

算法研究

SIMO信道下MPSK信号载波频率及相位联合估计

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摘要:

为了提高低信噪比条件下MPSK信号载波参数的估计性能,提出了一种基于SIMO信道的MPSK信号载波频率与相位联合盲估计算法。该算法充分利用SIMO信道下多个接收信号间承载相同信息序列的特点,首先通过接收信号的不同组合构造多种乘积序列,形成载波参数与原信号待估参数成线性关系的多个单音信号;通过对单音信号载波参数的估计,获得关于待估参数的超定方程组;然后利用最小二乘方法剔除单音信号载波参数估计中可能存在的“野值”点;最后,通过加权最小二乘解算实现对SIMO信道下MPSK信号载波频率与相位联合估计。仿真结果表明,与传统的单天线参数估计算法相比,在观测时间相同的条件下,本文算法在低信噪比条件下具有更加精确的参数估计性能;同时,算法中频率估计“野值”现象出现的信噪比门限也较传统单天线方法显著下降。

关键词: 单输入多输出 载波同步 多相调制信号 最小二乘;野值

Joint Carrier frequencies and Phases Estimation for MPSK Signals over SIMO channels

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Abstract:

To improve the estimation performance at low SNR, a joint blind estimator of carrier frequencies and phases for MPSK signals over single input multiple output (SIMO) channels is proposed. As the received signals in SIMO channels have the same data symbols, the proposed algorithm constructs several single tone signals by multiplying the received signals with different combinations, the carrier frequencies and phases of which are linear combination with that of the received signals. By estimation the carrier parameter of these single tone signals, overdetermined equations with the interested parameters are established. After removing the outlier data probably existed in the estimations of parameters of single tone signals, the carrier frequencies and phases estimation of MPSK over SIMO channels can be obtained by weighted least square methods. Simulations show that the proposed estimator improves the performance of carrier frequencies and phases estimation especially at low SNR levels and have a lower SNR threshold than estimators traditionally using only one receive antenna.

Keywords: single input multiple output carrier synchronization PSK signal least square outlier

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