

改进粒子群优化在压缩感知 DOA 估计中的应用

赵宏伟, 刘 波, 刘 恒

(西安空间无线电技术研究所, 陕西 西安 710100)

摘 要: 以压缩感知(CS)的波达方向(DOA)估计为研究背景, 针对正交匹配追踪算法用于高维信号稀疏恢复时效率低下问题, 提出一种结合粒子群优化(PSO)和正交匹配追踪(OMP)的新 DOA 估计算法. 该算法充分利用了 PSO 算法解决寻优问题的优势, 并结合 OMP 算法的处理流程, 具有运算时间较少、估计误差较低和适用范围广等优势. 为了提高算法性能, 对标准 PSO 算法的粒子更新机制和惯性权值等进行了改进. 仿真结果证明了方法的有效性.

关键词: 波达方向估计; 粒子群优化; 压缩感知; 正交匹配追踪

Improved PSO and Its Application to CS DOA Estimation

ZHAO Hong-wei, LIU Bo, LIU Heng

(Xi'an Institute of Space Radio Technology, Xi'an 710100, China)

Abstract: The present direction of arrival (DOA) estimation methods based on the compressive sensing (CS) theory is background at present. Shortcoming of greedy pursuit methods is efficiency to solve sparse recovery. A new algorithm based on Particle Swarm Optimization (PSO) algorithm and orthogonal matching pursuit (OMP) algorithm is proposed. It has less computation time, low estimation error and wide application range, which makes full use of the advantages of PSO and OMP algorithm. To improve algorithm performance, the particle updating system of standard PSO algorithm are improved. The results of simulation experiments show that the proposed algorithm is effective.

Key words: direction of arrival estimation; particle swarm optimization; compressive sensing; orthogonal matching pursuit

作者简介:

赵宏伟 男, (1982-), 博士研究生. 研究方向为智能算法.

E-mail:honv88@163.com.

刘 波 男, (1963-), 博士生导师. 研究方向为卫星有效载荷系统设计.

刘 恒 男, (1986-), 博士研究生. 研究方向为相控阵天线设计.