

算法研究

连续相位调制信号的单通道盲分离算法研究

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摘要:

频谱紧凑的恒包络数字调制技术是未来数字通信的发展方向之一, 而对于这类调制信号的单通道盲分离研究目前还较为少见, 有效地解决连续相位调制信号的单通道盲分离问题具有较大意义。本文基于最优贝叶斯估计准则, 通过重要性函数来接近系统状态的真实后验概率分布, 利用改进的粒子滤波算法将连续相位调制信号的单通道盲分离问题转变为码元序列和未知参数序贯估计问题, 从而实现盲分离。该算法通过对接收信号的过采样以及数据的递归调用, 利用了更多的接收波形信息, 有效地抑制了噪声的影响, 并能克服相位连续性给算法带来的码间串扰。仿真实验以应用广泛的GMSK调制信号为例。实验结果表明, 该算法明显优于标准粒子滤波算法, 具有较好的符号估计性能和参数收敛性能。

关键词: 高斯最小频移键控; 单通道; 粒子滤波

Research on Single Channel Blind Separation Algorithm for Continuous Phase Modulation Signals

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Abstract:

The digital modulation with the characteristics of constant envelope and compact spectrum is one of the research emphases of digital communication. However, few research was carried on the single channel blind separation of this kind of signal. It is of great significance to solve the problem of single channel blind separation of continuous phase modulated signals. The paper is based on optimal Bayesian estimation criteria and the real posterior probability distribution of the system state is approached by means of important functions. The improved particle filtering algorithm is applied to solve the problem of single channel blind separation of continuous phase modulated signals and realize the sequential estimation of the symbols and unknown parameters. The proposed algorithm makes use of more information of received signal waveform through over-sampling and recursion of the data. So the noise can be effectively suppressed and ISI brought by continuous phase can be overcome. Simulation takes GMSK modulated signal as example which is widely used in communication and the results show that the proposed algorithm is superior to standard particle filtering algorithm and has favorable performance in symbol estimation and parameter convergence.

Keywords: Gaussian Minimum Shift Keying (GMSK) Single channel Particle Filtering

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