论文

基于辅助变量粒子滤波的空对海BO-TMA的研究

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摘要
论文探讨了TMA(目标运动分析)中基本的非线性估计问题；介绍了粒子滤波(PF)的基本思想和辅助变量PF(AVPF)的基本算法，特别针对空对海单站只测方位TMA(BO-TMA)问题应用AVPF和EKF(扩展卡尔曼滤波)进行了对照研究；建立了问题的离散非线性滤波估计模型；设计了典型的应用场景；给出了Monte Carlo仿真运行结果；表明AVPF具有更高的估计精度、更好的收敛特性和滤波一致性。
关键词　递推非线性滤波　扩展卡尔曼滤波　粒子滤波　辅助变量粒子滤波　只测方位目标运动分析
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Research on Air-to-Sea Bearing-Only TMA by Auxiliary Variable Particle Filtering

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Abstract
In comparison with the Extended Kalman Filtering (EKF) algorithm, the Auxiliary Variable Particle Filtering (AVPF) algorithm is exploited in this paper to solve the problem of TMA based on Bearing-Only measurements (BO-TMA). Firstly, the problem of nonlinear filtering is identified in nature as the groundwork embedded in TMA. The PF (Particle Filtering) and the AVPF algorithms are then introduced, including their design consideration and elements of algorithms. Particular attention is paid to the problem of single observer air-to-sea BO-TMA. The discrete-time models are formulated pertinent to the nonlinear filtering problem and a typical scenario is depicted. The contrast results of Monte Carlo simulations between the AVPF and EKF have demonstrated that AVPF is more feasible to the air-to-sea BO-TMA by virtue of its favorable consistency with higher accuracy and better convergence.
Key words　Recursive nonlinear filtering　Extended Kalman filtering　Particle filtering　Auxiliary variable particle filtering　Bearing-only target motion analysis

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