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Approximate symbol error rate for M-ary phase shift keying (M-PSK) using maximum ratio combining (MRC) technique over fading channels

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Abstract: In this study, approximate symbol error rate (SER) expressions are derived for M-ary phase shift keying (M-PSK) modulation scheme. Here, the channels are assumed to be slow-flat independent and identically distributed (i.i.d) with Rician and Rayleigh fading distributions. Simulation results show that by using maximum ratio combining (MRC) space diversity technique, the communication reliability (i.e., capacity and coverage) will increase when the diversity order N (i.e., the number of the combiner's branches) is increased and as a result less power is needed to achieve the same probability of error. Furthermore, the overall performance can be further improved by increasing the Rician parameter k . Finally, comparisons between the approximate and exact probabilities of symbol error for the Rayleigh fading channels case are performed and the results are shown to be comparable (1-2 dB difference).