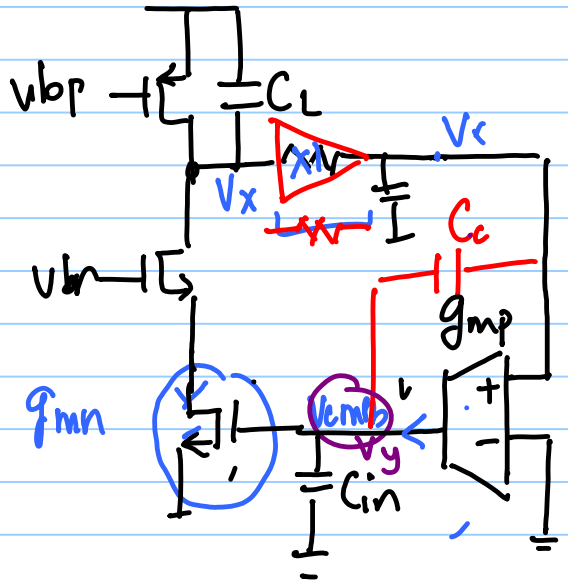
Lecture #38

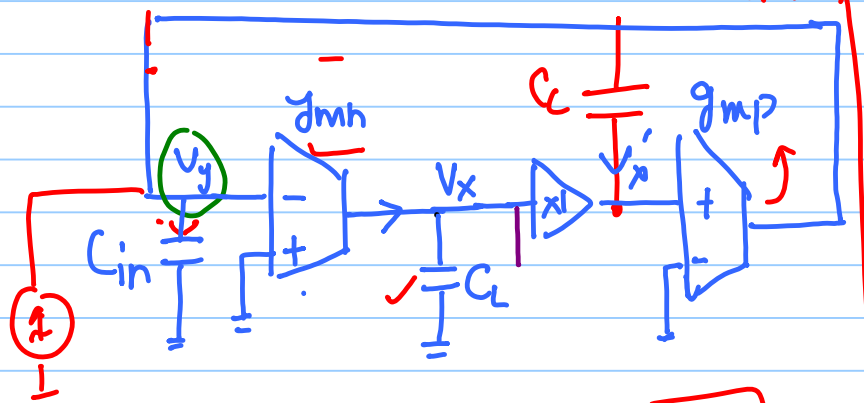
Note Title 03-04-2019

Common mode Feedback loop

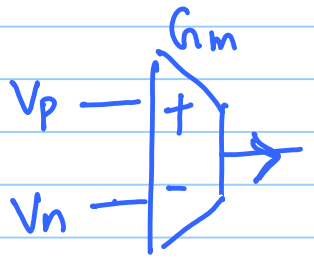


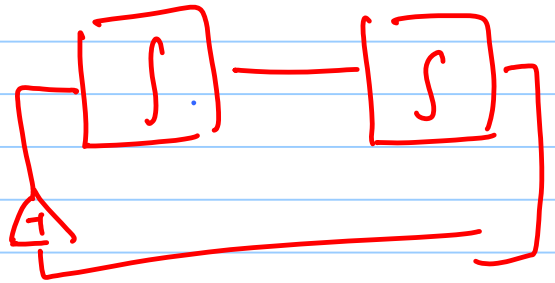
$$V_x = \frac{g_{mn} V_y}{sC_L}$$

$$i = V_y/\ell = \frac{g_{mn} V_y}{sC_L}$$



$$\frac{g_{mn} V_y}{sC_L} \Big/ \frac{1}{sC_c} = g_{mn} V_y \frac{C_c}{C_L}$$

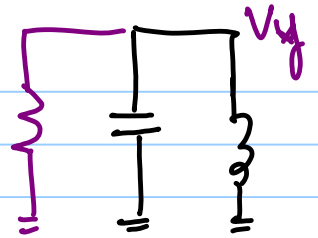




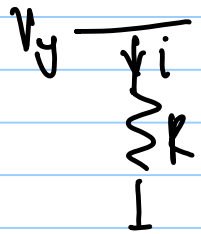
$$i_{out} = G_m (V_p - V_n)$$

$$I_{out} = \frac{V_y}{1/sC_{in}} - g_{mp} V_x = \frac{V_y}{1/sC_{in}} + g_{mp} \left(-\frac{g_{mn} V_y}{sC_L} \right)$$

$$= V_y \left[sC_{in} + \frac{1}{sC_L / g_{mp} g_{mn}} \right]$$

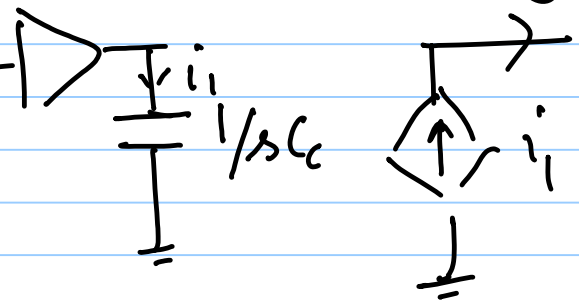


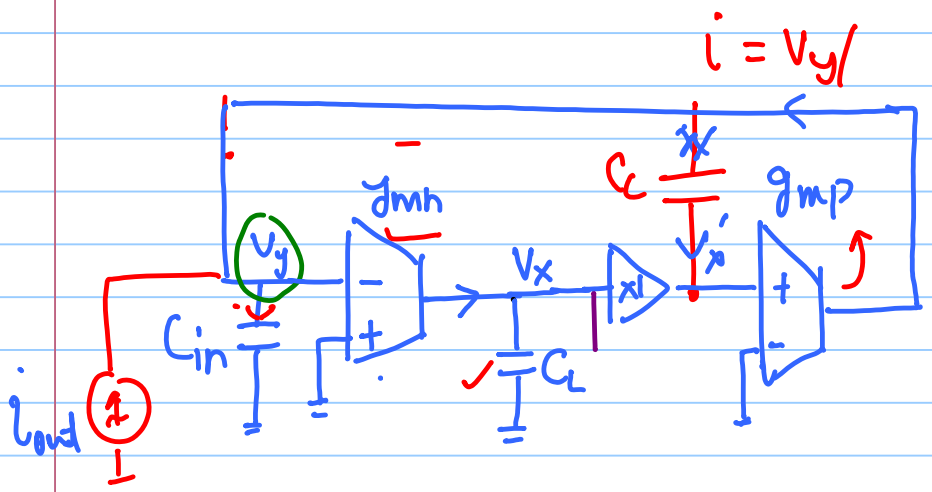
$$= \frac{V_y}{1/sC_{in}} + \frac{V_y}{sL_\infty}$$



$$i = \frac{V_y}{R}$$

$$V_x = \frac{g_{mn} V_y}{sC_L}$$





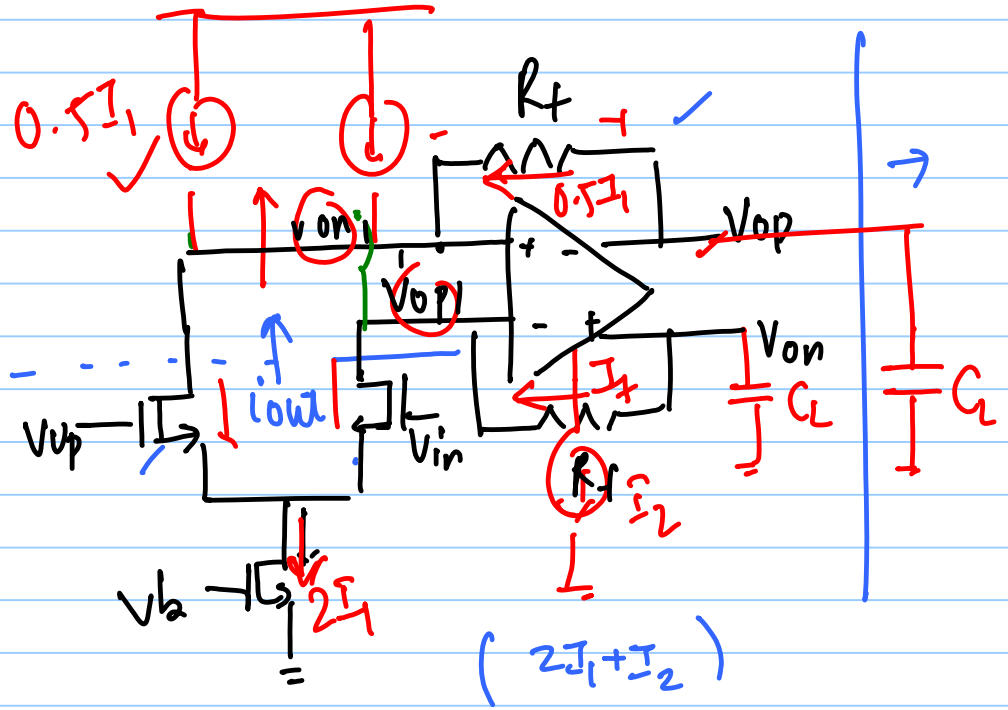
$$\frac{V_x'}{V_x} = \frac{1/sC_x'}{\frac{1}{sC_x'} + R}$$

$$i_{out} = \frac{V_y}{1/sC_{in}} + \frac{V_y - V_x'}{1/sC_c} - g_{mp}V_x'$$

$$= V_y \cdot sC_{in} + \frac{V_y - \left(\frac{-g_{mn}V_y}{sC_L}\right)}{1/sC_c} - g_{mp}\left(-\frac{g_{mp}V_y}{sC_L}\right)$$

$$= V_y\left(sC_{in} + sC_c\right) + \frac{V_y}{sL_x} + V_y \cdot g_{mn}\frac{C_c}{C_L}$$

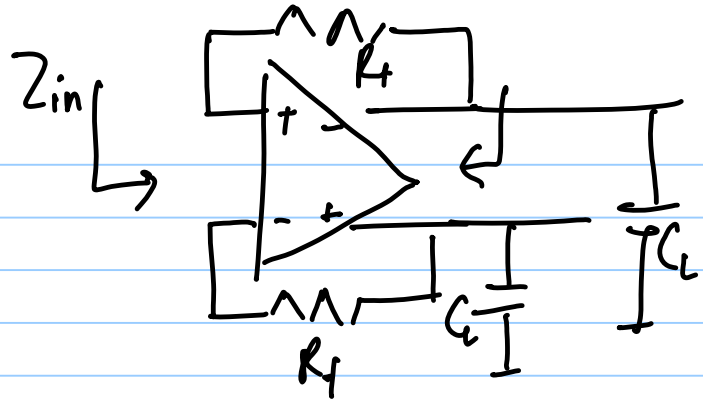
Transimpedance Amp.

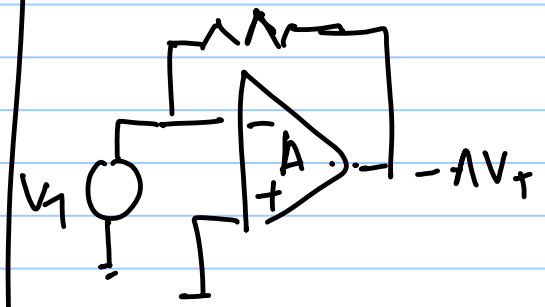


$(2I_1 + I_2)$

$i_{out} = g_{mn}(V_{ip} - V_{in}) = g_{mn} V_{diff}$

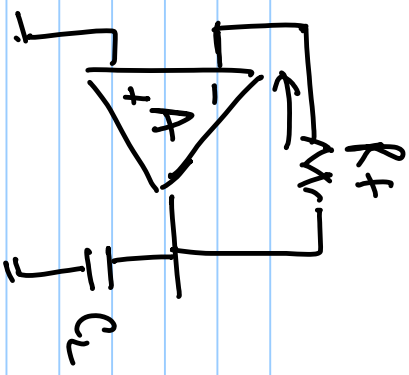
$V_{op} - V_{on} = g_{mn} V_{diff} \times R_f$





$$i = \frac{V_T - (-AV_T)}{R_f}$$

$$Z = \frac{V_T}{i} = \frac{R_f}{1+A}$$


+
A
-
R_f
C_f