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OFDM系统的非二进制级联码性能分析

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摘要 提出了一种新的级联码结构，将基于有限扩域的非二进制LDPC码和空时码级联，这种结构使得非二进制LDPC码不需要串并变换直接进行高阶调制，简化了系统结构，克服了串并变换所带来的误差. 分析比较了不同域值的LDPC级联码系统在不同调制模式下基于高斯白噪声信道和多径衰落信道的误码性能和译码复杂度，结果显示，新的级联编码的OFDM系统的性能优于二进制级联编码的OFDM系统，在高斯信道，误码率为10⁻⁶时，GF(4)和GF(16)分别提高0.2dB和0.3dB，在多径信道，误码率为10⁻⁶时，GF(4)和GF(16)分别提高1dB和2dB增益，级联的非二进制LDPC码的域值越大，系统的性能越好，译码复杂度也相应提高，GF(4)域上的加法计算次数比GF(2)域上多了2倍， 比GF(16)域多了10倍.

关键词 非二进制LDPC码 空时编码 多径瑞利衰落 OFDM
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Performance of non-binary concatenated coded OFDM systems

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Abstract

A new concatenated code structure is proposed which concatenates a space-time block codes with non binary low density parity check (LDPC) codes, which is high-level modulated without any parallel-to-serial conversion to lower the error and simplify the system structure. The performance of the new system in Bit error rate (BER) and complexity is evaluated, its comparisons are made with the binary LDPC concatenated codes OFDM system by simulation in AWGN channels and multiple Raleigh fading channels. Results show that the new system is superior to the old one. Compared with GF(2), a0.2dB and0.3dB increments are obtained by GF(4) and GF(16) respectively atBER=10⁻⁶ in AWGN channels, an 1dB and 2dB increments are obtained by GF(4) and GF(16) respectively in multi-path Rayleigh fading channels. The performance improves as the field order is increased, but the computational complexity is increased also. The number of additions is increased 2 times and 10times by GF(4) and GF(16) respectively.

Key words LDPC codes based on binary extension fields space-time codes multiple Rayleigh fading OFDM

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