

算法研究

一种高阶QAM信号多普勒参数盲估计方法

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摘要:

在卫星移动通信中, 卫星相对地面接收站的高速运动导致接收信号存在时变多普勒频率, 给正交幅度调制 (QAM) 信号的载波同步带来了极大困难. 现有的多普勒参数估计方法多利用导频等先验信息, 适用于移相键控 (PSK) 信号. 但在估计多普勒频率变化率时假设多普勒频率较小, 不符合实际情况, 且现有方法无法估计较大的多普勒频率, 另外在非协作通信下先验信息难以获得. 对此, 本文提出了一种针对高阶QAM信号的多普勒参数盲估计方法. 将信号盲去调制后, 利用瞬时频率估计函数, 可在较大的多普勒频率下估计出多普勒频率变化率; 通过检测信号四倍频率处的循环频率, 实现了多普勒频率盲估计; 最后利用arg运算求出初相. 详尽的Monte Carlo仿真分析了方法的估计性能, 仿真结果表明, 所提方法能有效实现QAM信号的多普勒参数盲估计.

关键词: 多普勒频率 多普勒频率变化率 正交幅度调制 (QAM) 信号 多项式相位 盲估计

A Blind Doppler Parameters Estimation Algorithm for High-order QAM Signals

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Abstract:

In satellite mobile communication, the received signal may experience time-varying doppler distortion due to the relative motion between the satellite and the ground receiver, which will bring large difficult in carrier synchronization of orthogonal amplitude modulation (QAM) signals. The existing methods usually use the prior information, and they are suitable for the phase-shift keying (PSK) signals. But these methods suppose the doppler frequency is small when estimating the Doppler rate, which is not in accord with the actual situation, and the existing methods can't estimate large doppler frequency, it is hard to get the prior information in the non-cooperative communication as well. To solve the problems, an algorithm of blind doppler parameters estimation for high-order QAM signals is proposed. After wiping off the modulation information of signals in a blind way, the proposed method can get the doppler rate under large doppler frequency by using the instantaneous frequency estimation function; by detecting one of the cyclic frequencies of signals, which locate at the quartic frequency offset, doppler frequency is effectively estimated. Finally, the initial phase is obtained through the arg handling. All-sided Monte Carlo simulations are employed to analyze the estimation performance. Experimental results indicate that the proposed algorithm can accomplish blind doppler parameters estimation for QAM signals effectively.

Keywords: Doppler frequency Doppler rate Orthogonal amplitude modulation (QAM) signals Polynomial phase Blind estimation

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2. 张天骐, 代少升, 马国宁, 张伟. 一种微弱直接序列扩频信号的盲自适应解扩算法[J]. 信号处理, 2010,26(5):

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3. 贺思三, 赵会宁, 刘铮, 周剑雄. 三阶多项式相位信号参数估计[J]. 信号处理, 2010,26(9): 1366-1370
4. 李志准, 谭贤四, 王红, 潘新龙. 高速高机动弱小目标检测方法研究[J]. 信号处理, 2011,27(6): 906-911

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