

论文

基于二分图的乘积码迭代译码算法

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摘要

该文给出了由汉明分量乘积码构造广义低密度(GLD)码的一般方法。基于所得稀疏矩阵的二分图,并结合分组码与低密度校验(LDPC)码的译码算法,设计出一种新颖的可用于乘积码迭代译码的Chase-MP算法。由于所得二分图中不含有长度为4和6的小环,因而大大减少图上迭代时外信息之间的相关性,进而提高译码性能。对加性高斯白噪声(AWGN)及瑞利(Rayleigh)衰落信道下,汉明分量(63, 57, 3)²乘积码的模拟仿真显示,该算法能够获得很好的译码性能。与传统的串行迭代Chase-2算法相比,Chase-MP算法适合用于全并行译码处理,便于硬件实现,而且译码性能优于串行迭代Chase-2算法。

关键词 [乘积码](#) [GLD码](#) [LDPC码](#) [二分图](#) [Chase-MP算法](#)

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Iterative Decoding Algorithm for Product Codes Based on Bipartite Graphs

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Abstract

This paper shows how to construct generalized low-density (GLD) codes from Hamming-component product codes. Combining the decoding algorithms for linear block and LDPC codes, a novel Chase-MP algorithm for decoding of product codes is proposed by using the bipartite graph of the constructed sparse matrix. Since there are no cycles of length 4 or 6 in the graph, dependence among extrinsic information is greatly reduced during iterations and decoding performance is also improved. Experimental simulations for the (63,57,3)² product code based on Hamming-component codes in terms of Bit Error Rate (BER) on the Additive White Gaussian Noise (AWGN) and Rayleigh fading channels show that our algorithm has remarkable coding gains. In comparison with the serially iterative Chase-2 algorithm, the Chase-MP algorithm is more convenient for fully parallelizable decoding and can achieve better performance.

Key words [Product codes](#) [GLD codes](#) [LDPC codes](#) [Bipartite graphs](#) [Chase-MP algorithm](#)

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