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A low-complexity MLSE algorithm for the NRZ high-speed transceivers

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In this article, a low-complexity maximum likelihood sequence equalizer (MLSE) algorithm for non-return-to-zero (NRZ) high-speed transceivers is proposed. In particle physics experiments and high-energy physics experiments, the amount of data transmission continues to increase, and transceivers play an important role. MLSE has received widespread attention because of its great advantages in eliminating inter-symbol interference (ISI), and it can work instead of a decision feedback equalizer (DFE). However, the complexity of MLSE also increases exponentially with the traceback length and equalizer order. Therefore, it is important to reduce the complexity of MLSE while ensuring its performance. This article simplifies the calculation of transition metrics for MLSE, eliminating the need for complex state calculations and result storage. A configurable and highly flexible transceiver simulation system is designed based on a field programmable gate array (FPGA), and the proposed algorithm is tested with this system. Quartus software synthesis results show that the proposed algorithm significantly reduces resource consumption without loss of algorithm performance.

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