

Improvement on Azimuth in Rotary Inertial Navigation System Using Photoelectric Encoder and Fiber Optic Gyro

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Abstract: For its obvious high accuracy in a long term, rotary inertial navigation system becomes popular. However, as errors increasing with time are changed into periodic errors with zero mean, the accuracy of its azimuth angle decreases in view of short term and can't fully satisfy the need of users such as flight control system. The precision of azimuth angle is studied by analyzing its influence factor and establishing the scale factor error model and drift models of fiber optic gyro and the measurement error model of photoelectric encoder. Correction for fiber optic gyro and photoelectric encoder based on their mutual assistance is designed to improve the short-term accuracy of rotary inertial navigation system's azimuth angle. Experimental results in a fiber optic gyro based rotary inertial navigation system verify the proposed method.

Keywords: Azimuth angle; Rotary inertial navigation system; Photoelectric encoder; Fiber optic gyro