短文与研究通讯

基于准循环LDPC码和SLM法降低PAPR的新方法

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摘要：

由于具有频谱利用率高、抗多径衰落能力强等优点，正交频分复用(OFDM)技术已成为通信领域的研究热点之一。但是OFDM技术中存在的高峰均功率比(PAPR)，为其实用化设置了障碍。本文提出利用不规则准循环低密度奇偶校验(QC-LDPC)码作为信道编码技术，联合选择映射(SLM)算法抑制高峰均功率比。其中，不规则QC-LDPC码的生成矩阵由校验矩阵中的子矩阵直接构造得到。相对于传统的选择映射算法，该方法能发挥LDPC码和SLM法的联合优势，同时由于采用基于置信传播(BP)的迭代译码算法，计算复杂度低、译码速度快。仿真结果表明，该联合方法既能有效地改善OFDM信号的PAPR特性，又能保证系统获得可靠的误码率性能，且实现简单。

关键词：　正交频分复用；峰均功率比；低密度奇偶校验码；选择映射算法

A New Scheme for PAPR Reduction Using Quasi-cyclic LDPC Code and SLM

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Abstract:

Because of high spectrum efficiency and robustness to multi-path delay, orthogonal frequency division multiplexing (OFDM) has been one of research hotspots in communication field. But the disadvantage of high peak-to-average power ratio (PAPR) in OFDM technology is one of the main obstacles to limit its wide applications. In order to reduce the peak-to-average power ratio of OFDM signals, the effective method that combined the selective mapping (SLM) technique with the irregular quasi-cyclic low density parity check (QC-LDPC) code is proposed, in which the irregular QC-LDPC code is selected as good error-correcting channel coding. The generated matrix of the irregular quasi-cyclic low density parity check code can be obtained directly with the two sub-matrixes in the parity check matrix. Compared with the traditional selective mapping technique, the combined method can give full play to advantages. By using the belief propagation (BP) iterative decoding algorithm of LDPC code, it can reduce the computational complexity and improve the decoding speed. The results with MATLAB simulation show that the proposed method can not only reduce the PAPR effectively and simply, but also have less affection to the bit error rate (BER) in orthogonal frequency division multiplexing system.

Keywords: Orthogonal Frequency Division Multiplexing　Peak-to-Average Power Ratio　Low Density Parity Check Code　Selective Mapping

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