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The Effect of System Stochastic Noise on SINS Initial Alignment

作　者：贾继超, 秦永元, 张波, 吴训忠

单　位：西北工业大学

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摘　要：

捷联惯导系统初始对准系统状态方程所描述的状态统计信息，受系统随机噪声驱动，系统随机噪声通过噪声驱动阵作用于状态。常用系统状态方程的系统噪声驱动阵为单位阵。经过分析发现系统噪声驱动阵为单位阵是有条件的；通过推导给出了系统状态方程可以简化此种形式的条件；指出了在水平陀螺、加速度计随机噪声水平不同时，若使用简化系统模型会引起状态估计误差；并通过单轴旋转多位置对准仿真实验进行了验证。仿真结果表明：若水平陀螺随机噪声水平不同，采用简化模型进行初始对准会引起状态估计误差。

关键词：捷联惯导系统；多位置对准；单轴旋转；卡尔曼滤波；系统随机噪声

系统随机噪声对捷联惯导初始对准影响分析

Author's Name:

Institution:

Abstract:

The states depicted by system equation of SINS initial alignment are driven by system stochastic noise. The system stochastic noise acts on system states by observation noise matrix. The observation noise matrix is an identical matrix in common system equation. But the assumption that the observation noise matrix is an identical matrix is conditional. The condition is given by deduction. If horizontal accelerometers or horizontal gyros noises are not equal, there will be state estimation errors when the simple system state equation is utilized. The single-axial rotation multi-position alignment simulation is carried out to validate the conclusion. The simulation results show if horizontal gyros noises are not equal, there will be state estimation errors when the simple system equation is utilized.

Keywords: SINS; multi-position alignment; single-axial rotation; Kalman filter; system stochastic noise

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