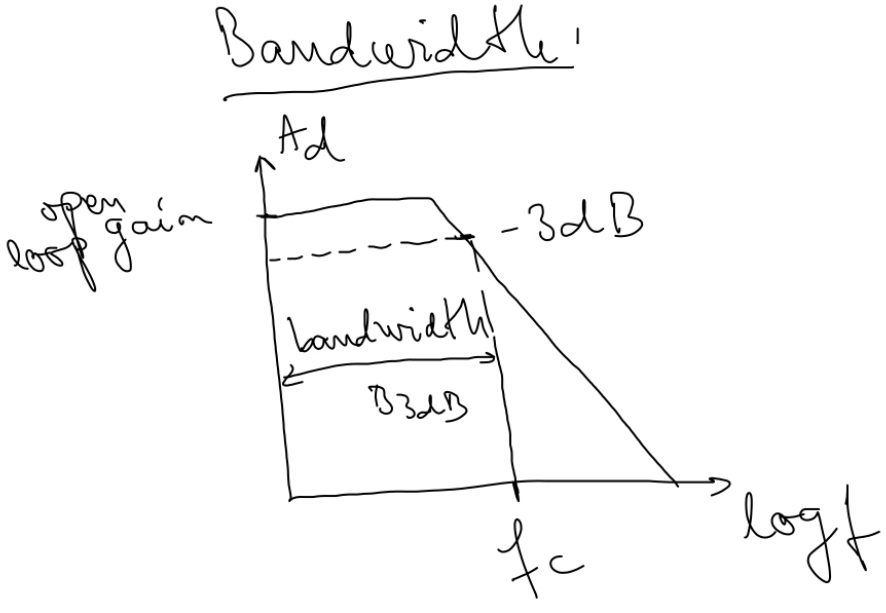
slew rate:

$$SR = \frac{dV}{dt} \quad (V/\mu s)$$



$$f_{max} = \frac{SR}{2\pi V_{max}}$$

Bandwidth:



Gain bandwidth product

$$GBP = A_d \times f_c$$

Marca tensometrică în punte:

- o marcă în punte: $S =$ mV/Ω
- două mărci în punte $S \approx$ mV/Ω
- patru mărci în punte $S =$

$\Delta\mathcal{E} = 2\ mV$

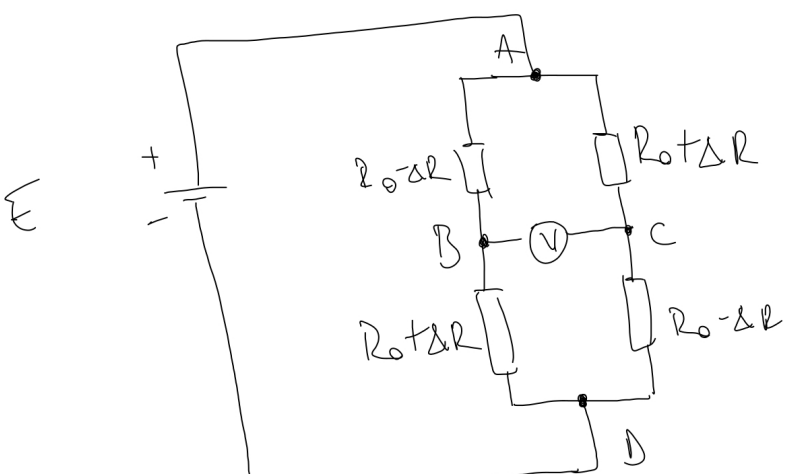
$R_{max} - R_{min} = 0.2\ \Omega$

$S = \frac{2\ mV}{0.2\ \Omega} = \frac{1}{0.1}\ \frac{mV}{\Omega} = 10\ mV/\Omega$

$\Delta R = 0.1\ \Omega$

$R_0 = 120\ \Omega$

$\mathcal{E} = 5V$



$\mathcal{E} = U_{BD} - U_{CD}$

$\mathcal{E}_{min}, \mathcal{E}_{max} = ?$

$S = \frac{\mathcal{E}_{max} - \mathcal{E}_{min}}{R_{max} - R_{min}} = ?$

$R_{max} - R_{min} = 2\Delta R = 0.2\ \Omega$