

EE482 Communication Systems II

Lab Assignment - IV[†]

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[†]Please check the due-date in the course homepage.

The lower and upper bounds for the bit error rate (BER) of M-PSK (M-ary phase shift keying) modulation are presented in our classes in terms of their mathematical expression. Further, Fig. 1 illustrates the curves of the aforementioned lower/upper bounds for M-PSK modulation schemes.

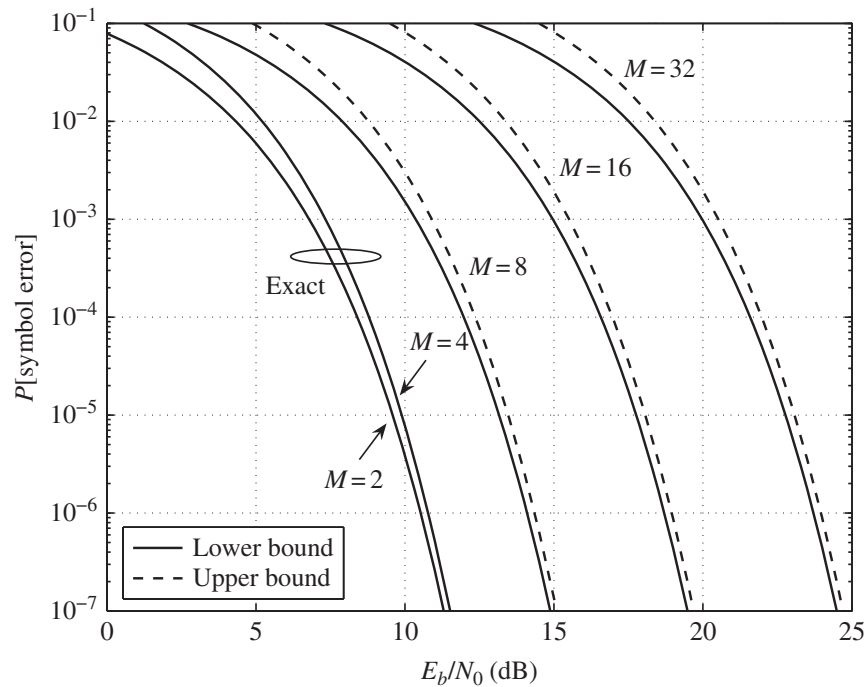


Fig. 1: Lower and upper bounds of M-ary phase shift keying (M-PSK) modulation

(1) **[Theoretical lower and upper bounds]** Utilizing MATLAB, plot the theoretical lower and upper bounds of the bit error rate for the 8-PSK modulation scheme. That is, directly use the derived formula for the lower/upper bound along with Q-function.

(2) [**Monte-Carlo simulation**] For $\text{SNR} = 5 \text{ dB}$, 10 dB , and 15 dB , accomplish Monte-Carlo simulation with the number of samples, $N = 10^5$ such that you can obtain the values of BER at those three SNR points. Compare the resulted bit error rates for those three points of the SNR, to the values obtained in the manner of (1).

(3) [**Discussions**] Describe interesting symptoms, in particular, if you meet any unexpected behavior(s) in the comparison. Think about the reason, and describe your reasoning.