

**EE 5654 - Digital Communications - Spring 2005**  
**Homework 4**  
**Due Thursday 3/31/05**

1. Simulate the performance of BPSK in the presence of ISI where the discrete-time, white noise channel model is  $h = [0.9, -0.15]$  for  $E_b/N_0 = 0$  to 7dB. Compare with theory (zero ISI). Repeat for  $h = [1 \ -0.75 \ .55 \ .05 \ -0.025 \ 0 \ 0]$ .
2. Repeat problem 1 with a zero-forcing equalizer with 11 taps.
3. Repeat problem 1 with a MMSE equalizer with 11 taps.

**Channel 1 – No Normalization**

w\_zf =

0

0

0

0

0

1.1111

0.1852

0.0309

0.0051

0.0009

0.0001

w\_mmse (0dB) =

-0.0000

-0.0000

-0.0003

-0.0034

-0.0460

0.4904

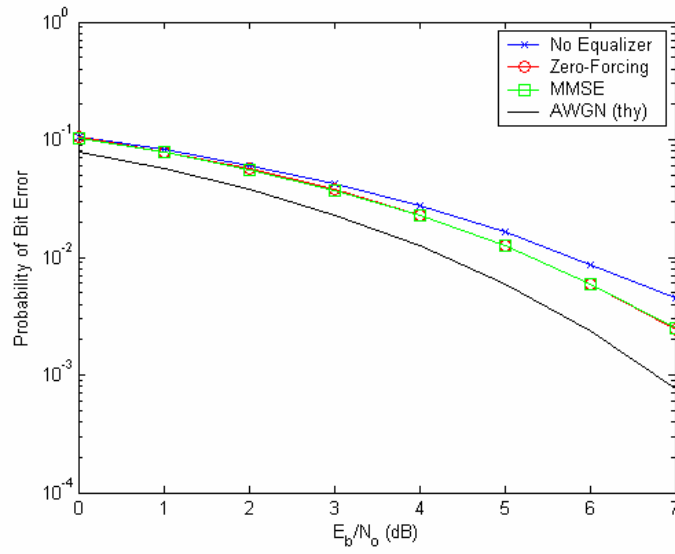
0.0363

0.0027

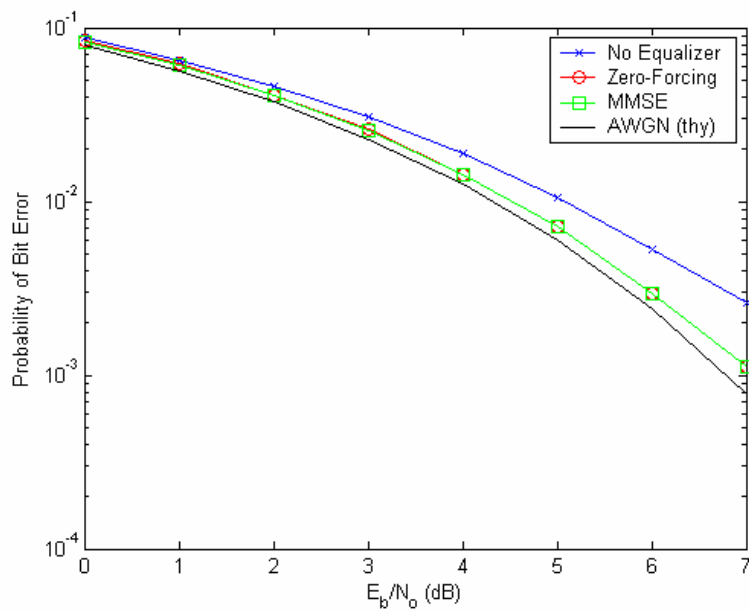
0.0002

0.0000

0.0000



### Channel 1 –Normalization



**Channel 2 – No normalization**

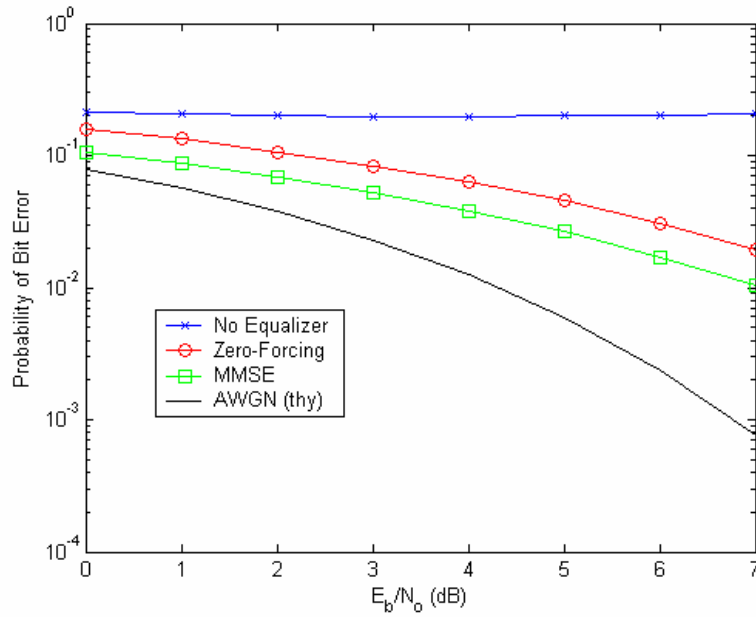
**w\_zf =**

**0  
0  
0  
0  
0  
1.0000  
0.7500  
0.0125  
-0.4531  
-0.3592  
-0.0021**

**w\_mmse (0dB) =**

**-0.0163  
0.0032  
0.0799  
0.1103  
-0.1235  
0.3452  
0.1619  
-0.0081  
-0.0481  
-0.0173  
0.0031**

**Results**



**Channel 2 - Normalization**

