Lecture 34

Monday, October 10, 2016 7:47 AM

Lecture 34

Equalization in Serial Links

On Tx Side — FIR (FFE) — CML Equalizer / VM Equalizer

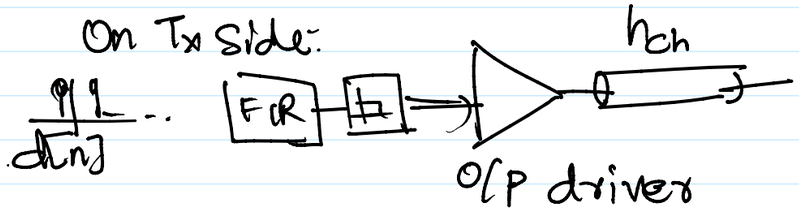
PWM — CML / VM

On Rx Side — FIR (FFE)

Linear Equalization — Active / Passive

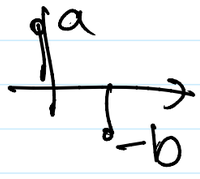
DFE (Non-Linear Equalizer)

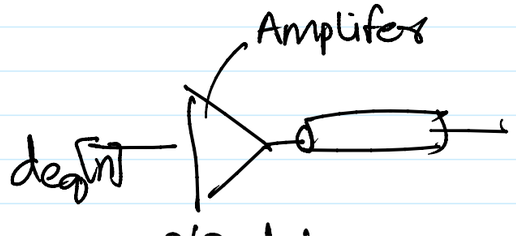
IIR Equalization

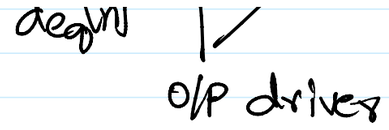


$$H_{eq}(s) = \frac{1}{H_{ch}(s)}$$

O/P of FIR filter, $d_{eq}[n] = d[n] * h_{eq}[n] = \sum d[k]\, h[n-k]$

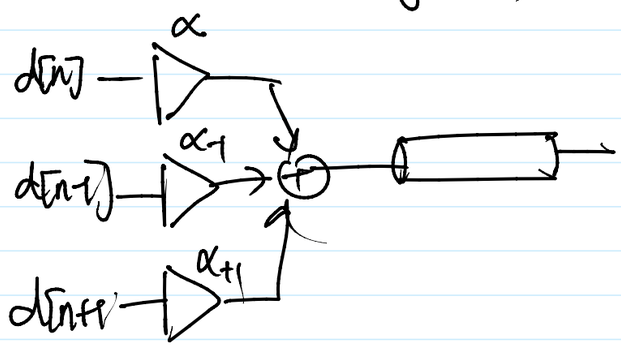




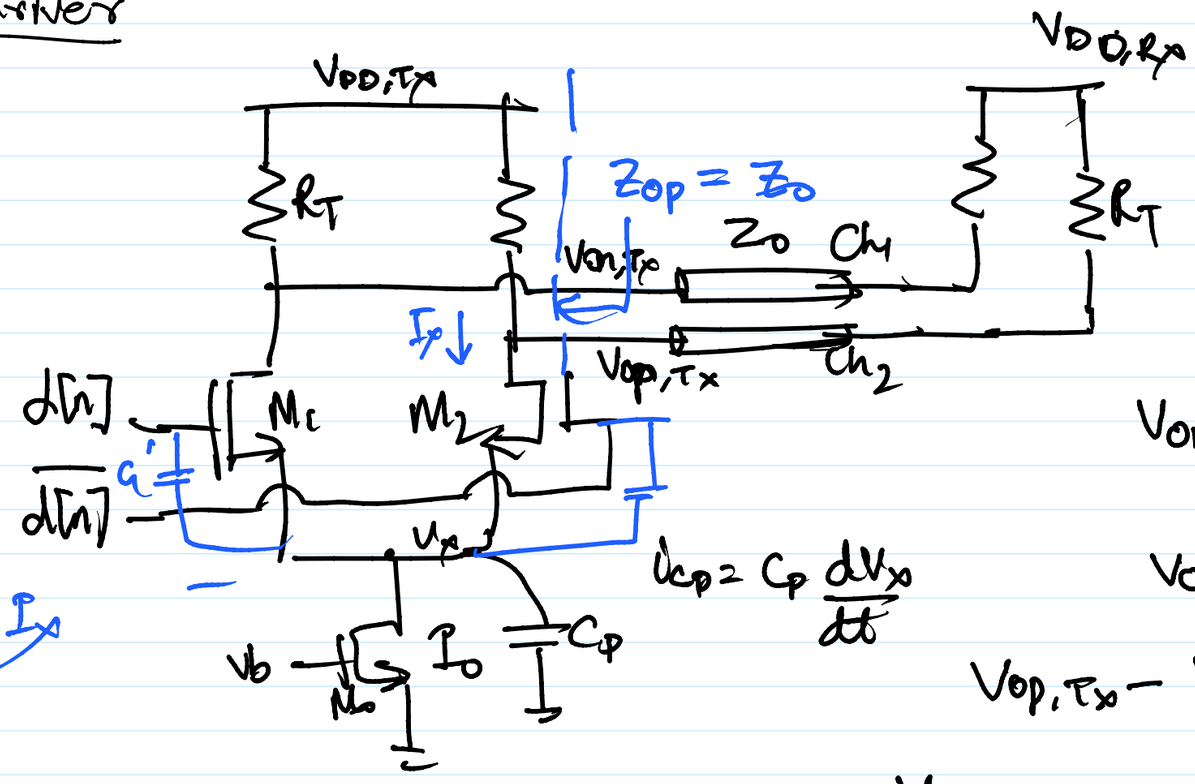


Amplifier — Linear gain, wide bandwidth

2)



CML o/p driver



$V_{DD,Tx} = V_{DD,Rx} = V_{DD}$

$V_{cm,Tx} = V_{DD,Tx} - \frac{I_o}{2} \times \frac{R_T}{2}$

$d[n]=1, \quad \overline{d[n]}=0$

$V_{on,Tx} = V_{DD} - \frac{I_o R_T}{2}$

$V_{op,Tx} = V_{DD}$

$V_{op,Tx} - V_{on,Rx} = \pm \frac{I_o R_T}{2}$

$V_{out,pk-pk} = I_o R_T$

$M_1, M_2, \frac{I_o}{2}, \quad V_{cm} - V_x - V_T = V_{OV}$

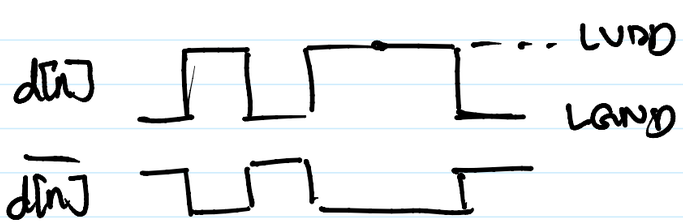
$\overline{d[n]} = 0 \Rightarrow M_2$ ~~cut off~~ Large $C_p \rightarrow$ data dependent IS

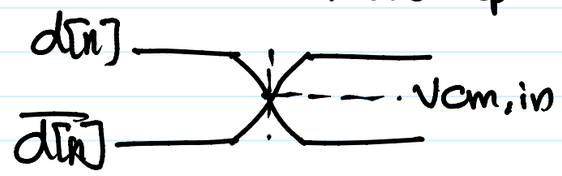
$d[n] = 0 \Rightarrow M_2$ — cut off

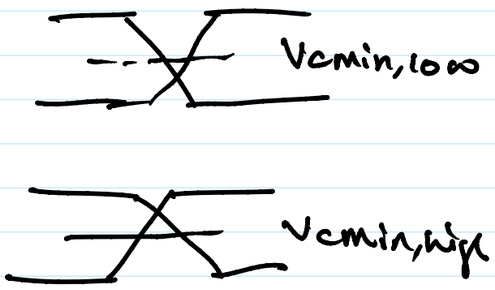
$d[n] = 1 \Rightarrow M_1$

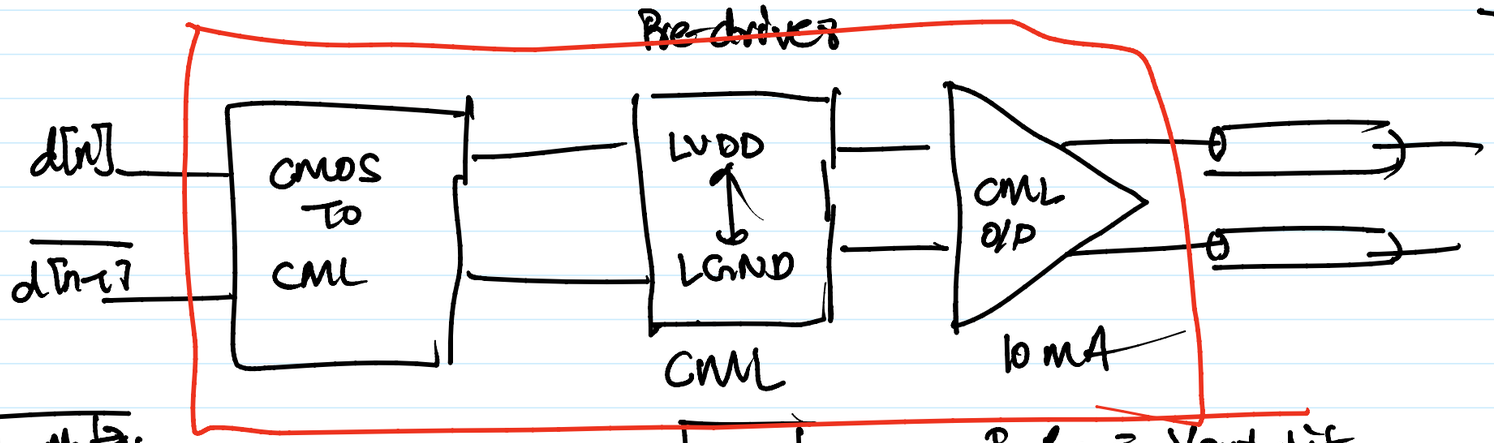
Large C_p → data dependent V_{cm}

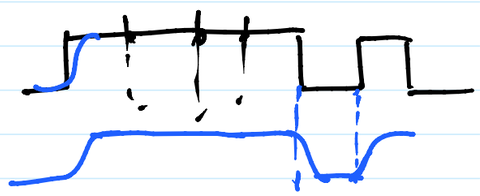
Small C_p → Smaller length M_0

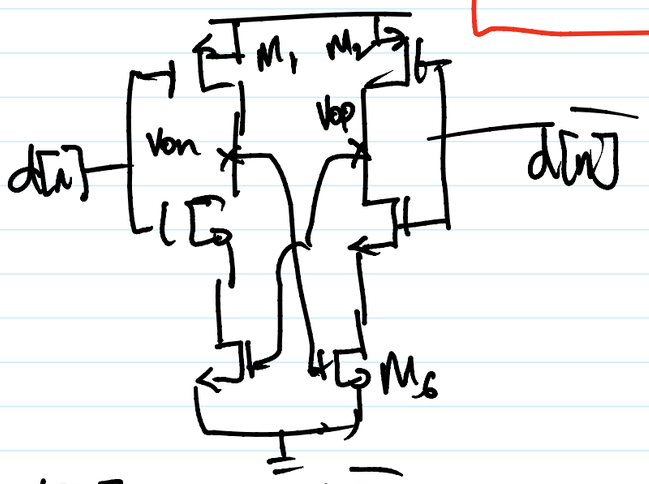


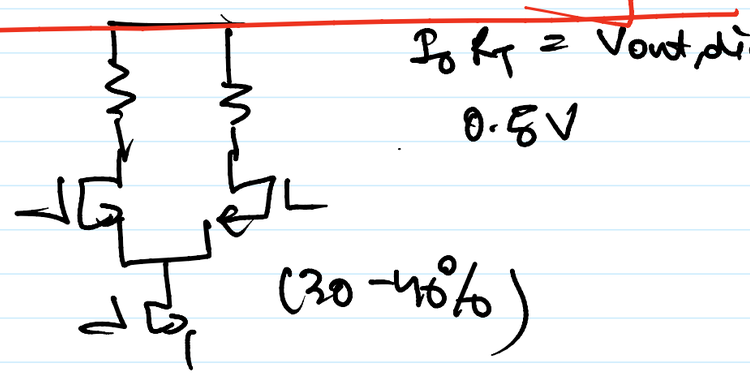












$I_0 R_T = V_{out,dif}$

0.8V

$\frac{I_0}{2} \rightarrow I$

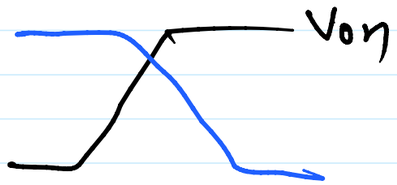
V_{OV}

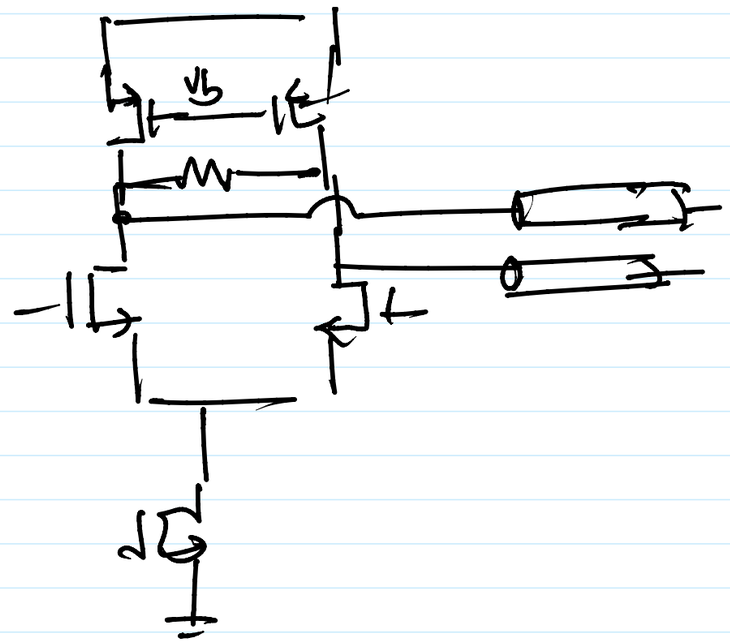
(30 - 40%)

$d[n] = 1, \ \overline{d[n]} = 0,$

$d[n] = 0$

$V_{on} = 0, \ V_{op} = ?$




Vb