

End to End Distortion and Hybrid Digital Analog Space-Time Coding

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Abstract:

We consider the problem of transmitting a Gaussian source over a non-ergodic multiple input multiple output (MIMO) fading channel. The measure of performance of interest is the mean squared error (MSE) in estimating the Gaussian source at the receiver. We are particularly interested in characterizing how the MSE decreases with the signal-to-noise ratio (SNR) at very high SNR's. We refer to the rate of decay of MSE with SNR as the distortion exponent. We provide upper bounds on the distortion exponent and the distortion exponent for some constructive joint source channel coding schemes. For a range of bandwidth efficiencies they coincide, providing an explicit characterization of the rate of decay of MSE with SNR. For other bandwidth efficiencies, the optimal exponent is yet unknown. The general underlying theme in the constructive schemes is the careful use of joint source channel coding and analog transmission to reduce mean squared error.