

算法研究

一种不受信道阶数估计影响的SIMO直接盲均衡算法

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摘要:

针对单输入多输出 (Single-Input-Multiple-Output, SIMO) 模型提出一种完全不需要信道阶数估计的直接盲均衡算法。文章利用接收数据的截短协方差矩阵和信号子空间的关系设计一种零延迟均衡器, 并通过信道矩阵和均衡器系数的合响应特性克服了算法相位偏转的问题, 最后得到一种对信道阶数估计鲁棒并且没有相位偏转的盲均衡算法。该算法不同于一般子空间类算法, 不需要直接对接收信号的协方差矩阵进行信号子空间和噪声子空间的分解, 因此对信道阶数估计具有很强的鲁棒性。文章给出了算法的Batch实现过程, 同时为更好适应一般时变信道环境和实现实时处理的要求, 通过递归迭代得到算法的自适应实现过程。仿真实验表明该算法几乎不受信道阶数过估计或欠估计的影响, 同时该算法具有良好的均方误差 (Mean Square Error, MSE) 和误符号率SER (Symbol Error Rate, SER) 性能, 并且具有很快的收敛速度。

关键词: 盲均衡; 单输入多输出; 二阶统计量; 信道阶数

Direct SIMO Blind Equalization Algorithm Independent of Channel Order Estimation

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Abstract:

Direct blind equalization algorithm for Single-Input-Multiple-Output (SIMO) model is proposed. The algorithm is completely independent of channel order estimation. Through the relationship between signal subspace and truncated data covariance, zero-delay equalizer which has random phase rotation problem is investigated. The combined impulse response of the channels matrix and equalizer filter impulse coefficients is used to deal with phase rotation problem of the proposed equalizer, so that a novel blind equalization algorithm is presented in this paper. Unlike many known subspace methods, the algorithm proposed in this paper do not rely on signal and noise subspace separation of received data covariance, and is robust to channel order estimation. The batch processing program of the proposed equalization algorithm is introduced in this paper. Based on recursion and iteration methods, the adaptive processing program of the proposed algorithm is also presented in this paper. Consequently the algorithm can be used in time-varying environment and can be applied to on-line processing. Simulation results illustrate that the performance of the proposed algorithm is also well in the condition of overestimation or underestimation of channel order. Besides that, good Mean Square Error (MSE), Symbol Error Rate (SER) and convergence performance are also presented through the simulation.

Keywords: blind equalization; Single-Input-Multiple-Output; Second Order Statistics; channel order

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