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Abstract

Engineering and the Built Environment
School of Electrical and Information Engineering

Master of Science

Modifications to the Symbol Wise Soft Input Parity check Transformation Decoding Algorithm

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Reed-Solomon codes are very popular codes used in the field of forward error correction due to their error correcting capabilities. Thus, a lot of research has been dedicated to the development of decoding algorithms for this class of code. The high performance decoding algorithms for Reed-Solomon codes suffer from high computational complexity. Recently, the development of a new decoding algorithm for Reed-Solomon codes, called the Parity check Transformation Algorithm (PTA), was introduced. The PTA outperformed other high performance symbol-level decoding algorithms for Reed-Solomon codes, and is said to be a less computational complex algorithm. The PTA, however, suffers from running a high number of iterations during the decoding process especially for low SNR regions.

The main focus of this dissertation is to reduce the number of iterations run by the PTA by developing an extension of the algorithm which is referred to as the Modified PTA (MPTA). This will be done by performing an analysis on the PTA algorithm and making modifications which will help meet the objective. This research will also work on improving the symbol error rate performance of the PTA with said modifications. By reducing the number of iteration run by the PTA, this will enable the algorithm to decode faster thus improving on its efficiency while decoding.