

论文

迭代最小斜度单型sigma采样UPF算法

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摘要:

针对condensation 算法以状态转移作为建议分布从而导致权值蜕化的问题,提出了以迭代最小斜度单型sigmaUKF 建立建议分布的UPF 算法.以最小斜度单型UKF产生统计线性误差项,再对IEKF 推导产生不依赖于系统非线性映射Jacobian 矩阵的迭代式,以此对状态均值、协方差进行迭代修正,以近似0 残差使状态收敛到MAP估计.平滑了状态一步预测误差,从而提高了估计精度.结果表明,该算法扩大了预测样本与观测似然峰值区的重叠区域,提高了非线性系统的状态估计精度.

关键词: 建议分布; 最小斜度单型sigma 采样; 迭代无味卡尔曼滤波; 粒子滤波

Unscented particle filter using iterated minimal skew simplex UKF

Abstract:

To resolve the weight degeneracy in condensation algorithm which uses transition prior as the proposal distribution, a unscented particle filter algorithm(ISUKF-PF) is proposed by using iterated minimal skew simplex UKF(ISUKF) as the proposal distribution. Statistical liner error propagations are obtained by ISUKF; and the IEKF iterated equations are derived by replacing the system model Jacobian matrix with statistical liner error propagation terms. Then the states mean and covariance are iterated and updated by the IEKF iterated equations to be convergent to the state MAP estimation for near zero-residual. The outputs of the ISUKF-PF have the higher estimation accuracy, smoothing errors by one-step prediction of states estimations. The results show that the ISUKF achieves the more overlap regions of prediction samples and peak zones of observation likelihood and increases the accuracy of state estimating in nonlinear system.

Keywords: proposal distribution; minimal skew simplex sigma points; iterated unscented Kalman filter; particle filter

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- sigma 采样; 迭代无味卡尔曼滤波; 粒子滤波

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