FREQUENCY SELECTIVE FADING CHANNEL ESTIMATION IN OFDM SYSTEMS USING KL EXPANSION (TueAmOR3)

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Abstract :

Modelling the frequency selective fading channels as random processes, we employ a linear expansion based on Karhunen−Loeve (KL) series representation involving a complete set of orthogonal deterministic vectors with a corresponding uncorrelated random coefficients. Focusing on OFDM transmissions through frequency selective fading, this paper proposes a novel computationally efficient, linear minimum mean square error (MMSE) channel estimation algorithm based on KL series expansion. Based on such expansion, no matrix inversion is required in the proposed MMSE estimator. Moreover, truncation in the linear expansion of channel is achieved by exploiting the optimal truncation property of the KL expansion resulting in a smaller computational load on the estimation algorithm. The performance of the proposed approach is studied through analytical and experimental results. We first exploit the performance of the MMSE channel estimator based on the evaluation of minimum Bayesian MSE. We also provide performance analysis results studying the influence of the effect of SNR and correlation mismatch on the estimator performance.
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Abstract : (cont.)

Simulation results confirm our theoretical results and illustrate that the proposed algorithm is capable of tracking fast fading and improving performance.