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Turbo Coded Space-Time Unitary Matrix Differential Modulation

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ABSTRACT

Non-coherent communication over the Rayleigh flat fading channel with multiple transmit and receive antennas is investigated. Codes achieving bit error rate (BER) lower than 10^{-4} at bit energy over the noise spectral density ratio $\left(E_b / N_0\right)$ of 0.8 to 2.8 dB from the capacity limit were found with coding rates of 0.5 to 2.25 bits per channel use. The codes are serial concatenation of turbo code and a unitary matrix differential modulation code. The receiver is based on a high performance joint iterative decoding of the turbo code and the modulation code. Information theoretic arguments are harnessed to form guidelines for code design and to evaluate performance of the iterative decoder.

Keywords: Unitary matrix, multi-antenna, capacity limit, space-time, turbo-code, differential modulation, joint iterative decoding.