

Abstract: Design of Equalized Maximum Likelihood Sequence Receiver for a Magnetic Recording Channel

Chung-Jung Huang¹, Tsai-Sheng Kao^{2,*}, Hao-Hsiang Ku³, and Hsia-Hung Ou⁴

¹*Department of Electrical Engineering, National Chiao Tung University, Taiwan, R.O.C.*

²*Department of Electronic Engineering, Hwa-Hsia Institute of Technology, Taiwan, R.O.C.*

³*Department of Computer Science and Information Engineering, Hwa-Hsia Institute of Technology, Taiwan, R.O.C.*

⁴*Graduate Institute of International Sports Affairs, National Taiwan Sport University, Taiwan, R.O.C.*

Abstract

The nonlinear effects, known as transition shift and partial erasure, arise and limit the performance of the detector in a high-density magnetic recording channel. Although the partial response maximum likelihood (PRML) sequence detector can achieve an acceptable performance in a reasonable realization complexity, the given target response is not optimized. In this article, we jointly optimize the coefficients of the partial equalizer and target response for an equalized maximum likelihood sequence receiver such that the mean squared error between the outputs of the partial equalizer and target response is minimized in the presence of the partial erasure effect, and evaluate the bit error rates (BERs) of the extended partial response class VI (EPR4) equalized channel. In addition, the mean squared error and bit error rate are simulated to verify the proposed method for an EPR4-equalized channel; the results indicate both the mean squared error and bit error rate for the proposed method are improved as compared with those of the conventional design.

Acknowledgements

This work was supported in part by National Science Council, Taiwan, under Grant numbers NSC 100-2221-E-146-004 and NSC 99-2218-E-146-003-MY2.