Abstract

One of the options to mitigate fading effects in mobile communication is adaptive transmitter gain. This paper proposes a simple technique to eliminate the effects of fading in different multi antenna set-ups by varying the transmitter gain. The multi antenna set-ups considered in this paper include Single input-single output (SISO), Single input-multi output (SIMO), Multi input-single output (MISO), Multi input-multi output (MIMO) systems. For all these set-ups, the data streams after doing BPSK modulation is transmitted together with the transmitter gain through a frequency-selective Rayleigh fading channel. The Channel State Information (CSI) is unknown to the receiver and so, before doing equalization the channel characteristics are determined using the Least Mean Square (LMS) algorithm. The average Bit Error Rate (BER)
for different values of the transmitter gain is calculated and the performances of the different
set-ups are compared. Also, the BER for different Signal-to-Noise Ratio (SNR) are obtained for
the different systems. Both the above BER analysis schemes are then repeated by applying
three different error correction codes. The error correction coding schemes used in this paper
includes Linear block coding, Cyclic coding and Hamming coding. Out of the three coding
techniques, the one that gives the best possible result is taken into consideration and the
difference in BER for the coded and uncoded multi antenna systems are analyzed.
Performance is also analyzed in terms of the coding gain. All the above cases are repeated for
Rician channel as well. Finally, we will see that our results are identical to that of some
previously reported works.

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**Index Terms**

Computer Science

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**Keywords**

Rayleigh Fading  Rician Fading  Linear Block Codes  Cyclic Codes  Hamming Codes  Coding Gain  Lms (least Mean Square)  Transmitter Gain