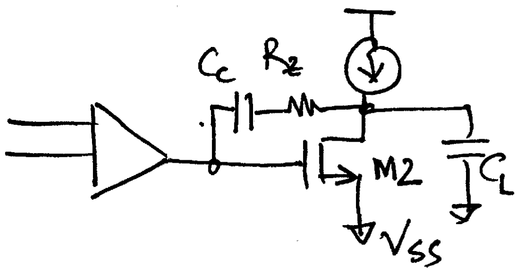
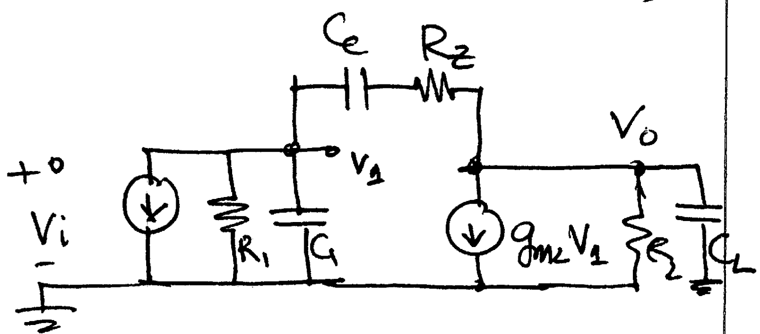
AHUJA COMPENSATION

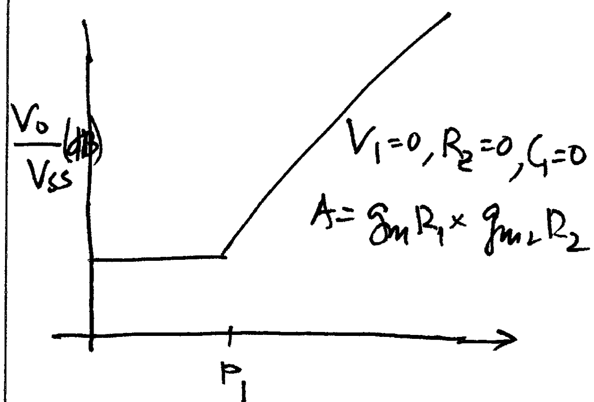
zero

$I = C_c \frac{d(V_1 - V_0)}{dt}$

Classic Compensation:







$$P_1 = \frac{1}{(1+g_{m2}R_2)\,C_c R_1}$$

$$P_2 = \frac{g_{m2} C_c}{C_1 C_L + C_1 C_c + C_L C_c} \approx \frac{g_{m2}}{C_L}$$

$$Z_1 = \frac{1}{C_c\left(\frac{1}{g_{m2}} - R_z\right)}$$

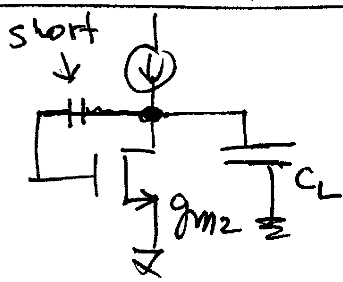
Two issues:

1) Cannot drive large loads.

To be stable : $C_L < \frac{g_{m2} C_c}{g_{m1}}$

2) Poor negative supply rejection.

Intuitive second pole locatio

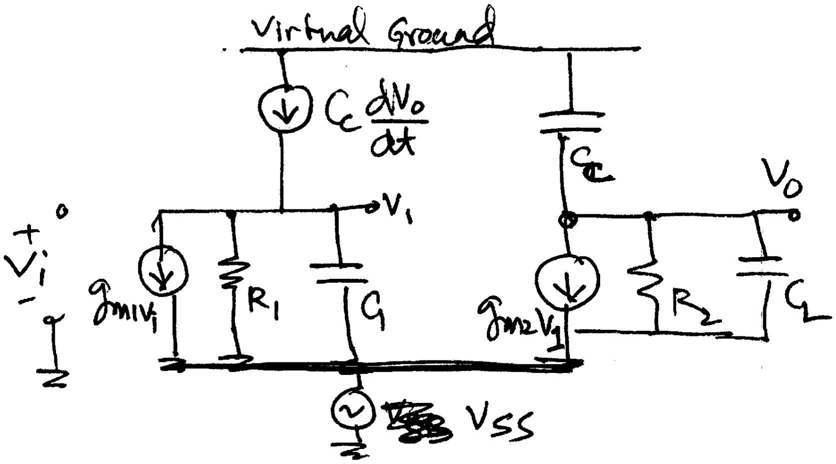


$\longrightarrow$ $P_2 \approx \frac{g_{m2}}{C_L}$

Improved Compensation:

No forward path so no zero.

Conceptual small signal:



$$p_1 \cong \frac{1}{g_{m2} R_2 C_c R_1}$$

$$p_2 \cong \frac{g_{m2} C_c}{C_1 (C_c + C_L)}$$

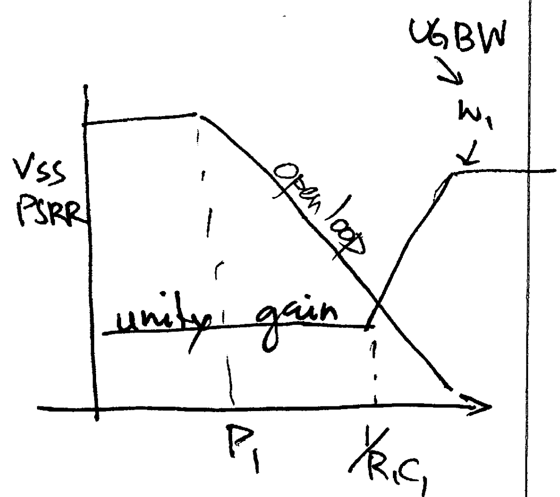
Negative PSRR

For open loop:

$$\frac{V_o}{V_{SS}} \cong \frac{1 + sC_1R_1}{(1+s/p_1)(1+s/p_2)}$$

For unity gain mode.

$$\frac{V_o}{V_{SS}} \cong \frac{1 + sC_1R_1}{A_1A_2(1+s/w_1)}$$

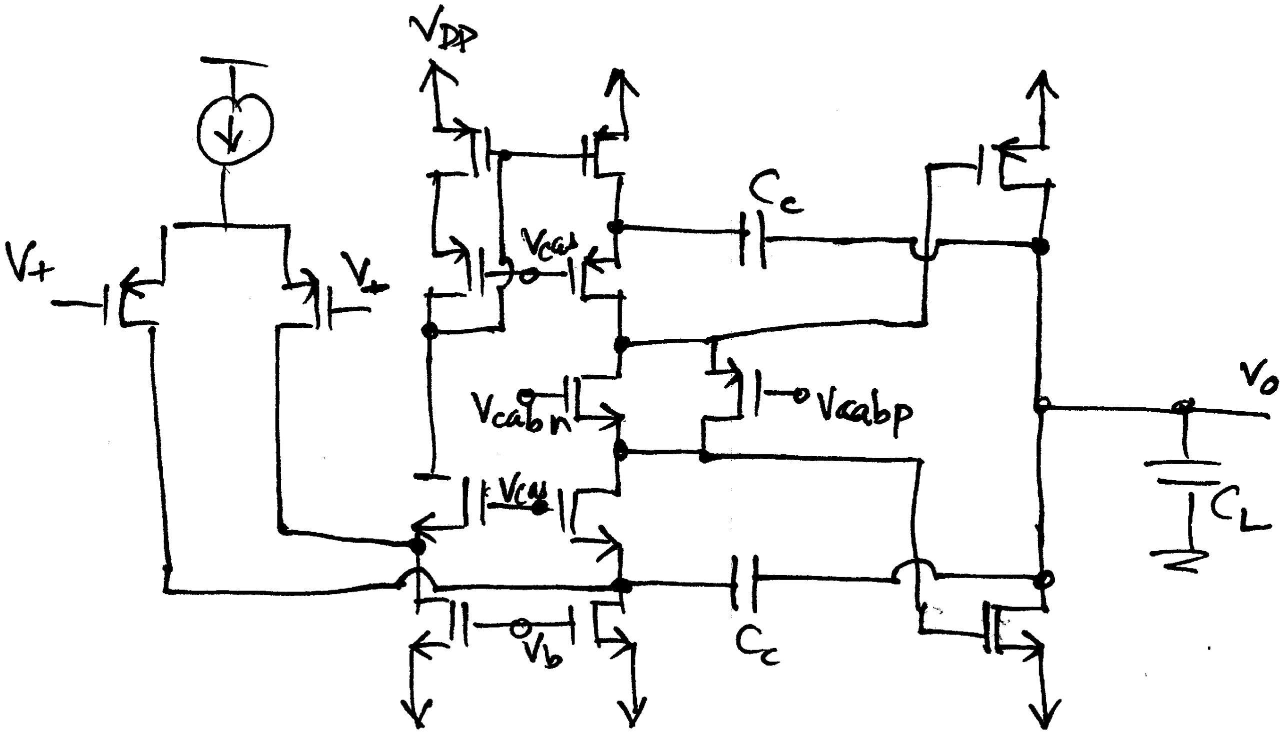


Observation:

* P_1 is the same as before.
* P_2 moves out $\approx \frac{g_{m2}}{C_1}$
* No zeros

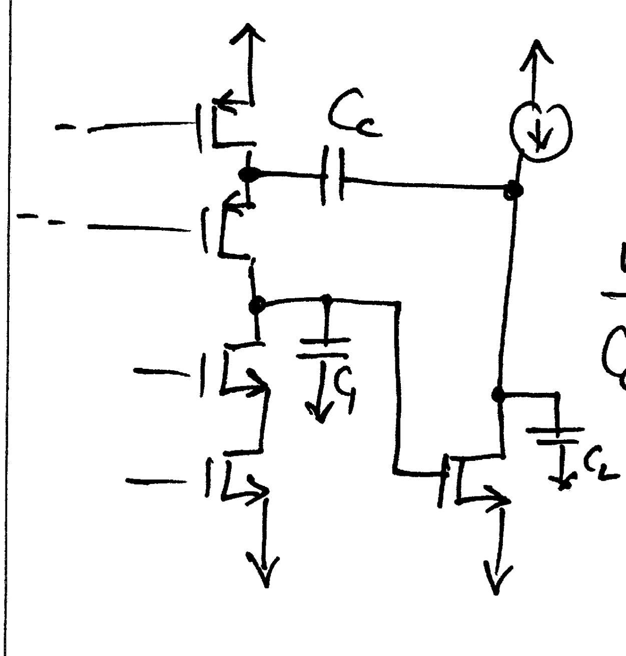
* V_{SS} PSRR improves by pushing zero to $\frac{1}{R_1C_1}$

Implementation in Class AB Amplifier

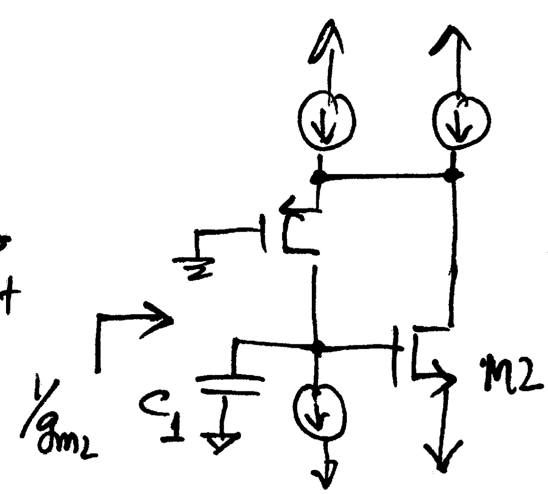


Intuitive way to see the second pole:

Let's simplify by assuming a class A operation
So the output stage looks like:



when $\longrightarrow$ C_c is short



$$\Rightarrow p_2 \approx \frac{g_{m2}}{C_1}$$