


Original Paper

High-Precision Calibration for MEMS Gyroscopes Based on Persistent Excitation Signal Criterion

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Abstract

The micro inertial gyroscopes based on the electro-mechanical system (MEMS gyros) are widely used in many applications. The calibration parameters include zero drifts, scale factors and installation errors, which are determined by calibration. Measurements often show large errors because of being not precisely calibrated and effectively compensated. This paper selects the constant angular acceleration signal as the excitation signal based on Persistent Excitation Signal Criterion (PE Criterion) in the modern control theory. The calibration scheme and data acquisition program are proposed. Calibration parameters are obtained using superposition, cross-correlation data processing methods. The effectiveness and reliability of the proposed calibration procedures are proven by simulations. Experimental results show that the proposed method is an efficient and simple high-precision calibration method.

Keywords

Calibration – MEMS gyros – PE Criterion – Constant angular acceleration – Cross-correlation