研究简报

基于SCCC结构非相干MAP译码的简化算法

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Simplified Noncoherent MAP Decoding Algorithm Based on SCCC Structure

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摘要 差分编码和序列译码相结合是实现高性能非相干解调的主要方式。对采用差分编码的SCCC结构进行非相干译码，其性能近乎于相干解调，但在估计信道转移概率时引入了修正的零阶贝塞尔函数，因此译码复杂度过高，不利于工程实现。针对这个问题，该文提出了两种基于SCCC结构的非相干MAP译码的简化算法。该算法利用对贝塞尔函数的近似式，简化了内码译码log-MAP算法中分支度量的计算。理论分析和仿真结果表明，简化后的算法在保证译码性能的前提下，显著地减小了译码复杂度。

关键词： 差分编码 串行级联卷积码(SCCC) MAP算法 非相干解调

Abstract： Differential encoding used in conjunction with sequence decoding is a primary method to implement high performance noncoherent demodulation. Though noncoherent decoding based on SCCC with differential encoding is almost similar to coherent demodulation in performance, its high decoding complexity makes its engineering application difficult because of the introduction of modified zero-order Bessel function to estimate the channel transition probability. To solve this problem, two simplified noncoherent MAP decoding algorithms based on SCCC structure are proposed in this paper. These algorithms use an approximate formula of zero-order Bessel function to simplify the branch metrics in log-MAP algorithm of inner decoder. Theoretical analysis and simulation results show that the proposed algorithms can largely reduce the decoding computational complexity and have good performance.

Keywords： Differential encoding   Serially Concatenated Convolutional Code (SCCC)   MAP algorithm   Noncoherent demodulation

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引用本文：

曹敏, 尹虹, 王国栋, 李际平.基于SCCC结构非相干MAP译码的简化算法[J] 电子与信息学报, 2010,V32(10): 2526-2530

Cao Min, Yin Hong, Wang Guo-Dong, Li Ji-Ping.Simplified Noncoherent MAP Decoding Algorithm Based on SCCC Structure[J] , 2010,V32(10): 2526-2530

链接本文：

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