

短文与研究通讯

多径信道中基于盲波束成形的CDMA多用户检测和伪码估计

沈雷, 赵知劲

杭州电子科技大学通信工程学院

摘要:

在分析阵列天线接收的多径CDMA信号的基础上, 发掘阵列信号子空间与扩频用户伪码序列的关系, 对传统的子空间波束成形器结构做了改进, 提出一种新的基于盲波束成形的伪随机码序列盲估计算法。算法采用复独立分量分析法迭代, 得到盲波束成形器系数, 能在波达方向未知的情况下, 估计各个用户的扩频序列。本文同时提出一种基于盲波束成形的异步多径CDMA信号多用户检测算法, 可以在未知各个用户扩频码和波达方向的先验知识条件下, 完成多径异步CDMA信号的多用户检测。算法由于同时利用了扩频增益和阵列天线分集增益, 相比于单天线多用户检测算法性能有所提高。理论分析和仿真结果验证了算法的可行性。

关键词: 盲波束成形; 伪码估计; 盲多用户检测; 阵列天线; 复独立分量分析

Multi-User Detection and Chip Sequence Estimation of multi-path CDMA signal Based on Blind Beamforming

SHEN Lei, ZHAO Zhi-Jin

Telecommunication school, hangzhou Dianzi University, Hangzhou

Abstract:

Based on the relationship of the subspace of the received signals and the spreading code of users, a novel subspace algorithm that can blindly estimate spreading code sequences of multi-path code division multiple access (CDMA) signals was presented, in non cooperative communication surroundings. Without the information of the direction of arrival (DOA) of all source signals, this novel subspace algorithm was proposed to get the coefficients of the beam former based on complex independent component analysis (CICA). A new algorithm which is fit for multi-user detection of multi-path signals was also proposed, without the information of the spreading code sequences and the direction of arrival of source signals. The performance of the proposed algorithm was analyzed, and the close expression of the performance under Gaussian noise was given. Because of utilizing the spreading gain and the array antenna gain, this proposed beam forming algorithm performs better than the traditional algorithm of single antenna. The effectiveness of the proposed algorithm was showed by the illustrative simulation results at last.

Keywords: blind beamforming chip sequence estimation blind multi user detection array antenna: complex independent component analysis

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通讯作者:

作者简介:

作者Email: shenlei@hdu.edu.cn

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