

HW #3
EEC 215

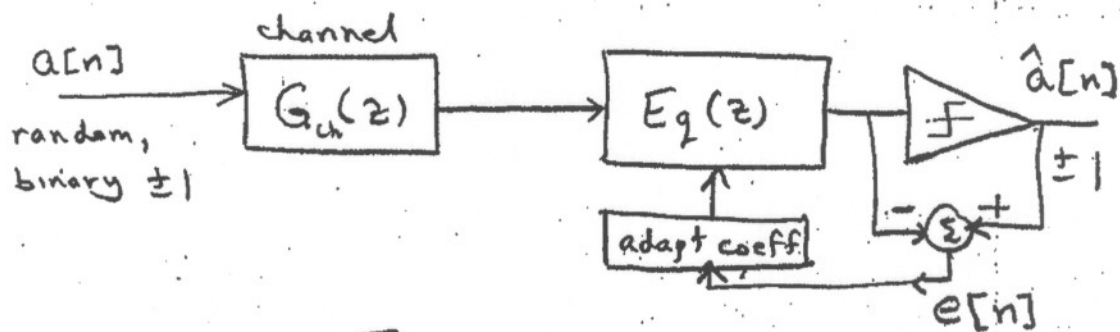


Fig. 1

$E_q(z)$ = adaptive FIR equalizer

1. a) In Fig. 1, let $G_{ch}(z) = \frac{K}{1 - 0.6z^{-1}}$, $K = 0.4$.

Use the LMS algorithm to adapt a 2-tap FIR equalizer. Use $\beta = 0.01$.

Preset the equalizer coeffs so $E_q(z) = 1 + 0z^{-1}$ initially. Plot the coeffs versus time.

Also plot $MSE[n] \approx \frac{1}{20} \sum_{i=0}^{19} e^2[n-i]$.
Show 5000 samples.

b) Repeat (a) using a 4-tap FIR equalizer.
What do you notice?

c) Repeat (a) using $\beta = 0.02$. Compare (a) & (c).

d) Repeat (a) using channel $G_{ch}(z)$ with $K=1$.
 Compare (d) w/ (a).

2. In Fig. 1, let $G_{ch}(z) = 1 - 0.6z^{-1}$.

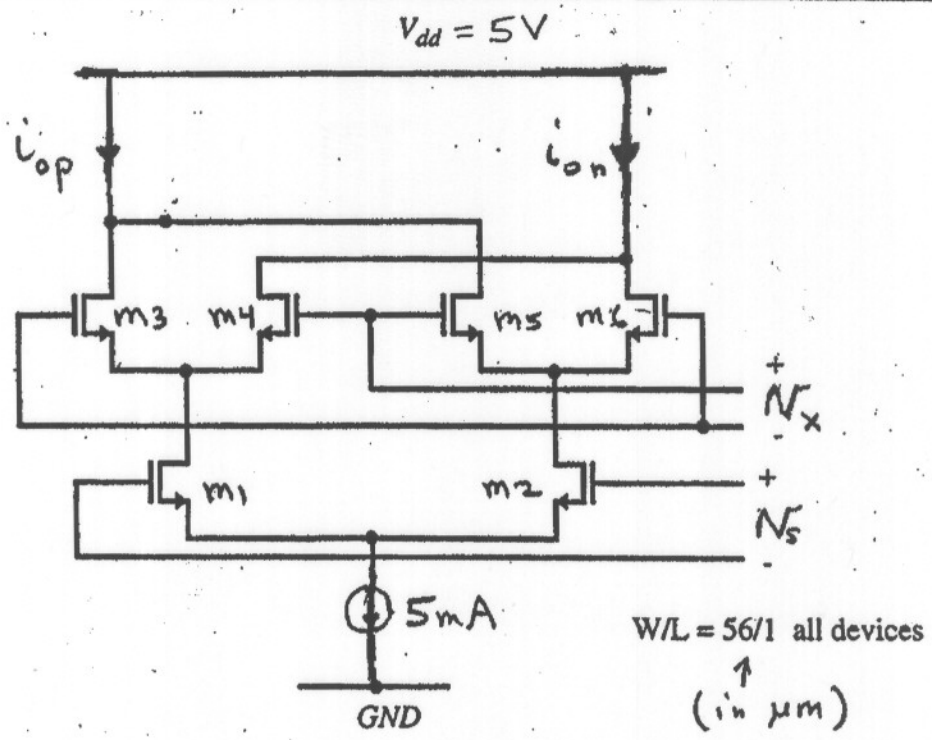
a) Use a 5-tap equalizer, initialized to
 $E_q(z) = 1 + 0z^{-1} + 0z^{-2} + \dots + 0z^{-4}$. Use $\beta = 0.01$.
 Plot the coeffs vs. time and $MSE[n]$
 vs. time n .

b) Repeat (a) using a 10-tap equalizer.
 Compare the coeff values and the
 MSE in (a) & (b).

3. For a partial-response Class 4 channel,
 $G(z) = 1 - z^{-2}$ (or "1-D²"). Plot
 $|G(z=e^{j\omega T})|$.

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 4370 300 SHEETS EYE-EASE 5 SOLVING
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 4385 600 SHEETS EYE-EASE 5 SOLVING
 4390 700 SHEETS EYE-EASE 5 SOLVING
 4395 800 SHEETS EYE-EASE 5 SOLVING
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4.



For the analog multiplier shown above, $i_o = i_{op} - i_{on}$.

- a) simulate this circuit to find A in $i_o = AN_x N_s$. Make sure all xtrs are saturated and use the models in whurst/215/mos_models (also on the 215 web page).
- b) Let N_x be the coeff input (c_i) and N_s be the signal input ($x[n-i]$) in an analog FIR equalizer. Linearity from the $x[n-i]$ input to the output must

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meet a spec. For $N_x = 0.6V_{DC}$,

determine the amplitude allowed at

N_s to give a total distortion of

-40dB at i_o . (Use $N_s = B \sin(2\pi 10kt)$,

and use .FOUR to find the

distortion - or .FFT.)