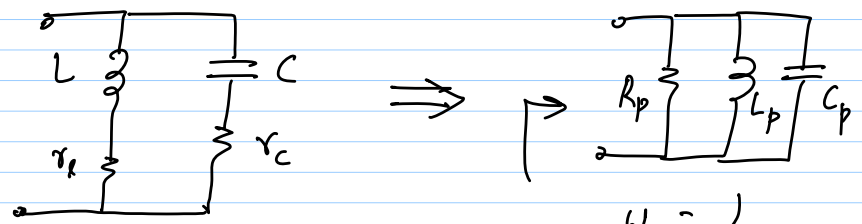
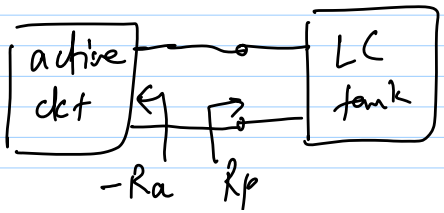
23/10/13

Lec 33



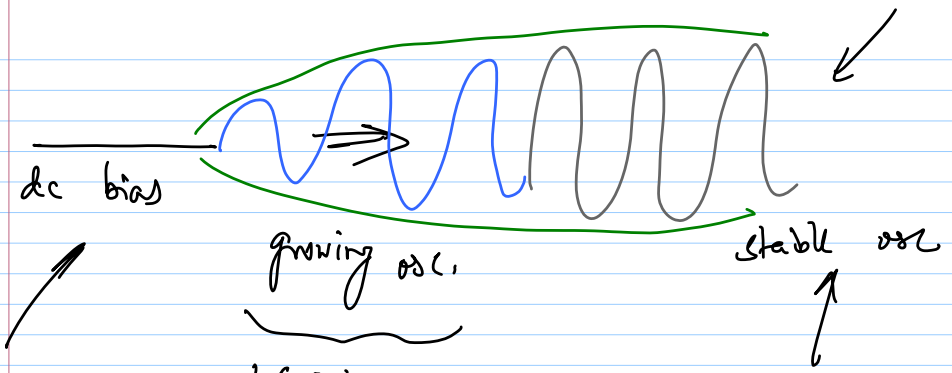
$$\omega_0 = \frac{1}{\sqrt{L_p C_p}}$$

One-port view of Osc.



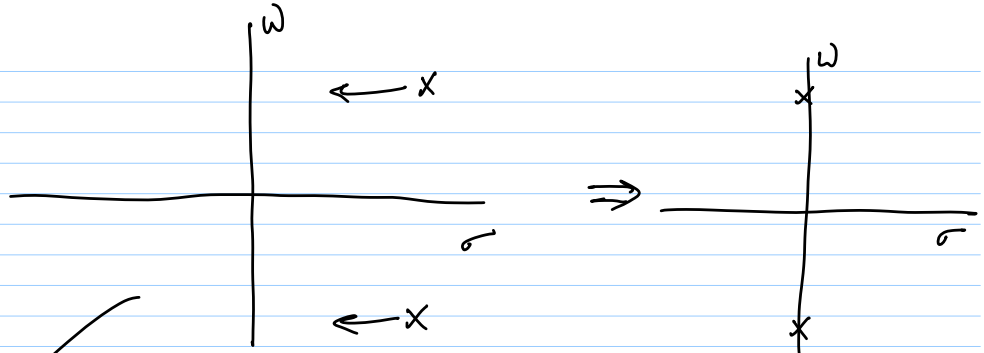
for stable Osc.

$$|R_a| = |R_p|$$



$LC > 1$;

for a 2nd order system, you have complex conjugate poles when $Q > 1/2$



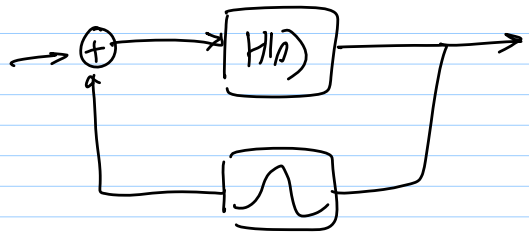
Stable Osc.

$-R_a \leftrightarrow R_p$

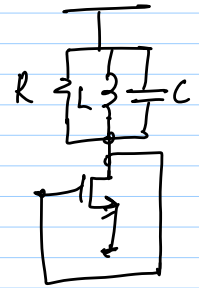
$|R_a| = |R_p|$

$\rightarrow |R_a| < |R_p|$

We want $-R_a = f(V_{int})$



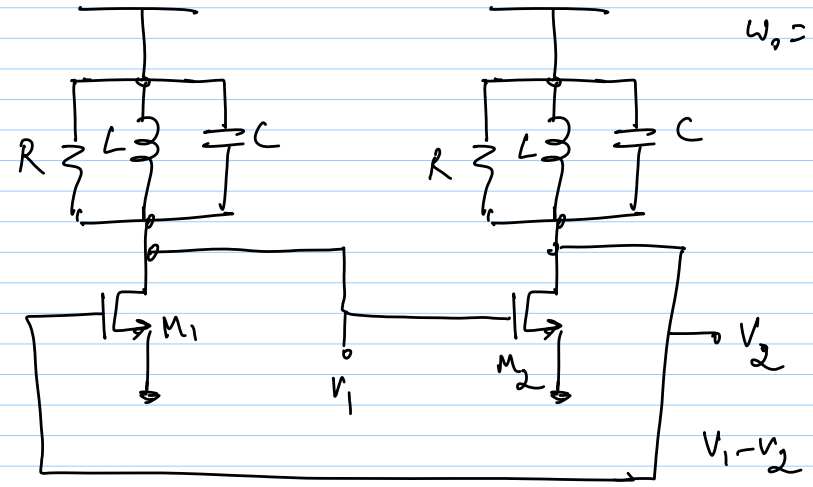
1)



total phase shift = 180°

@ $\omega = \frac{1}{\sqrt{LC}}$

2)

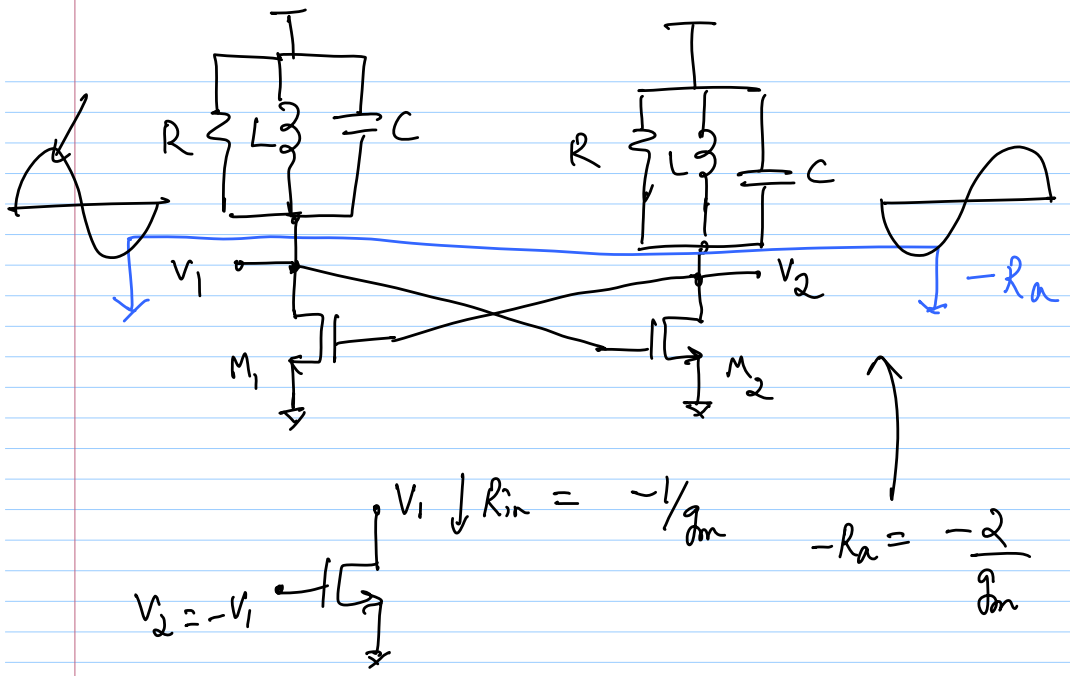


$\omega_0 = \frac{1}{\sqrt{LC}}$

$V_1 - V_2$ diff. outputs

phase shift @ $\omega_0 = 360°$

$LG = (g_m R)^2 \geq 1$ @ $\omega_0 = \frac{1}{\sqrt{LC}}$



$V_1 \downarrow R_{in} = -1/g_m$

$V_2 = -V_1$

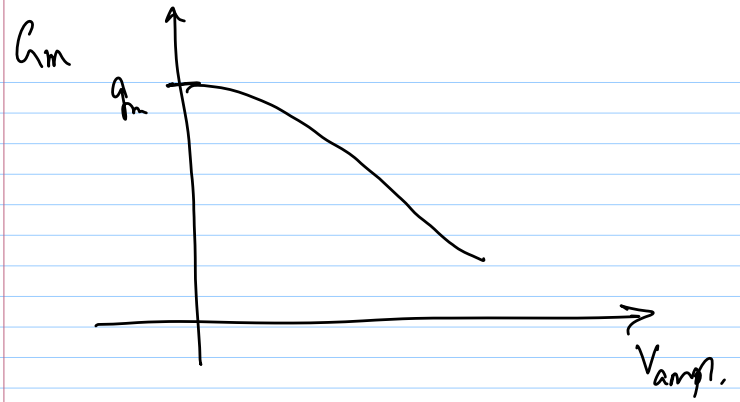
$-R_a = \frac{-2}{g_m}$

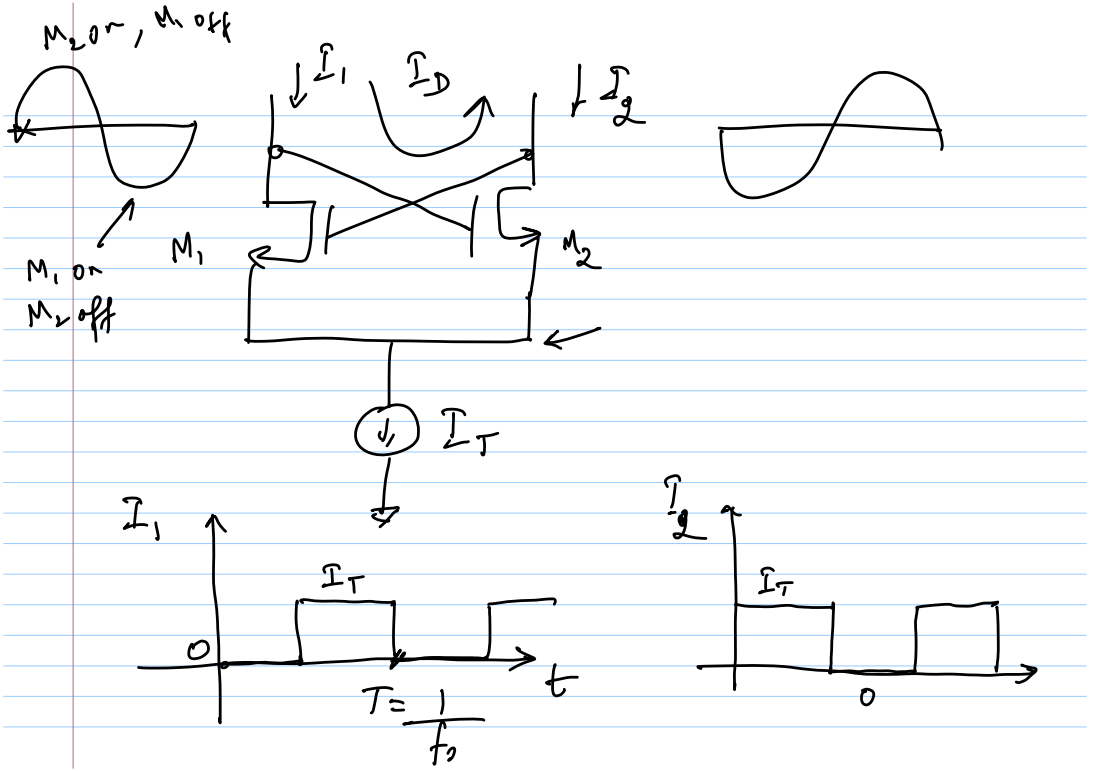
for Stable Osc.,

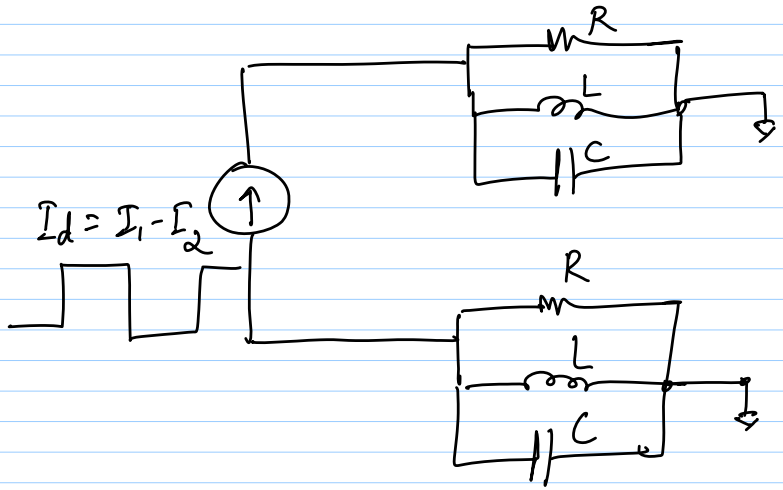
$|-R_a| = |R_p|$ ↙ $\boxed{R_p = 2R}$

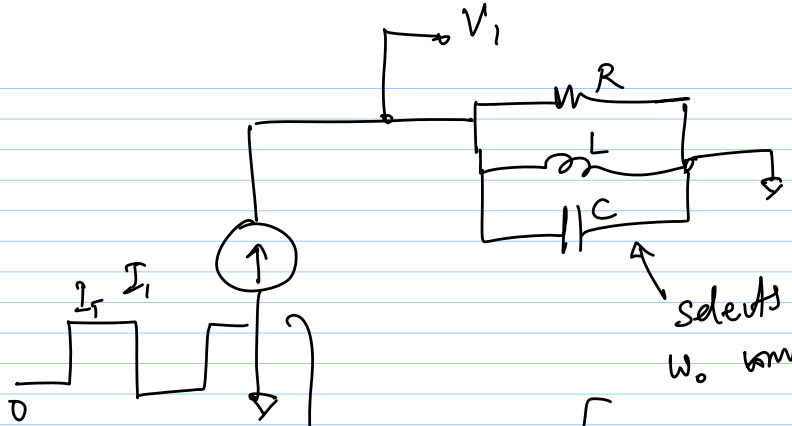
$\frac{2}{g_m} = 2R \Rightarrow \boxed{g_m R = 1}$

$\left|\frac{-2}{g_m}\right| \leq R_p \Rightarrow \boxed{|g_m| \geq \frac{2}{R_p}}$









$$I_1 = I_T\left[\frac{1}{2} - \frac{1}{\pi}\sin W_0 t + \dots\right]$$

$$|V_1| = I_T \cdot \frac{1}{\pi} \cdot R \Rightarrow \boxed{V_{02} = \frac{2}{\pi} \cdot I_T \cdot R}$$