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一种FM-QCSK混沌数字通信系统及其性能分析

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摘要 在调频-四相混沌键控(FM-QCSK)混沌数字通信系统中，对时域连续混沌信号进行频率调制，使单位码元具有近似相等的比特能量;针对混沌样值函数构造一组正交基，采用频域或时域方法得到混沌载波的正交信号，接收时直接将参考信号及其正交信号分两路与载信信号进行相关处理，不需FM解调，这就使单位码元符号所表示的信息增加了一倍. 计算机仿真结果表明，在AWGN信道下，FM-QCSK的误码率性能接近于FM-DCSK；在多径信道下，FM-QCSK方法在BER为10⁻⁴时， E_b/N₀ 控制在20dB，其性能好于传统的周期性载波调制系统.

关键词 调频-四相混沌键控 非相干 混沌载波 性能分析

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An FM-QCSK chaotic communication system and its performance analysis

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Abstract

In the FM-QCSK(Frequency Modulated Quadrature Chaos Shift Keying) communication system, frequency modulation of the continuous-time chaotic signal makes it possible to generate an inherent wideband signal with constant energy per bit. For the chaotic sample function, a set of orthogonal bases can be used to produce the quadrature signal of the chaotic carrier in the frequency or time domain. In the receiver, the reference signal and its quadrature component are directly correlated with the information-bearing part without FM demodulation. In this way, a symbol can once represent 2-bit information to achieve the higher rate of transmission. Simulation results show that the BER performance of FM-QCSK is close to that of FM-DCSK in the AWGN channel, and that compared with traditional periodical carrier modulation, this scheme is robust to the frequency selective fading in the multipath channel.

Key words FM-QCSK noncoherent detection chaotic carrier performance analysis

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