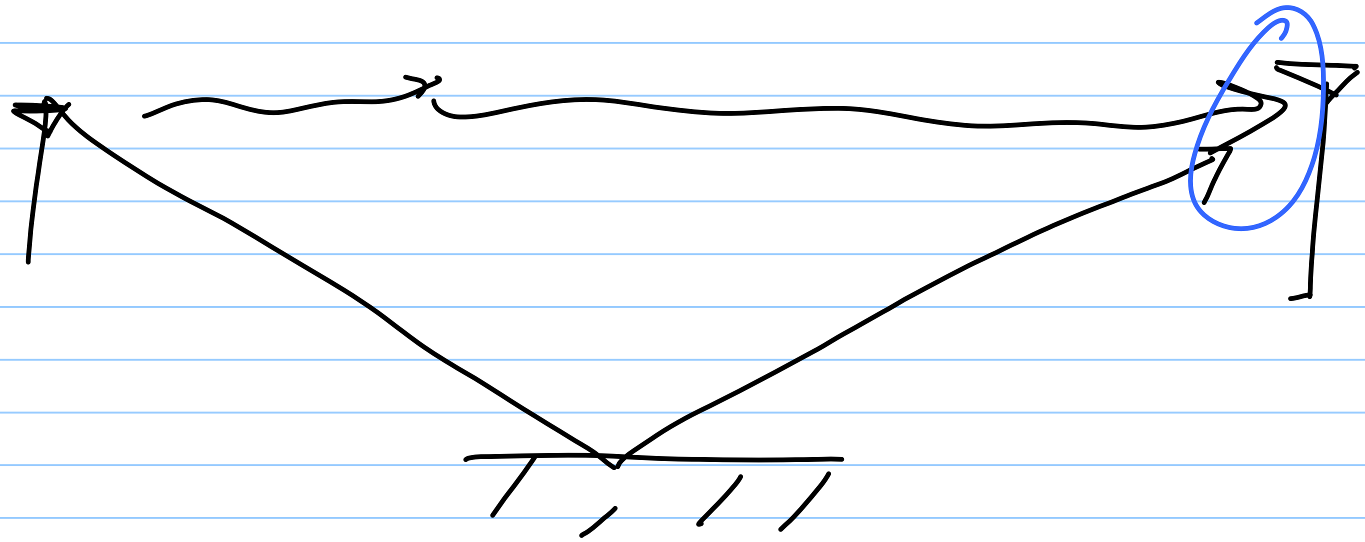
29/02/2019

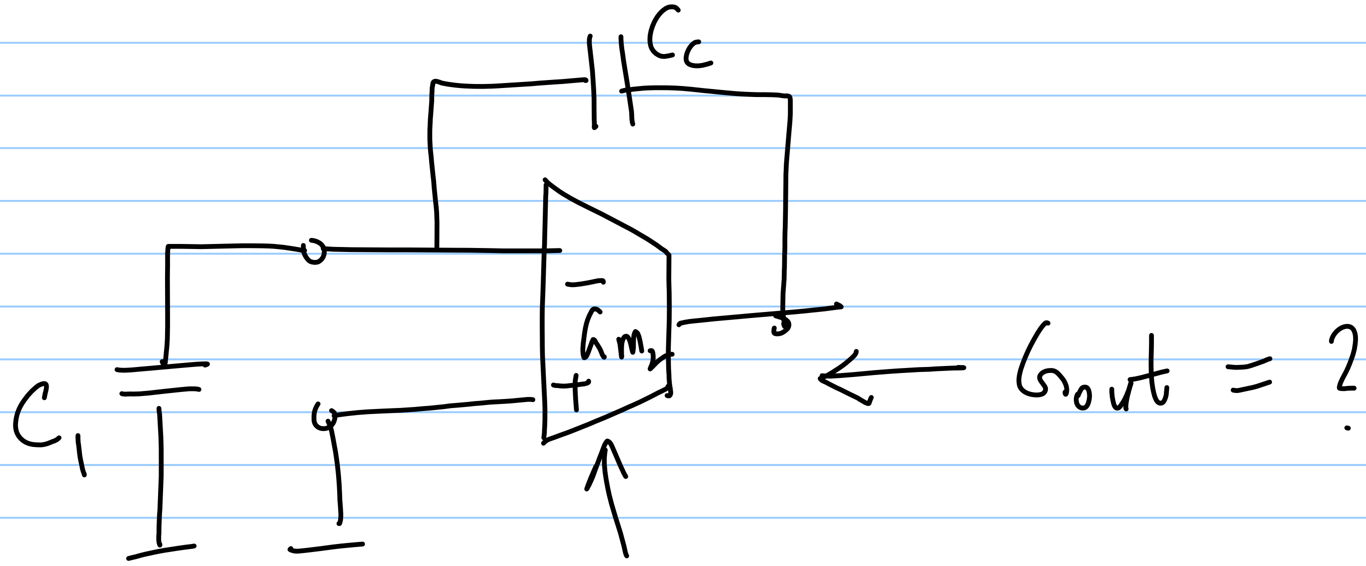
Lecture 23



$$p_1 \approx \frac{-\sigma_{01}}{C_1 \left(\frac{\sigma_{m2}}{\sigma_{02}} \right)}$$

$$p_2 \simeq -\frac{b}{a} = \frac{C_c\left(G_{m_2}+G_{o_2}+G_{o_1}\right)+C_1G_{o_2}+C_2G_{o_1}}{C_1C_2+C_2C_c+C_1C_c}$$

$$\simeq \frac{-C_c\,G_{m_2}}{C_1C_2+C_cC_1+C_cC_2}$$

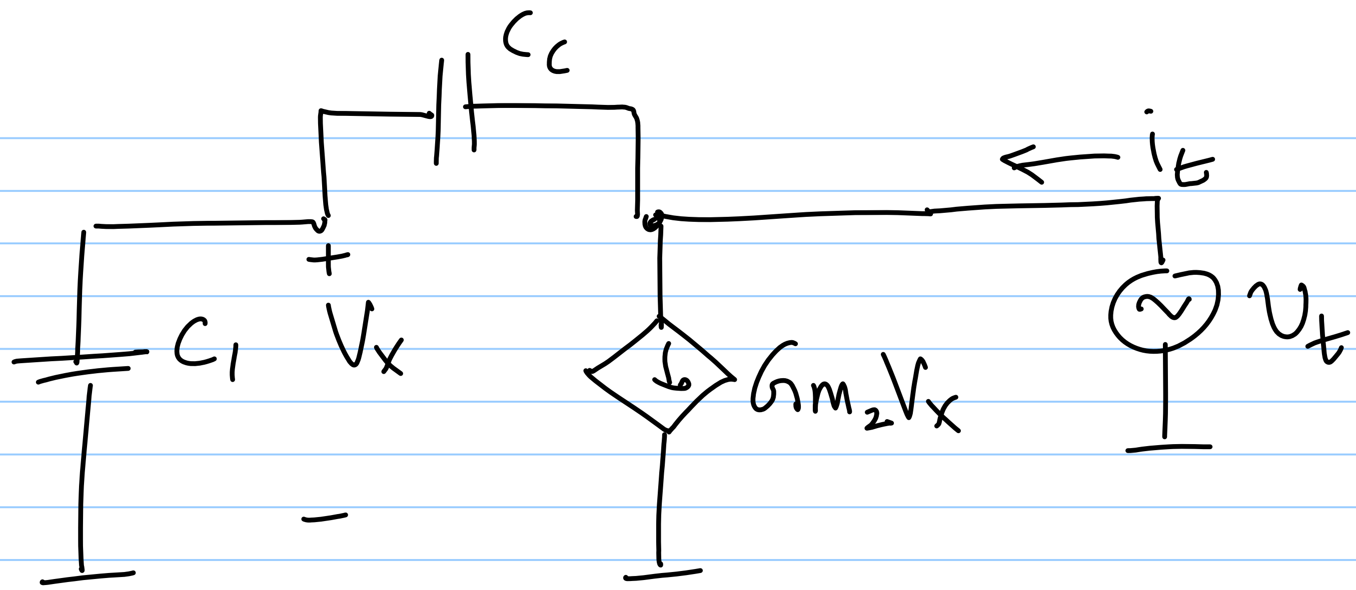


VCCS (OTA)

$$p_2 \approx -\frac{C_c\left(G_{m_2}+G_{o_2}+G_{o_1}\right)+C_1G_{o_2}+C_2G_{o_1}}{C_1C_2+C_2C_c+C_1C_c} \times \frac{1/(C_1+C_c)}{1/(C_1+C_c)}$$

$$\approx -\frac{G_{m_2}\dfrac{C_c}{C_1+C_c}+G_{o_2}+G_{o_1}\cdot\dfrac{C_2+C_c}{C_1+C_c}}{C_2+\dfrac{C_1C_c}{C_1+C_c}}$$

$$p_{2\,\text{orig.}} = -\frac{G_{o_2}}{C_2} \quad ; \quad p_{1\,\text{orig.}} = \frac{-G_{o_1}}{C_1}$$



$$Y_{out} = \frac{i_t}{v_t} = \frac{1}{\frac{1}{sC_1} + \frac{1}{sC_c}} + \left(\frac{\frac{G_{m_2}}{sC_1}}{1/sC_1 + 1/sC_c} \right)$$

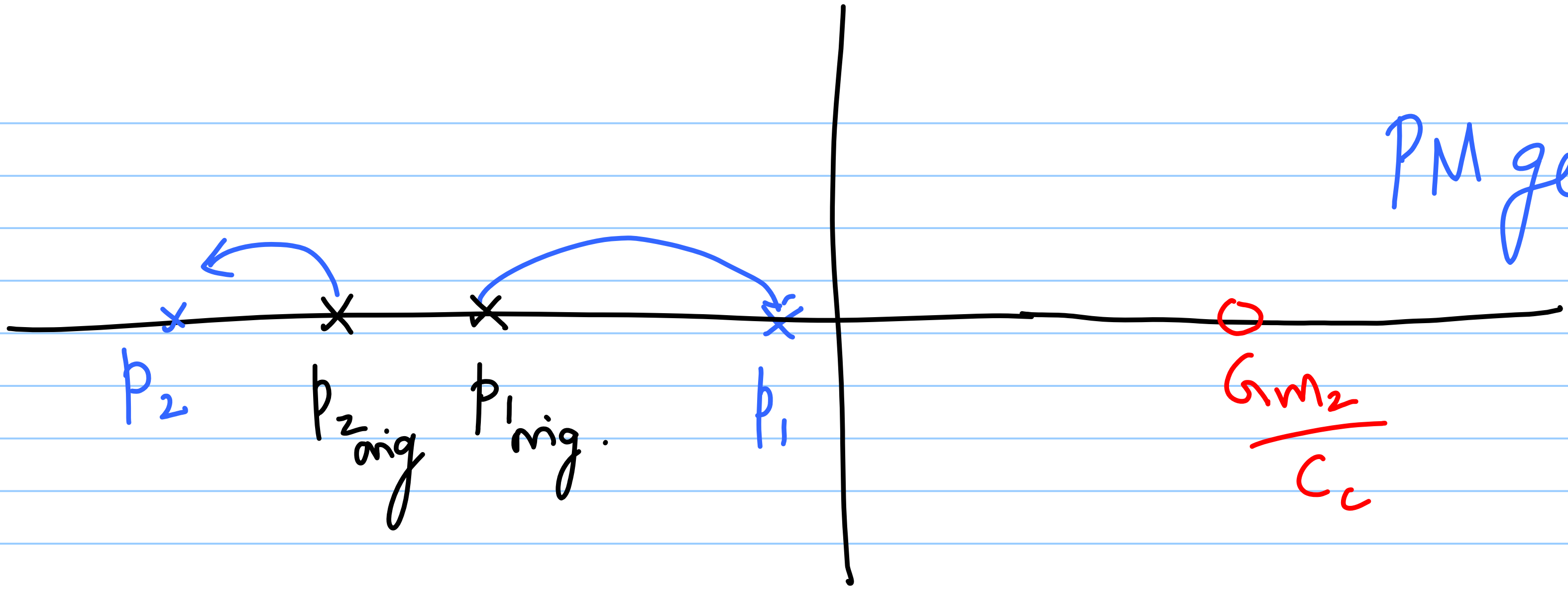
$$= \frac{1}{\frac{1}{sC_1} + \frac{1}{sC_c}} \left[1 + \frac{G_{m2}}{sC_1} \right]$$

$$= \frac{G_{m2} + sC_1}{1 + \frac{C_1}{C_c}}$$

$$Y_{out} = G_{out} + j B_{out}$$

$$G_{out} = \frac{G_{m2}}{1 + C_1/C_c} = \frac{C_c G_{m2}}{C_1 + C_c}$$

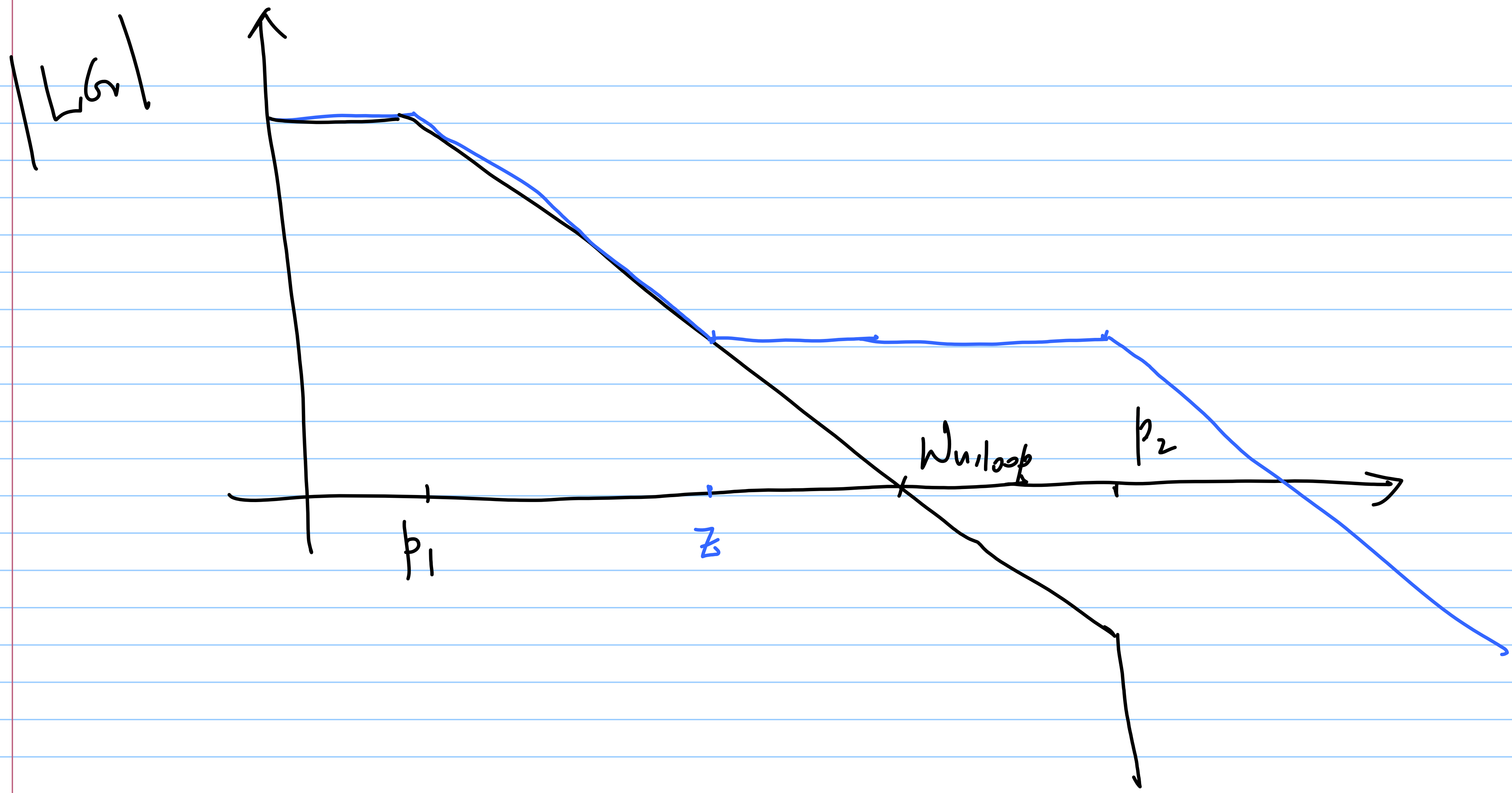
PM gets better



"Miller Compensation"

or

"Pole-splitting compensation"



|LG|
p1
z
Wu,loop
p2