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Erasure correction by low-density codes. (English. Russian original) Zbl 1178.94254

Probl. Inf. Transm. 45, No. 3, 204-220 (2009); translation from Probl. Peredachi Inf. 45, No. 3, 15-32 (2009).

Summary: We generalize the method for computing the number of errors correctable by a low-density parity-check (LDPC) code in a binary symmetric channel, which was proposed by *V. V. Zyablov* and *M. S. Pinsker* [Probl. Peredaci Inform. 11, No. 1, 23–26 (1975; [Zbl 0358.94017](#))]. This method is for the first time applied for computing the fraction of guaranteed correctable erasures for an LDPC code with a given constituent code used in an erasure channel. Unlike previously known combinatorial methods for computing the fraction of correctable erasures, this method is based on the theory of generating functions, which allows us to obtain more precise results and unify the computation method for various constituent codes of a regular LDPC code. We also show that there exist an LDPC code with a given constituent code which, when decoded with a low-complexity iterative algorithm, is capable of correcting any erasure pattern with a number of erasures that grows linearly with the code length. The number of decoding iterations, required to correct the erasures, is a logarithmic function of the code length. We make comparative analysis of various numerical results obtained by various computation methods for certain parameters of an LDPC code with a constituent single-parity-check or Hamming code.

MSC:

[94B60](#) Other types of codes
[94B20](#) Burst-correcting codes

Cited in **2** Documents

Full Text: [DOI](#)

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