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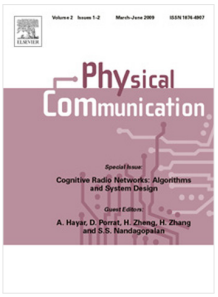

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Trellis Coded Quadrature Spatial Modulation

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Abstract

In this paper, a novel multiple-input multiple-output (MIMO) transmission scheme called *trellis coded quadrature spatial modulation* (TC-QSM), is proposed. In the proposed scheme, trellis coded modulation (TCM) principle is applied to the emerging quadrature spatial modulation (QSM) scheme, and a trellis encoder and a QSM mapper are jointly designed to benefit from both coding and multiplexing gains. At the receiver side, a soft-decision Viterbi decoder is used along with a QSM decoder to obtain the optimum error performance. Considering our design criterion, TC-QSM schemes are designed for different number of trellis states, transmit antennas and spectral efficiencies. The pairwise error probability (PEP) of the TC-QSM scheme is derived over quasi-static Nakagami-m, Rician and Rayleigh fading channels and an upper bound on the average bit error probability (BEP) is obtained. Through comprehensive Monte Carlo simulations, the effect of signal and spatial bits on uncoded and trellis coded SM and QSM schemes over Nakagami-m and Rician fading channels are investigated for different fading parameters. Moreover, the error performance of the TC-QSM and SM with trellis coding (SM-TC) schemes are compared for different spectral efficiency values, where it is revealed that the proposed TC-QSM scheme provides an interesting trade-off between performance and implementation cost, and achieves an improved error performance over reference schemes

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