

Spice

LAMBDA =  $\lambda$  for channel modulation

in Sat  $i_D = \frac{K_P}{2} \frac{W}{L} (V_{GS} - V_{th})^2 (1 + \lambda V_{DS})$

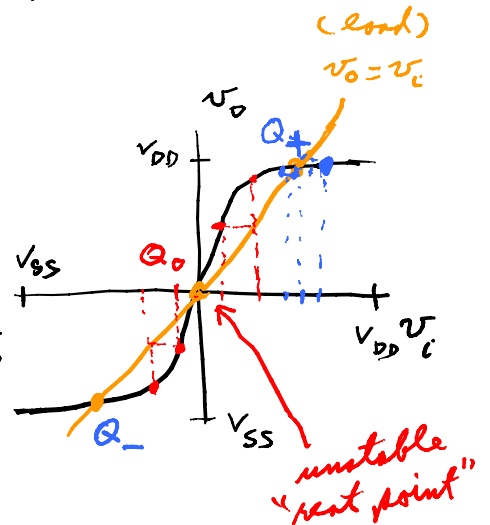
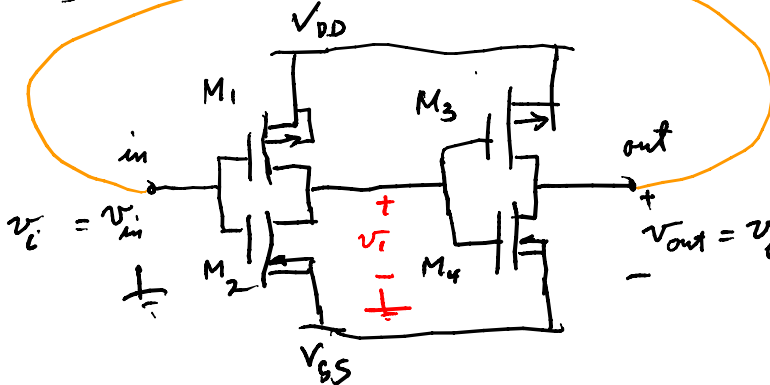
NMOS

GAMMA =  $\gamma$  body effect

$V_{th} = V_{T0} + \gamma (\sqrt{2\phi + V_{SB}} - \sqrt{2\phi})$  ;  $2\phi \approx 0.6v$

Eq. (4.33) on p. 258

Latch, p. 1014

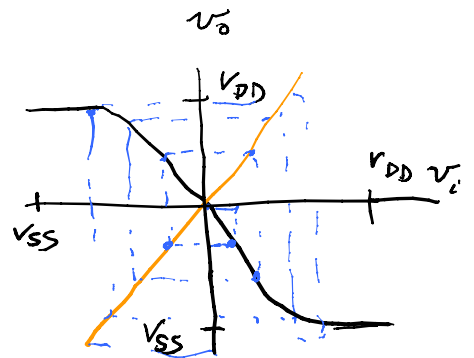
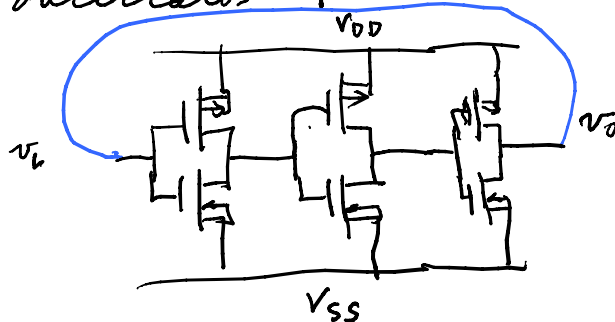


$Q_0$  is "unstable"

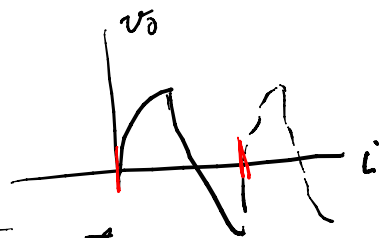
$Q_+$  is "stable" (locally but not globally)

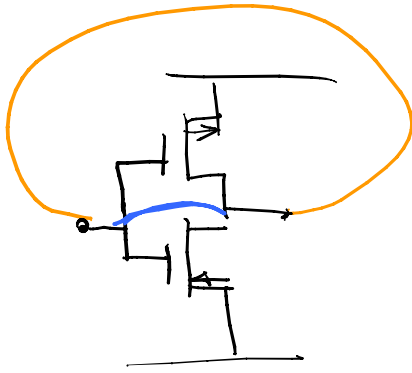
$Q_-$  " " " " " "

Q ring oscillator - p. 1027



oscillator - frequency depends on capacitance seen looking into gates of transistors





relaxation oscillation

for only one have 2 diodes, one as  
a load on the other to make  
a voltage divider