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Research Letter

Precoded DOSTBC over Rayleigh Channels

Manav R. Bhatnagar, Are Hjørungnes, and Lingyang Song

University Graduate Center, University of Oslo, Instituttveien 25, P. O. Box 70, Kjeller 2027, Norway

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Abstract

Differential orthogonal space-time block codes (DOSTBC) sent over correlated Rayleigh fading channels are considered in this paper. Approximate expressions for the symbol error rate (SER) are derived for DOSTBC with M-PSK, M-PAM, and M-QAM constellations assuming arbitrary correlation between the transmit and receive antennas. A full memoryless precoder is designed to improve the performance of the DOSTBC over correlated Rayleigh MIMO channels. The proposed precoder design differs from the previous work: (1) our precoder design considers arbitrary correlation in the channels, whereas the previously proposed precoder design considers only transmit correlations in the Kronecker correlation model; (2) the proposed precoder is based on minimizing proposed SER, whereas the previously proposed precoder is based on minimizing the Chernoff bound of approximate SER; (3) we propose precoder design for DOSTBC with M-PSK, M-PAM, and M-QAM constellations, whereas the previously proposed precoder works for DOSTBC with M-PSK only. Additionally, the proposed precoded DOSTBC outperforms the conventional eigenbeamforming-based precoded DOSTBC for the Kronecker model with only transmit correlation.