Fading Channels: How Perfect need "Perfect Side-Information" be?

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ABSTRACT

The analysis of flat fading channels is often performed under the assumption that the additive noise is white and Gaussian, and that the receiver has precise knowledge of the realization of the fading process. These assumptions imply the optimality of Gaussian codebooks and of a scaled nearest-neighbor decoder.

Here we study the robustness of this communication scheme with respect to errors in the estimation of the fading process. We quantify the degradation in performance that results from such estimation errors, and demonstrate the lack of robustness of this scheme. For some situations we suggest the rule of the thumb that in, order to avoid degradation, the estimation error should be negligible compared to the reciprocal of the signal to noise