



Research Article



## Training-Based Channel Estimation in MIMO Rician Fading Channels

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### ABSTRACT

In this paper, least squares and linear minimum mean squared error estimators for channel matrix estimation in

Rician fading multi-antenna systems is analyzed. The design of mean squared error minimizing training sequences is investigated in Multiple-Input Multiple-Output Rician fading channels. The problem of Multiple-Input Multiple-Output channel estimation has mostly been treated within the context of minimizing the mean squared error of the channel estimate subject to various constraints, such as an upper bound on the available training energy. A more general framework for the task of training sequence design in Multiple-Input Multiple-Output systems is introduced, which can also treat the minimization of channel estimators. It is shown that the proposed framework can be used to minimize the training energy budget subject to a quality constraint on the mean squared error of the channel estimator, a weighted channel estimation mean squared error and the mean squared error of the equalization error due to the use of an equalizer at the receiver (or an appropriate linear precoder at the transmitter).

**Keywords:** Rician fading channel, Channel Estimation, LS, LMMSE, MIMO.

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