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Abctract

For the accounting period research of the multithreshold decoder application on an additive white Gaussian channel has been carried out. Research has shown that with the help of the multithreshold decoders it is possible to get a coding gain about 8 dB with implementation complexity in tens times less than efficiency comparable methods of error-correction.

Also the error propagation effect in linear codes is analyzed. It is shown, that for reduction of the error propagation it is necessary to choose codes having small count of equal errors included in checks concerning different information symbols. The technique for construction of such codes is offered and realized in software. With the help of the given software several self-orthogonal codes with small error propagation is constructed. The using of these codes allows to close the region of effective work of multithreshold decoder to channel capacity about 0,2 dB.

The technique of the multithreshold decoder using in concatenated codes is developed. Concatenated code consisting of self-orthogonal code decoding with the multithreshold decoder, and short convolutional code decoding with the Viterby decoder is offered. Research of an overall performance of the given code is carried out. It is shown, that the given concatenated code appears better the concatenated code consisting of Read-Solomon code and convolutional code both on efficiency, and on speed. The way of self-orthogonal code decoding is offered. This method based on decoding of received from channel block with several multithreshold decoders. Application of the given way has allowed to approach area of effective work for the multithreshold decoder to channel capacity approximately on 0,2 dB.

The using of suggested methods for improving of multithreshold decoder allows to close the region of effective work of multithreshold decoder to channel capacity about 1,5 dB.

The simulator of digital communication system is developed and registered in ROSPATENT. It allows to spend comprehensive investigation of the best error-

correction methods. The simulator allows to carry out research of such modern error-correction methods as the Viterby decoder, turbo codes, product-accumulate codes, the multithreshold decoders, etc. Research of the given methods can be spent as on the channel with binary phase modulation and on channels with multi-level modulation (*M*-ary phase modulation and quadrature-amplitude modulation).

With the help of the simulator of the digital communication system the comparative analysis of an overall performance of the multithreshold decoder and the offered concatenated codes based on it with the best modern error-correction methods is carried out.

The results of the analysis show advantage of using multithreshold decoders in high-speed communication channels.

It began developing of demonstrate-test stand with simulator of digital channel which can be used for investigation of hardware multithreshold decoders.