

论文与技术报告

精确测量系统的聚类准蒙特卡罗粒子滤波算法

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摘要:

针对粒子滤波在精确测量系统中由于似然分布过于尖锐引起的失效问题,提出一种基于确定性准蒙特卡罗采样和聚类方法的粒子滤波算法,当判定重要性样本缺失时,利用聚类方法提取提议分布中的关键样本,在由关键样本构成的新的支撑集基础上,确定采样空间和繁殖样本个数,并采用准蒙特卡罗方法生成新的确定性样本序列,以获取有效样本,避免失效现象的发生。仿真实验表明,该算法在测量噪声较小的情况下,与一般粒子滤波算法相比,可以获得更为精确和稳定的状态估计。

关键词: 粒子滤波; 准蒙特卡罗采样; 聚类; 精确测量

A Cluster-based Quasi-Monte Carlo Sampling Particle Filter for Accurate Measurement System

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Abstract:

Aiming at the particle filter's inefficacy problem caused by narrow likelihood of accurate measurement system, a new particle filter with resampling step based on clustering and determination quasi-Monte Carlo is proposed. When importance samples are lost, the algorithm extracts key samples using clustering method, and then determines the number of spring-offs of them and sampling space according to the new support set composed of key samples. New particles are generated by QMC, in order to obtain more efficient samples and avoid the inefficacy phenomena. Simulations show that, compared to the general resampling step of particle filter, this algorithm obtains more accurate and steady state estimation.

Keywords: Particle filter Quasi-Monte Carlo sampling Cluster Accurate measurement

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