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Impact of Fading Severity and Receive Antenna Correlation on TAS/MRC under Nakagami Fading

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Abstract:

Transmit antenna selection (TAS) is well-known to allow a reduced signal processing complexity while maintaining the diversity order of a MIMO system. Assuming Nakagami fading, we show in this work that antenna correlation in a maximal ratio combining (MRC) receiver, as well as severe fading, have a beneficial impact on ergodic capacity if TAS is used at the transmit end. This is in sharp contrast to MRC reception when a single transmit antenna is considered. We also derive novel closed-form expressions for the average symbol error rate (ASER) of TAS/MRC for different M-ary modulations, generalizing previous works by considering receive antenna correlation where the eigenvalues of the receive correlation matrix have an arbitrary multiplicity. Monte Carlo simulations are performed to validate the analysis. Our results show that, contrary to the behavior of ergodic capacity, antenna correlation and severe fading always have a detrimental impact on ASER for the average SNR values of interest, as in those cases the ASER is dominated by the diversity gain.

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