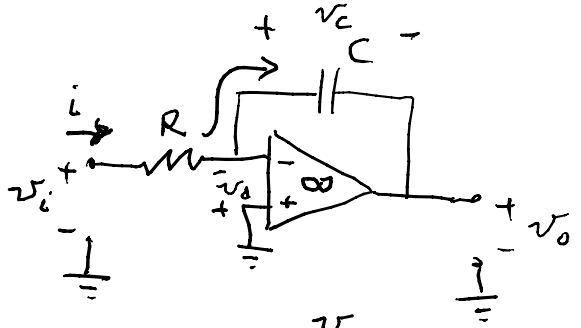
EE 303
01/29/07

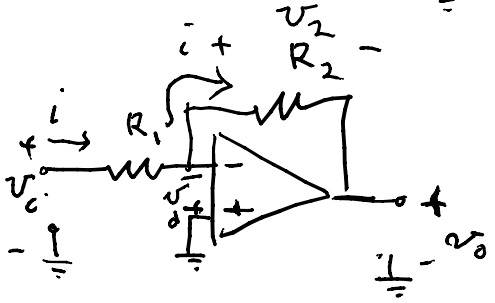



1st case: $v_d = 0 \Rightarrow v_i = Ri$

$i_- = 0$

$v_c = -v_o = \frac{1}{sC} \cdot i = \frac{1}{sC} \cdot \frac{v_i}{R}$

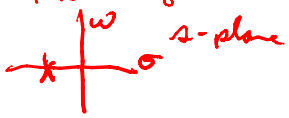
$v_o = -\frac{1}{sRC} \cdot v_i$




$v_o = \frac{K}{1 + s/\omega_0} \cdot v_d$ , $K > 0$, $\omega_0 > 0$

$i_- = 0, i_+ = 0$

pole at $s = -\omega_0$




$v_i = R_1 i - v_d$ ; $v_2 = R_2 i = -v_d - v_o$

$= R_2 (v_i + v_o)/R_1$

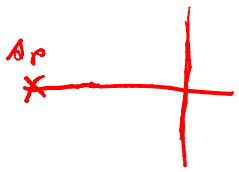
$\frac{R_2}{R} v_i = -(1 + \frac{R_2}{R_1}) v_d - v_o$

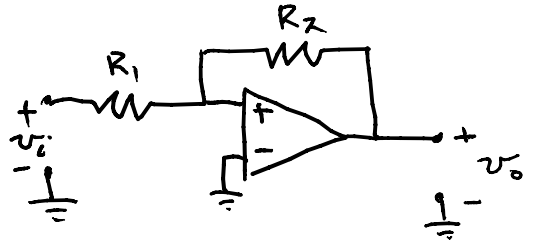
$\Rightarrow v_d = \frac{(1 + s/\omega_0)}{K} v_o$

$\Rightarrow \frac{R_2}{R_1} v_i = -\left[\underbrace{(R_2 + R_1)}_{R_1}\left(\frac{1 + (s/\omega_0)}{K}\right) + 1\right] v_o = -\frac{1}{K}\left[\left(K + \frac{R_2 + R_1}{R_1}\right) + s\left(\frac{R_1 + R_2}{\omega_0 R_1}\right)\right] v_o$

$\frac{v_o}{v_i} = -\frac{R_2}{R_1} \cdot \frac{K}{\left(\left(K + \frac{R_2 + R_1}{R_1}\right) + \left(\frac{R_1 + R_2}{\omega_0 R_1}\right) s\right)}$

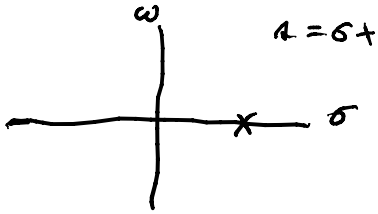
pole: $s_p = \frac{-\left(K + \frac{(R_2 + R_1)}{R_1}\right)}{\left(\frac{R_1 + R_2}{\omega_0 R_1}\right)} < 0$




pole $\Rightarrow s_p = -\left(\frac{-|K|}{\left(\frac{R_1 + R_2}{\omega_0}\right)} + \frac{1}{\omega_0}\right)$

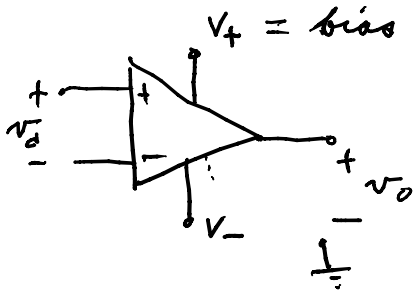
as $|K|$ is very large then $s_p > 0$

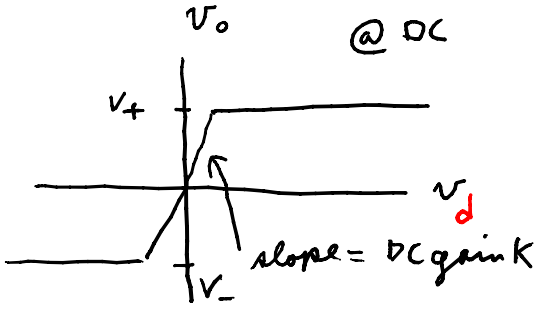



$\Rightarrow e^{+t}$

or this circuit unstable

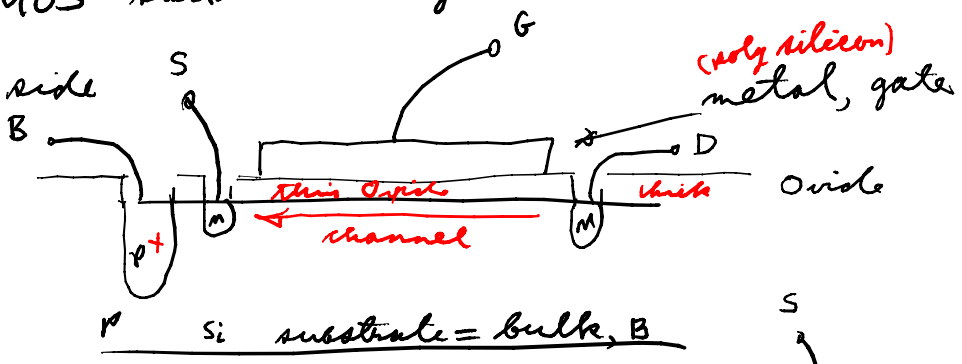
$\Rightarrow$ saturates the op-amp.

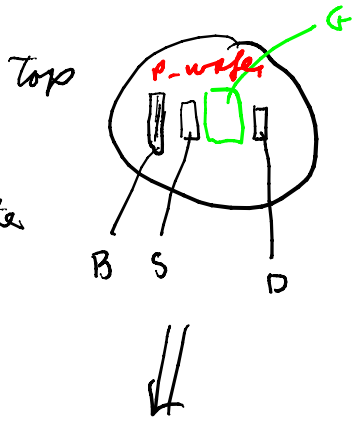


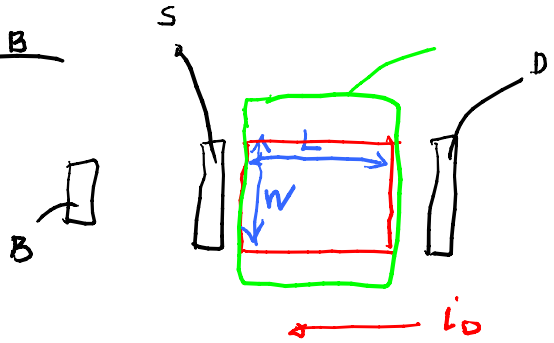




# MOS fabrication

NMOS start with P wafer

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