基于椭球拟合的微惯性测量组合现场快速标定方法

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摘　要：

在静态随意放置条件下，微惯性测量组合中三个轴向正交配置的惯性器件所敏感矢量和为固定矢量。依据上述客观事实，提出了一种微惯性测量组合现场快速标定方法。在建立并优化微惯性测量组合标定模型基础上，通过基于椭球约束的最小二乘法拟合得到全部待标定参数，从而实现微惯性测量组合现场高精度标定，最后合理编排了微惯性测量组合现场快速标定方案。试验结果表明，该方法具有操作方便、省时、精度高，不依赖精密仪器提供方向基准和水平基准等特点，特别适用于短时间高精度微惯性测量系统，可显著提高其的实际使用精度。

关键词：惯性测量组合；现场标定；椭球拟合；零偏；标度因数

A Rapid Field Calibrating Method for Micro Inertial Measurement Unit Based on Ellipsoid Fitting

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Abstract:

When the Micro Inertial Measurement Unit is been placed randomly in the case of stationary, the sum vectors that measured by the inertial devices configured orthogonally along three axises, are constant vectors. In view of the above objective facts, a field calibration method of micro inertial measurement unit was proposed. On the base of the establishment and optimization of calibration model, all parameters to be calibrated can be obtained through the least square by the ellipsoid fitting, with the result of high-precision field calibration for micro inertial measurement unit. Finally, a filed calibration program for micro inertial measurement unit is scheduled reasonably. The experiment results show that the method has such characteristics such as easily-operation, time-saving, higher calibration accuracy, and not depending on the baseline direction and datum offered by precision instruments. Especially, it fits for inertial measurement systems which work short time and ask for high accuracy. In addition, it can also significantly increase the measurement accuracy of micro inertial measurement system in practical application.

Keywords: Micro Inertial Measurement Unit; Field calibration; Ellipsoid fitting; Zero bias; Scale factor

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