

基于重力矢量积分的SINS对准算法误差分析

作者: 吴枫, 秦永元, 周琪, 朱启举, 王海明

单位: 西北工业大学

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摘要:

针对基于重力矢量积分的捷联惯导初始对准算法, 分析了惯性器件误差和线运动干扰对对准精度的影响。推导了惯性器件误差与对准失准角之间的解析表达关系, 指出可从初始欧拉角估计值中提取陀螺漂移信息, 实现陀螺的在线标定。理论分析表明, 该算法将传统解析对准算法对角运动的敏感转化为对线运动的敏感, 线运动干扰成为影响算法对准精度的主要因素。仿真试验验证了上述分析的合理性。

关键词: 误差分析, 对准算法, 惯性参考系, 惯性器件误差, 线运动

Error Analysis for SINS Alignment Using Gravity Integration in Inertial Reference Frame

Author's Name:

Institution:

Abstract:

Sensitivity analysis for Strap-down Inertial Navigation System (SINS) alignment using gravity integration in inertial frame is carried out with respect to IMU sensor errors and linear vibration. And the explicit analytical error formulations are derived. By inspecting the error formulations, it can be found that the proposed alignment algorithm is more sensitive to linear vibration than sensor errors and gyro biases can be estimated by the fitting slope of the calculated initial Euler angles. The analysis is well validated by simulation and thus it's helpful in design alignment process for Strap-down inertial navigation system.

Keywords: error analysis, alignment, inertial reference frame, sensor errors, linear vibration

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