

光纤陀螺随机误差建模的实验研究

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摘要:

为提高光纤陀螺精度, 需要对其随机误差进行精确建模。以VG941-3AM微型精密光纤陀螺仪为实验研究对象, 进行了数据采集、预处理和平稳性检验。将基于残差序列最小自相关原理的LAC(least-autocorrelation)准则及其递归算法, 应用于光纤陀螺随机误差模型的辨识。建立了ARMA模型的状态方程和观测方程, 设计了Kalman滤波器。实验结果证明了算法的有效性和准确性, 处理后的光纤陀螺随机误差减小了95~97%。

关键词: 光纤陀螺; 随机误差; ARMA模型; 最小自相关准则

Experimental Study on Random Error Modeling for Fiber Optic Gyros

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Abstract:

In order to improve the precision of fiber optic gyro (FOG), the random error model of FOG should be established accurately. VG941-3AM micro precision fiber optic gyros were chosen as experimental subjects. Data acquisition, pretreatment and stationarity test were carried out. Based on the least-autocorrelation principle of residual sequence, the least-autocorrelation (LAC) criterion and its recursive algorithm were applied to the identification of random error models of gyros. The state equation and observation equation of the ARMA models were established, and Kalman filter was designed. The experimental results proved the validity and veracity of the algorithm. The random error of fiber optic gyros using the above method was reduced by 95~97%.

Keywords: fiber optic gyro (FOG); random error; ARMA model; least-autocorrelation (LAC) criterion

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