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Title: Square‑root Unscented Kalman Filter of Small UAV Integrated Navigation System

作者: 曲 杰 [1; 2] ; 孙 尧 [1] ; 莫宏伟 [1]
1 哈尔滨工程大学，哈尔滨 150001；2 北京自动化控制设备研究所，北京 100074

Author(s): QU Yunjie [1; 2] ; SUN Yao [1] ; MO Hongwei 1
1 Harbin Engineering University，Harbin 150001，China; 2 Beijing Institute of Automatic Control Equipment，Beijing 100074，Chi na

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摘要: 由于小型无人机组合导航系统的误差模型与观测模型均为非线性，对模型进行线性化的扩展卡尔曼 滤波会引入线性化过程中忽略高次项的误差，导致滤波器性能下降。提出将平方根UKF方法（SRUKF）用于 小型无人机IMU/GPS组合导航，SRUKF方法利用协方差平方根代替协方差参加递推运算，保证滤波算法的 数值稳定性，提高组合定位的精度和可靠性。仿真结果表明，SRUKF方法是组合导航中一种很好的非线性 滤波方法，实现了低成本、高精度的实时定位。

Abstract: The process models and measurement models of the integrated navigation system， which is applied to small UAV， are strongly nonlinear. When the effects of the higher order terms of the Taylor series expansion become signifi‑cant， EKF can seriously affect the accuracy or even lead to diver gence of any inference system. A new filter algorithm based on square root unscented Kaman filter （SRUKF） is presented a nd used to the integrated navigation system of small UAV. SRUKF takes covariance square root matrix instead of c ovariance one in filter iteration， which effectively avoided filtering divergence， and meanwhile improved the convergenc e velocity and stability of the algorithm. The re‑sults of simulation prove that SRUKF is a more ideal nonlinear fi ltering method for the integrated navigation of small UAV and can obtain higher accuracy solutions.

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