



OPTIMAL DESIGN OF NONCOHERENT CAYLEY UNITARY SPACE-TIME CODES (TueAmOR4)

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★ **Abstract :** The Cayley unitary (CU) codes constitute a systematic way of constructing unitary space-time modulations for noncoherent MIMO communications. For MIMO systems employing CU codes, there is no explicit expression for block (or bit) error probabilities. Hence, deterministic optimization tools cannot be employed to design the optimal CU codes. In this work, we propose to optimize the design of CU codes through simulation-based optimization techniques, in particular, stochastic approximation together with gradient estimation. The proposed methodology can be employed to design optimal CU codes under the maximum likelihood decoding or the suboptimal linearized sphere decoding. Simulation results show that new CU codes obtained by the proposed design significantly outperform those in the literature designed by minimizing the expected distance between codeword pairs. The new CU codes also enjoy comparable performance over training-based designs.