



航空学报 » 2013, Vol. 34 » Issue (12) :2785-2793 DOI: 10.7527/S1000-6893.2013.0338

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异步多传感器多目标PHD航迹合成算法

吴鑫辉^{1,2}, 黄高明¹, 高俊¹

1. 海军工程大学 电子工程学院, 湖北 武汉 430033;
2. 海军装备研究院 指挥自动化所, 北京 100036

PHD for Composite Tracking Algorithm Based on Asynchronous Multi-sensor Multi-target Measurements

WU Xinhui^{1,2}, HUANG Gaoming¹, GAO Jun¹

1. College of Electronic Engineering, Naval University of Engineering, Wuhan 430033, China;
2. Automatization of Command Institute, Academy of Navy Equipment, Beijing 100036, China

摘要

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摘要

针对传统异步多传感器航迹合成算法存在计算量大及航迹丢失等问题, 提出了一种基于概率假设密度 (PHD) 的多目标航迹合成算法。将监测区域划分为单传感器区域、多传感器交叉区域以及探测盲区3类。在随机集理论框架下, 推导了3类区域的多传感器多目标PHD递推式, 并给出了区域之间航迹初始和航迹维持方法。最后推导了线性高斯条件下各区域PHD航迹合成递推式的闭集解。仿真实例表明, 相比乘积多传感器PHD算法, 该算法能有效地减小计算量, 并且能跟踪探测盲区中的目标, 具有良好的工程应用前景。

关键词: 随机有限集 多目标航迹合成 多传感器多目标跟踪 概率假设密度 乘积多传感器PHD

Abstract:

The current composite tracking algorithms are computationally intractable and may lose target tracks in the undetected region. In order to solve these problems, a new composite tracking algorithm based on the probability hypothesis density (PHD) algorithm is proposed. The detection region is divided into a one-sensor region, a multiple-sensor region and an undetected region. Multi-sensor PHD filters for the regions are constructed using finite sets statistics theory (FISST). Tracking initiation and tracking maintenance methods for different regions are presented. Finally, the closed-form solutions to the PHD composite tracking algorithm are derived under the linear-Gaussian conditions. Compared with the product multi-sensor PHD, simulation results show that the proposed algorithm has lower computational complexity and better estimation of target states, which indicates its good prospect for application in engineering fields.

Keywords: random finite set multi-target composite tracking multi-sensor multi-target tracking probability hypothesis density product multi-sensor PHD

Received 2012-12-25; published 2013-09-05

Fund:

国家自然科学基金 (60901069)

Corresponding Authors: 黄高明, Tel.: 027-83444077E-mail: hgaom@163.com Email: hgaom@163.com

About author: 吴鑫辉男, 博士研究生。主要研究方向: 数字信号处理、目标无源探测与跟踪。E-mail: wuxinhui009@163.com; 黄高明

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