

Problem 10.10. Plot the BER performance of differential BPSK and compare the results to Fig. 10.16.

Solution

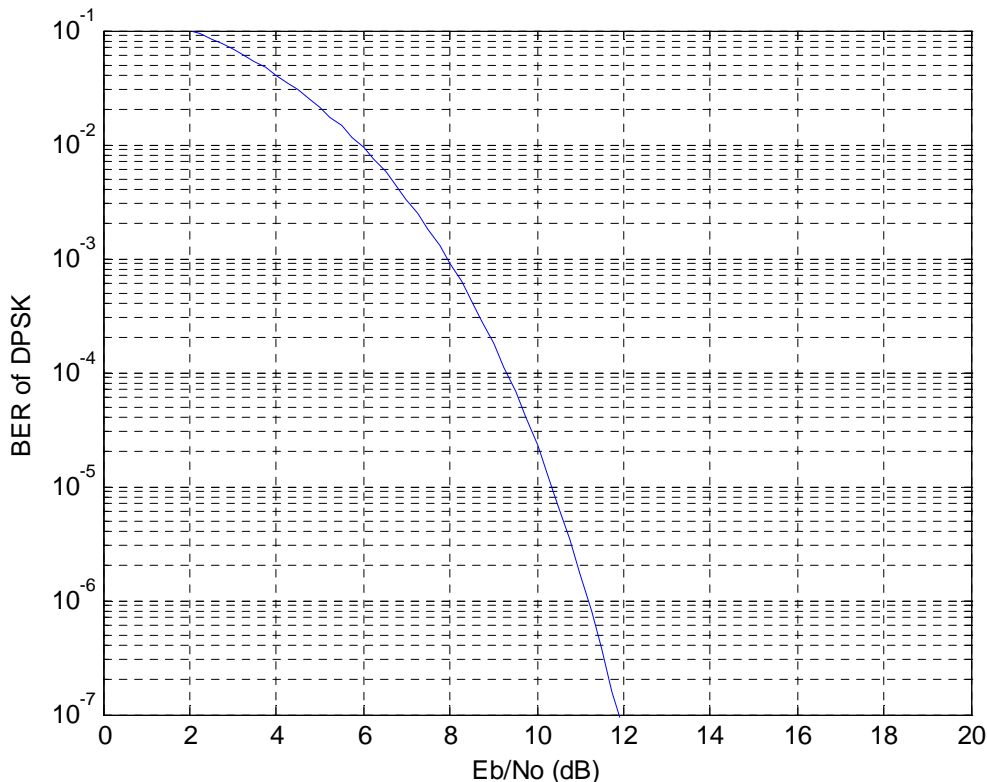
The bit error probability of differential BPSK is (Eq. (10.75))

$$P_e^{DPSK} = 0.5 \exp\left(-\frac{E_b}{N_0}\right).$$

The following Matlab script plots this performance

```
EbNodB=[0:0.25:12];  
EbNo = 10.^(EbNodB/10);  
BER = 0.5*exp(-EbNo);  
semilogy(EbNodB,BER)  
grid  
xlabel('Eb/No (dB)')  
ylabel('BER of DPSK')  
axis([0 20 1E-7 0.1])
```

This script produces the following plot.



The performance of DPSK is slightly worse than BPSK and QPSK. The relative loss with DPSK is less than 1 dB at E_b/N_0 of 8 dB and higher. The loss at lower E_b/N_0 ratios is greater.