应用

可变速率多元LDPC码高阶调制系统

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摘要：

由于无线信道的时变性及无线频谱资源的短缺，码率自适应技术及高频谱效率的高阶调制技术均为未来高速率无线通信发展的必然方向，本文提出了一种基于多元速率兼容LDPC（RC-LDPC）码的可变速率高阶编码调制方案。该方案基于符号级的多元LDPC码缩短和打孔算法，并与高阶映射联合优化设计，获得了比二元RC-LDPC码方案优异的性能，实现了多元LDPC码率从1/3到5/6灵活变化，并且所有子码都可以共享母码的编译码器，因此相对于多元母码，基本不增加系统复杂度。仿真结果证明采用64-QAM调制时，本方案的误码率性能比二元码对应方案在各个码率分别有0.5到1.3dB的增益。

关键词： 多元LDPC码；速率兼容；高阶调制

Non-binary rate-compatible LDPC-coded high order modulation system

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Abstract:

Due to the time-varying wireless channel and the lack of wireless spectrum resource, code-rate adaption technique and high order modulation scheme with high spectrum efficiency will be the most attractive candidates for high speed wireless communication in future. In this paper, a variable--rate high order modulation scheme based on non-binary rate-compatible low-density parity-check (RC-LDPC）codes was proposed. In this scheme, the symbol-wise shortening algorithm and puncturing algorithm for non-binary LDPC codes were provided, and the jointed design of high order mapping and non-binary RC-LDPC codes were proposed, too. With these algorithms, some information bits or redundancy bits will be not transmitted over wireless channels; at the receiver, the partial code-words should be filled with some proper bits or probabilities. Finally, we can obtain a non-binary RC-LDPC-coded high order modulation scheme with the flexible code-rate range from 1/3 to 5/6. And all rate-compatible LDPC codes can be decoded by using the parity-check matrix of the mother code, so the complexity will not increase significantly. Finally, simulation results show that gains of 0.51-1.3dB are obtained over binary RC-LDPC-coded 64-QAM-modulation schemes.

Keywords: non-binary low-density parity-check codes   rate-compatible   high order modulation

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