RLS channel estimation and tracking for MIMO-extended IEEE 802.11a WLANs

ABSTRACT

Wireless communication systems based on multiple-input multiple-output (MIMO) technology and orthogonal frequency division multiplexing (OFDM) have the potential to achieve enormous increase in the capacity and link reliability. In order to realize such systems, channel estimation is crucial. In this paper, an adaptive channel estimation and tracking scheme based on recursive least squares (RLS) algorithm is proposed for MIMO OFDM-based wireless local area networks (WLANs). Preamble-aided channel estimation is performed in time-domain (TD). The estimator is then extended to perform decision-directed (DD) channel tracking during data transmission. The channel is assumed to be constant during one OFDM symbol and evolving in time according to the first-order Markov process. Different training rates at different Doppler frequencies were investigated. Simulation results show that the proposed estimation scheme has excellent performance measured in terms of the mean squares error (MSE) and the bit error rate (BER), provided that the forgetting factor of the RLS algorithm is optimally selected.

Keyword: MIMO; OFDM; Channel estimation; RLS algorithm