Multithreshold majority decoding of LDP-codes

P.P. Urbanovich[1), 2)], D.M. Romanenko[1)], D.V. Shiman[1)]
[1)] Belorussian State Technological University, Minsk, Belarus,
E-mail: upp@rambler.ru, rdm@tut.by
[2)] Lublin Catholic University, Lublin, Poland

Observed sharp increase of informational flows and tightening requirements for transmitted and treated information aggravated the problem of secure storage and transmission of Binary Data. Using redundant codes can solve the described problems. There are many different codes with high-correcting capabilities (for example BCH-codes, Reed-Solomon, low-density and other's). But at the same time the main role in the process of error correcting plays the decoder. So, the purpose of this work is studying of multithreshold majority decoding of Low-Density Parity Codes (LDPC).

The progressive development of iterative codes led to the emergence of three-dimensional versions, which can be attributed to LDPC-codes thanks to the low-density units in the generator matrix (in rows – not more than $\sqrt[3]{k}$; units). Expedient to use not more 9 linearly independent parities in LDPC-code. With length increasing of the information sequence for the considered low-density code rate parameter increases and for k = 4096 bits reaches 0.76.

To study the correction of multiple batch and independent errors multithreshold decoder and three-dimensional iterative code was developed a software model that simulates the process of coding, the appearance and correction errors.

The results of the modeling process of majority multithreshold decoding (threshold values were $T1$ = 5, $T2 \geq 4$, $T3 \geq 3$) the different types of triple independent errors for the information sequence length k = 64 bits and three-dimensional iterative code with 5 linearly independent parities are represented in table 1.

Tab. 1. The results of the modeling of the correction errors process

Error type	Quantity of corrected errors, %	Quantity of errors after decoding, %			
		Single	Double	Triple	Quadruple and more
Single	100	0	0	0	0
Double	100	0	0	0	0
Triple	99	0,6	0,6	0	0,2
Quadruple	97	0,7	0,7	0	1,6