Precision Test Benches for Gyro Dynamic Tests

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The book considers the principles of designing precision test benches for testing the static and dynamic parameters of gyroscopic devices. The general concept for designing the test bench circuit configurations is developed based on the accuracy analysis of various class and type modern gyroscopic devices and on the circuit designs by the leading test bench manufacturers.

Much attention is given to the circuitry of single-axis calibration test benches and three-axis simulation calibration test benches with various type precision angular rate sensors and linear accelerometers used as inertial sensors. Based on the general concept of circuit design, a generalized mathematical model for the test benches with inertial sensors has been developed. Mathematical models of mechanical parts have been obtained as specific cases.

Synthesis of regulators is covered for a number of circuits of precision test benches with inertial sensors, their dynamic and accuracy characteristics in noise conditions are estimated.

Examples of test bench designs are given, along with the results from experimental studies of circuit designs of currently used test benches.