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Design of Linear Precoder for Correlated multiuser MIMO system with imperfect CSI

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Abstract

In this paper, we have designed a transceiver to minimize the mean square error (MSE) subject to total transmit power constraint for multi-user multiple input multiple output (MU-MIMO) system under imperfect channel state information (CSI). For the transmission, we presume spatially and temporarily correlated Rayleigh flat fading channel. Because of channel estimation error and feedback delay, the CSI existing at both transmit and receive side will be imperfect. In addition, mutual coupling significantly degrade the system performance. Thus, we also considered the mutual coupling of antenna at both sides of the downlink (DL) which was neglected in previous work. With the above scenario, the proposed precoder design shows significant improvement in bit error rate (BER) compared with the existing precoder model. The linear MMSE prediction algorithm for channel gain is proposed for further progression in performance. The simulation result shows the precoder with predicted CSI results in better BER performance than the existing method. The results are validated by comparing the simulation results with their analytical performance.

Keywords

MU-MIMO; MMSE linear precoder; channel correlation; mutual coupling; feedback delay; estimation error.

1. Introduction

The demand in QoS, better outage performance and higher data rate transmissions in rich