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## #1569420765: On Codes that Correct Asymmetric Errors with Graded Magnitude Distribution

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Conference and track		2011 IEEE International Symposium on Information Theory - 2011 IEEE International Symposium on Information Theory																														
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Registration																																
Category		Eligible for ISIT Student Paper Award																														
Title		<i>On Codes that Correct Asymmetric Errors with Graded Magnitude Distribution</i>																														
Abstract		In multi-level flash memories, the dominant cell errors are asymmetric with limited-magnitude. With such an error model in mind, Cassuto et al. recently developed bounds and constructions for codes correcting $t$ asymmetric errors with magnitude no more than $\ell$ . However, a more refined model of these memory devices reflects the fact that typically only a small number of errors have large magnitude while the remainder are of smaller magnitude. In this work, we study such an error model, in which at most $t_1$ errors of maximum magnitude $\ell_1$ and at most $t_2$ errors of maximum magnitude $\ell_2$ , with $\ell_1 < \ell_2$ , can occur. We adapt the analysis and code construction of Cassuto, et al. for the refined error model and assess the relative efficiency of the new codes. We then consider in more detail specific constructions for the case where $t_1 = t_2 = 1$ , $\ell_1 = 1$ , and $\ell_2 > 1$ .																														
Topics		Coding theory and practice																														
Session		The program is not yet visible (tpc)																														
DOI																																
Status		accepted																														

	Document (show)	Pages	File size	Changed	MD5	Similarity score
Review manuscript		5	190,965	February 15, 2011 17:24:40 EST	c125487b29478ff8f7c2e74e53cd527d	9
Final manuscript		Can upload 5 pages until May 31, 2011 00:00:00 EDT.				

### Personal notes



### Reviews

You are a TPC member for this conference.

#### 1 Review

##### Review 1 (Reviewer C)

Importance      Technical Level      Novelty      Presentation      Recommendation

Very Important (4) Good technical level (4) Average Novelty (3) Good (4) Recommend (4)

### Strengths (What are the key strengths of this paper?)

The paper is strong in two aspects: (1) It explores a new and interesting topic for multi-level flash memories -- namely, the design of ECC where large errors are less likely to appear than small errors, -- which is practically very important. (2) It presents new code constructions for the general error model considered in the paper (namely, asymmetric errors with graded magnitude distribution), and shows more efficient code constructions when the number and size of errors are much more restricted.

The paper is well written.

### Weaknesses (What are the major weaknesses of this paper?)

No major weakness I can think of.

### Comments and Recommendation (Please give the reasoning for your overall recommendation and any additional comments you wish to add.)

The paper is strong in two aspects: (1) It explores a new and interesting topic for multi-level flash memories -- namely, the design of ECC where large errors are less likely to appear than small errors, -- which is practically very important. (2) It presents new code constructions for the general error model considered in the paper (namely, asymmetric errors with graded magnitude distribution), and shows more efficient code constructions when the number and size of errors are much more restricted.

The paper is well written.

## 1 Summary review by TPC member

### Review 1 (Reviewer A)

TPC recommendation

Strong accept (5)

### TPC Recommendation Justification (Please give a justification for your recommendation, especially if the review scores vary widely or your recommendation differs significantly from those of the reviewers.)

Correction of asymmetric errors with limited magnitude is very important in flash memories. This paper present error-correcting codes in this direction. A must accept.

## Discussion