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Tightened Upper Bounds on the ML Decoding Error Probability of Binary Linear Block Codes

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Abstract

The performance of maximum-likelihood (ML) decoded binary linear block codes is addressed via the derivation of tightened upper bounds on their decoding error probability. The upper bounds on the block and bit error probabilities are valid for any memoryless, binary-input and output-symmetric communication channel, and their effectiveness is exemplified for various ensembles of turbo-like codes over the AWGN channel. An expurgation of the distance spectrum of binary linear block codes further tightens the resulting upper bounds.