**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])the following plot

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.

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