Abstract

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Optimal channel equalization for time-varying channels with non-stationary noises

Filter bank transceivers are widely employed in data communication networks to cope with ISI (inter-symbol-interference) through the use of redundancies. The authors considered optimal channel equalization for time-varying channels with possible nonstationary noise processes. It is shown that all zero-forcing receiver filter banks can be parameterized in an affine form which eliminate completely the ISI, and optimal channel equalizers can be designed through minimization of the MSE (mean-squared-error) between the detected signals and the transmitted signals, among all zero-forcing receiver filter banks. The main results show that the optimal channel equalizer is a modified Kalman filter. The results in this paper are applicable to DWMT (discrete wavelet multitone) systems, multirate transmultiplexers, OFDM (orthogonal frequency division multiplexing), and DS (direct sequence) CDMA (code division multiple access) networks. The design algorithm for optimal channel equalizers is developed, and a simulation example is worked out to illustrate the proposed design algorithm