Research Article

Iterative frequency-domain detection and channel estimation for space–time block codes

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ABSTRACT

In this paper, we consider iterative frequency-domain receivers for block transmission techniques with rate-1 space–time block coding (STBC) for two or four transmit antennas. Single carrier with frequency-domain equalisation (SC-FDE) combined with antenna diversity is a promising candidate for future broadband wireless systems. Because our STBC with four transmit antennas is not orthogonal, our receiver includes the cancellation of the residual interference, allowing performances close to the ones of an orthogonal code.

We propose an iterative STBC receiver that considers an iterative detection and channel estimation. The channel estimates usually obtained with the help of pilot symbols and/or training sequences are multiplexed with data symbols. Because this leads to spectral degradation, the use of superimposed pilots (i.e. pilots added to data) was recently proposed as an efficient alternative. Our performance results show that the proposed SC-FDE STBC receiver allows excellent performance with the use of the channel data obtained from the channel estimation.