



## 多惯组冗余系统安装误差的空中标定技术

作者：张金亮, 秦永元, 吴枫

单位：西北工业大学自动化学院

基金项目：总装备部惯性预研基金（51309040501）

摘要：

以多组平行安装的捷联惯导构成的冗余系统为研究对象，提出了一种GPS辅助条件下惯导间安装误差的空中标定算法。该算法以其中一套惯导系统为安装基准，与GPS伪距、伪距率信息深组合后的导航结果为真实参考信息，标定前利用飞机机动提高基准惯导的姿态精度，标定开始时刻将基准惯导的导航信息装订给待标定惯导作为导航初值并进行姿态更新，利用待标定惯导的导航误差模型建立卡尔曼滤波器，量测量取为组合姿态与待标定惯导姿态的姿态误差，通过姿态匹配的方式对两套惯导之间安装误差进行标定。仿真结果显示，该方法不需要飞机做精确的角机动，只利用简单的摇翼和盘旋机动就可以对安装误差进行精确标定，且标定精度可达到角秒级水平。

关键词：多惯导；GPS；冗余系统；深组合；安装误差；空中标定

## In-flight Calibration for Installation Errors in A Multi-IMU Redundancy System

**Author's Name:**

**Institution:**

**Abstract:**

An in-flight calibration algorithm is proposed to estimate installation errors between IMUs in a multi-IMU redundancy system, where more than two IMUs are installed parallel to each other. One IMU, which is deeply integrated with GPS pseudo-range and pseudo-range rate, is chosen as the installation reference, and its attitude is further improved through a series of aircraft maneuver before calibration to provide precise attitude reference. At the beginning of calibration, the reference binds real-time navigation parameters to other IMUs, which will then run attitude update procedure, but the velocity and position is still provided by the reference. Then a Kalman filter is designed taking advantage of SINS attitude error model and taking attitude difference to the reference as measurement. Simulation result shows that the proposed algorithm can precisely estimate the calibration errors just through rough roll and turning maneuver, and the precision can achieve arc second level

**Keywords:** Multi-IMU; GPS; Redundancy System; Deep integration; Installation errors; In-flight calibration

投稿时间：2012-12-28

[查看pdf文件](#)