

# 基于加权比特翻转的 MLC 型 NAND 闪存系统

张旋<sup>1</sup>, 余娟<sup>2</sup>

(1 西安理工大学,陕西 西安 710082; 2 陕西师范大学,陕西 西安 710062)

**摘要:** 多级单元(Multi-Level-Cell, MLC)技术增加了 NAND 闪存的存储密度,但也增强了单元间干扰(Cell-to-Cell Interference, CCI)噪声强度,导致了 NAND 闪存的可靠性急剧下降.在深入研究 MLC 闪存模型和 CCI 噪声模型基础上,提出了一种 MLC 型 NAND 闪存的加权比特翻转硬判决译码方法.仿真结果表明,在 MLC 闪存信道条件下,该方法既可保证 MLC 闪存单元的可靠性,对可保持较低的译码复杂度,从而实现了译码复杂度和性能间的良好折衷.

**关键词:** 多级单元; 单元间干扰; 加权比特翻转译码

**中图分类号:** TP393

**文献标识码:** A

**文章编号:** 1000-7180(2018)02-0075-04

## Research on MLC NAND Flash Memory Based on Weighted Bit-flipping Decoding Algorithm

ZHANG Xuan<sup>1</sup>, YU Juan<sup>2</sup>

(1 Xi'an University of Technology, Xi'an 710082, China; 2 Shaanxi Normal University, Xi'an 710062, China)

**Abstract:** Multi-level cell(MLC) increases the storage density of NAND flash memory, while the Cell-to-Cell interference (CCI) is enhanced, and the reliability of NAND flash memory is decreased. On the research of MLC channel model and CCI noise model, this paper proposes a weighted bit-flipping decoding algorithm for MLC NAND flash memory. The simulation results show that this method can ensure the reliability of the NAND flash memory, while maintaining low decoding complexity, so as to realize a better tradeoff between complexity and decoding performance.

**Key words:** multi-level cell; cell-to-cell interference; weighted bit-flipping decoding

**作者简介:**

张旋男, (1980-), 硕士研究生.研究方向为计算机网络与差错控制技术、大数据系统中数据的可靠性技术.E-mail: zxolive@163.com.

余娟女, (1980-), 博士研究生, 讲师.研究方向为复杂系统及优化控制.