

基于DSC与MEMS的微型测姿系统研究

作者：罗秋凤, 高振, 牛妍

单位：南京航空航天大学无人机研究院

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摘要：

针对当前无人机航姿系统对GPS信息依赖严重的特点，设计了基于MEMS ADIS16405传感器和数字信号处理器（DSC）TMS320F28335的微型惯性测姿系统。以MEMS传感器的角速度、重力加速度、航向信息，建立姿态四元数方程，解算出飞行器姿态。运用扩展卡尔曼滤波方法，消除MEMS陀螺漂移误差。DSC28335的硬件平台实现了四元数扩展卡尔曼滤波算法。转台仿真试验表明，漂移误差能在线最优估计和实时补偿，输出的航姿精度较高。该微型测姿系统具有较高的实用价值。

关键词：微型测姿系统； MEMS传感器； TMS320F28335； 扩展卡尔曼滤波； 四元素

Research for micro attitude acquisition system based on DSC and MEMS

Author's Name:

Institution:

Abstract:

Aiming at the high cost , large size and severe dependence on GPS of UAV Attitude Acquisition System, an low-cost micro attitude acquisition system was designed based on MEMS sensor ADIS16405 and digital signal controller TMS320F28335(abbr. DSC28335). First the attitude-quaternion equations were established with angular velocity , gravity acceleration and heading from MEMS sensor, the UAV attitudes were calculated. Then MEMS gyroscope drift was eliminated by Extend Kalman Filter. The DSC28335 hardware platform fulfilled quaternion Extend Kalman Filter algorithm. The Turntable simulation experiment shows the system can get high accuracy attitudes, online optimal estimation and realtime compensation for gyroscope drift . The micro attitude system can be put into engineering application.

Keywords: Micro attitude acquisition system; MEMS sensor; TMS320F28335; Extend Kalman Filter ; Quaternion

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