

Minimum Distance Improvement Method for Sequential Detectors

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Abstract

Intersymbol interference (ISI) is a major concern in transmission systems such as mobile radio systems, magnetic recording, terrestrial television broadcasting etc. There has been a significant amount of study to find a solution in order to alleviate the effects of ISI. ISI degrades the bit error rate (BER) performance of sequential detectors such as *maximum likelihood sequence detection* (MLSD) and the *maximum a posteriori* (MAP) algorithm due to minimum distance reduction. This paper describes a novel spectrum rotation method which is applied to both transmitted and received signals to increase the minimum distance for sequential detection algorithms when equalizing and decoding the received signals. This rotation method results in a significant improvement in the BER performance for binary phase shift keying (PSK) systems when operating over severe ISI corrupted and noisy channels. The paper will present the theoretical justification for the performance improvement. Simulation results will be presented to verify the theoretical predictions. The results show that a BER performance improvement of up to 4.6 dB can be achieved, when employing MLSD and MAP turbo equalization methods compared with existing approaches.

Index Terms

Equalisation, Iterative Turbo decoding, Sequential detection.

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