

Capacity Improvement for TDD-MIMO Systems via AR Modeling Based Linear Prediction

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Abstract The quality of channel state information (CSI) affects the performance of multiple input multiple output (MIMO) systems which employ multi-elements antenna arrays at both the transmitter and the receiver. In a time division duplex (TDD) systems, the CSI for downlink can be obtained from uplink channel using reciprocity principal. However, the performance of a MIMO system can be degraded due to channel impairments especially in fast fading scenarios when the CSI obtained from uplink is used for downlink transmission. In this paper, we study performance of autoregressive (AR) modeling based MIMO channel prediction under varying channel propagation conditions (mobile speed, multipath number and angle spread) and prediction filter order. Our simulation results show that using the predicted CSI for downlink provides capacity improvement compared to conventional method.

Keywords TDD-MIMO · Channel capacity · CSI · Waterfilling

1 Introduction

Recently, the multiple-input multiple-output (MIMO) technology has received significant attention of the researchers because of the capacity enhancement and other advantages provided by it [1–4]. MIMO channel matrix describes propagation characteristics of the signals present at transmit and receive antenna arrays [5, 6]. For time division duplex (TDD) systems, the last known channel state information (CSI) estimated during the uplink interval can be

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