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Research Letter

Simplified LLRs for the Decoding of Single Parity Check Turbo Product Codes Transmitted Using 16QAM

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Abstract

Iterative soft-decision decoding algorithms require channel log-likelihood ratios (LLRs) which, when using 16QAM modulation, require intensive computations to be obtained. Therefore, we derive four simple approximate LLR expressions. When using the maximum a posteriori probability algorithm for decoding single parity check turbo product codes (SPC/TPCs), these LLRs can be simplified even further. We show through computer simulations that the bit-error-rate performance of $(8,7)_2$ and $(8,7)_3$ SPC/TPCs, transmitted using 16QAM and decoded using the maximum a posteriori algorithm with our simplified LLRs, is nearly identical to the one achieved by using the exact LLRs.