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基于**ISL0**算法的码间干扰稀疏多径信道估计
ISI sparse channel estimation based on ISL0 algorithm

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中文摘要：

　　针对存在码间干扰ISI的稀疏多径信道，已提出基于压缩感知理论的平滑SL0算法来研究其稀疏特性，然而SL0算法的迭代方向为负梯度方向，存在"锯齿效应"，且其代价函数"陡峭性"性能欠佳，使得信道估计和收敛效果均未达到最优。因此提出利用拉格朗日算子，结合牛顿法来改进和优化SL0算法，获得了快速和高效的信号重构ISL0算法，对稀疏多径信道状态信息进行了相关估计，分析了信噪比SNR和迭代次数等参数对重构信号均方误差MSE的影响。比较了ISL0算法与其他相关算法的迭代时间以及对稀疏信道中ISI均衡效果的差异。算法的优越性通过仿真得到验证，实时仿真结果显示ISL0算法能很好地对稀疏信道进行估计。在同样信道环境条件下，相比CoSaMP、SL0及其他算法，ISL0算法的性能有了较大提高。

英文摘要：

　　A smoothed L0 (SL0) algorithm based on compressed sensing proposed in previous works for inter symbol interference (ISI) sparse channel estimation. But this method has "notched effect" due to the negative iterative gradient direction. Moreover, the "steep nature" of cost function in SL0 is not steep enough, leading to channel estimation errors and make convergence results not the most optimal. The lagrange multipliers and newton method were combined to optimize SL0 algorithm in order to obtain a more rapid and efficient signal reconstruction algorithm termed as an improved smoothed L0 (ISL0). The channel state information (CSI) of the sparse multi-path channel was obtained and analysis of reconstructed signal deviation, mean squared error (MSE) in the perspective of iterations and signal-to-noise ratio (SNR) as well as the iteration time and ISI equalization performance were also done. Furthermore, the superiority of ISL0 has been verified by computer simulation. Real-time simulation results clearly show that the ISL0 algorithm can estimate the ISI sparse channel much better. Compared with CoSaMP, SL0 and some other algorithms, the ISL0 algorithm can greatly improve the performance of system in the same channel environments.

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