

论文

一种基于缩减伴随式集的QC-LDPC码级联译码算法

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摘要

该文在研究缩减伴随式集译码(RLSD)算法和规则QC-LDPC码字结构的基础上,提出了一种新的针对中短QC-LDPC码的BP-RLSD级联译码算法。BP算法译码失败时的软输出对数信息,作为RLSD算法的输入。根据QC-LDPC码所具有的循环置换结构,给出一种根据伴随式的重量来确定候选错误模式搜索空间的算法,同时给出一种“查表”方法快速搜索出部分错误位置。结合接收序列的低可信度集合(LRIPs),可以实现最大似然(ML)码字的快速搜索。这些方法可以大幅减少计算时间。仿真显示该文提出的算法是有效的。与BP算法的级联译码,可以在计算复杂度和性能之间进行较好的折衷。

关键词 [QC-LDPC码](#) [缩减伴随式集译码\(RLSD\)](#) [低可信度集合\(LRIPs\)](#) [最大似然译码\(MLD\)](#)

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Concatenation Decoding Algorithm for QC-LDPC Codes Based on the Reduced List Syndromes

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Abstract

Reduced List Syndrome Decoding (RLSD) algorithm and QC-LDPC codes are investigated in this paper, based on which, a new BP-RLSD concatenation algorithm for QC-LDPC codes is proposed. When the Belief Propagation (BP) algorithm fails, the soft LLR reliable information is sent to the RLSD algorithm. Based on the regular structure of permutation sub matrices, this paper proposes a method to reduce the search space of error patterns according to the weight of syndrome. This paper also proposes a fast look-up table method to search out a part of error positions. Those methods, combined with the information of Least Reliable Independent Positions (LRIPs), can achieve an efficient search for the Maximum Likelihood (ML) code, and substantially reduce the computation time. The simulation results show that the proposed methods are effective. The improved algorithm combined with the BP algorithm, can achieves a good tradeoff between computational complexity and decoding performance.

Key words [QC-LDPC codes](#) [Reduced List Syndrome Decoding\(RLSD\)](#) [Least Reliable Independent Positions \(LRIPs\)](#) [Maximum likelihood Decoding \(MLD\)](#)

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