

论文与技术报告

MPPSK调制解调器研究

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摘要:

为深入研究多元位置相移键控(MPPSK)调制信号的功率谱特性且改善其接收端解调性能, 给出了(M>2)时的MPPSK理论功率谱的一般表达式, 并设计了一种新的基于BP神经网络的解调器。在MPPSK调制原理的基础上, 利用交变波和稳态波分解法推导了(M=3)3PPSK的理论功率谱解析式, 并推广得到了(M>3)时的MPPSK理论功率谱一般表达式, 通过仿真验证了理论推导的正确性, 分析了影响MPPSK功率谱的主要因素。同时, 基于已有的锁相环解调和数字冲击滤波器多路判决解调的两种方案, 充分利用数字冲击滤波器输出的显著波形差异, 提出了一种基于BP神经网络的MPPSK解调器, 并对三种解调方案进行了仿真。仿真结果表明: 新的MPPSK解调器解调性能要明显好于已有的两种解调方案。

关键词: 多元位置相移键控; 解调器; 交变波; 稳态波; 锁相环; 数字冲击滤波器

Research on MPPSK Modem

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Abstract:

In order to research the power spectrum characteristics of M-ary Position Phase Shift Keying (MPPSK) modulation signal deeply, and improve the demodulation performance of the receiver, the theoretical power spectrum expression of MPPSK is presented when M is larger than 2, and a new MPPSK demodulator based on BP neural network is designed. Based on the principle of MPPSK modulation, the decomposition method of alternating wave and steady wave is utilized to deduce the theoretical power spectrum expression of MPPSK when M equals 3, and the expression is extended to the MPPSK when M is larger than 3. The simulation is conducted to verify the correctness of theoretical derivation, and the main factors impacted the power spectrum of MPPSK is also analyzed. Meanwhile, based on the two existing demodulation methods of phase-locked loop (PLL) demodulation and mutli-path discrimination relying on the digital impacting filter, the MPPSK demodulator based on BP neural network is presented by utilizing the obvious difference of the output of digital impacting filter, and the corresponding simulation are also carried out. Simulation results show that the new MPPSK demodulator has a better demodulation performance than the two existing demodulation schemes.

Keywords: M-ary Position Phase Shift Keying Demodulator Alternating wave Steady wave Phase-locked loop Digital impacting filter

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