

制导、导航与控制

CCD星敏感器辅助光纤陀螺在线标定技术

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摘要:

首先建立陀螺在线标定模型, 然后以电荷耦合器件星敏感器输出的姿态四元数和陀螺输出的载体相对于惯性空间的姿态四元数构造量测量, 采用模型预测滤波与扩展卡尔曼滤波相结合的方法, 将部分陀螺误差项作为模型误差, 在线实时估计并修正系统模型, 提高了状态估计的精度, 最后对该算法进行了数学仿真。仿真结果表明, 该方法能有效地完成陀螺在线标定, 标定精度和速度明显优于传统方法。这种在线标定的处理方法在实际使用和维护中具有极大便利。

关键词: 光纤陀螺 电荷耦合器件星敏感器 在线标定 扩展卡尔曼滤波 模型预测滤波

FOG on line calibration assisted by CCD star sensor

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Abstract:

First of all, the dissertation calibrates the gyro model. Then the attitude quaternion from charge coupled device star sensor's output and the other attitude quaternion that carrier relative inertial space of SINS's output are used to construct the observation, a model predictive filter(MPF) and an extended Kalman filter(EKF) are integrated for use. In this method, parts of inertial element errors are regarded as the model error and are used to estimate the part of the solution. And the algorithm could be implemented on line for estimating both filter measurements and state trajectories. Finally, the algorithm is simulated in MATLAB. It shows the effectiveness and accuracy of this technique, which has a strong practical significance. So it takes great conveniences for application and maintenance.

Keywords: [fiber optic gyroscope \(FOG\)](#) charge coupled device (CCD) star sensor on line calibration extended Kalman filter (EKF) model predictive filter (MPF)

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