Iterative Non-Stationary Channel Estimation for LTE Downlink Communications

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Abstract:

Intelligent transport systems (ITS) require lowlatency dependable wireless communication links between transmitter and receiver. In vehicular communication scenarios communication channels are highly dispersive which makes the design of appropriate channel estimators especially difficult. In this paper we address the problem of non-stationary vehicular channel estimation for 3GPP long term evolution (LTE) which is recently investigated for its usability in ITS applications. We present an iterative reduced-rank channel estimator for the LTE downlink utilizing a subspace representation based o n discrete prolate spheroidal sequences. The subspace is adapted to the time-varying delay and Doppler-spread for each received frame with a hypothesis test. This hypothesis test is adapted to the specific pilot grid in LTE. With this setup we can achieve a twofold reduction in the number of required iterations to achieve a frame error rate (FER) below 10^-1 for a relative velocity range of 0 to 400 km/h, a delay spread of 0 to 4.7 s at a signal-to-noise ratio (SNR) of 13 dB.