算法研究

一种新的基于角度和时差的稳健定位跟踪算法

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摘要：

针对无源定位必须实现快速和稳定无偏定位跟踪的要求，提出了一种新的双站基于角度和时差的稳健定位跟踪算法。该算法将扩维伪线性测量方程的观测误差矩阵协方差阵引入约束条件，通过对未知状态变量含二次约束的伪线性方程进行约束最小二乘(CLS)极小化处理，最终只需要对一对矩阵束进行广义特征分解即可获得目标状态的渐进无偏估计值。仿真结果表明，与扩展卡尔曼滤波（EKF）算法及最小二乘(LS)算法相比，本文所提算法定位跟踪性能更稳定，精度更高，估计误差可以接近克拉美罗限（CRLB）。在测量误差较大或者两个观测站测量误差不一致时优势更明显，实用性强。

关键词： 无源定位； 角度； 时差； 稳健； 约束最小二乘；特征分解

A Novel Robust Algorithm for Passive Location and Tracking with Angles and Time Difference of Arrival Measurements

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Abstract:

In order to realize fast, stable and unbiased location and tracking, a new robust location and tracking algorithm with angles and time difference of arrival (TDOA) measurements is proposed. The proposed algorithm introduces the observation error correlation matrix into the constraint condition and uses constraint least squares minimization on the pseudo linear equation which includes quadratic constraint about the state vector and the asymptotically unbiased state estimate can be got by taking a generalized eigen-decomposition to a pair of matrix pencil. Simulation results indicate that the proposed algorithm has more stable performance and higher precision compared with EKF algorithm and LS algorithm and its location error can reach the Cramer-Rao bound. Its advantage will be more obvious when the measurement errors are large or the two stations's measurement errors are different, thus it has strong practicability.

Keywords: passive location　angles　TDOA　robust　constraint least squares;eigen-decomposition

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