

算法研究

BPSK通信系统的部分最优MIMO检测算法

刘文龙,裴莹莹,金明录

大连理工大学信息与通信工程学院

摘要:

在BPSK调制下,基于最大似然(Maximum Likelihood, ML)准则的MIMO检测器是一个二进制二次规划问题,其计算复杂度随着天线数的增多呈指数增加,当天线数较多时,其计算量太大,无法满足实时通信的要求。本文提出了一种新的MIMO检测算法。使用新算法,可以在很小的计算开销下,求解出ML检测器的部分全局最优解,然后将优先检测出的部分最优解从原二进制二次规划问题中剔除得到一个相对小规模问题,最后使用传统的次最优检测算法对该小规模问题进行求解。这样,新算法不仅可以得到比传统的次最优检测器更低的误码率,计算量又远小于ML最优检测器。本文的仿真结果验证了新算法的有效性。

关键词: MIMO检测; 二进制二次规划; 迭代反馈; 全局最优性条件

Partial Optimal MIMO Detection for BPSK Communication System

LIU Wen-long, PEI Ying-ying, JIN Ming-lu

School of Information and Communication Engineering, Dalian University of Technology

Abstract:

The maximum likelihood (ML) MIMO detector for BPSK communication system can be posed as a binary quadratic programming. The computation for optimal solution has exponential complexity in terms of the number of transmit antennas in general. It becomes a barrier to ML detector for its applications in the real time communication environment, especially in the case that the number of transmit antenna is large. In this paper, we proposed a novel MIMO detection algorithm. Using the novel algorithm, part of globally optimal solution of ML detector can be decided with low computational complexity, and then we can substitute them into the original binary quadratic programming and obtain a smaller-scale binary quadratic programming for the undecided information sequences. Finally we can use some conventional sub-optimal detectors to solve the smaller-scale problem so that the novel algorithm can achieve better performance than that of conventional ones with lower computational complexity. Simulation results verify the validity of the algorithm.

Keywords: MIMO detection Binary Quadratic Programming Iterative Feedback Global Optimality Conditions

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通讯作者:

作者简介:

作者Email: liuwl@dlut.edu.cn

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