Algorithms of dynamically tuned gyroscope certification under conditions of real-world orientation relative to the geographic coordinate system

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The article proposes the algorithm for calibrating the parameters of dynamically tuned gyroscopes by sequentially orienting the gyroscope with respect to the geographic coordinate system by means of a turntable, the accuracy of manufacturing elements of which is not exaggerated. Accuracy of calibration is provided by the algorithm of data processing, obtained from a gyroscope taking into account its actual orientation relative to the geographic coordinate system. A prerequisite for ensuring high calibration accuracy is the requirement to ensure accurate repeatability of gyroscope positions during testing. A corresponding mathematical model of the intrinsic precession rate of dynamically tunable gyroscopes is developed in the angular velocity sensor mode, taking into account the real orientation of the turntable platform relative to the reference coordinate system associated with the stand base. Parameters related to the real platform orientation in the model are standardized and certified by the turntable manufacturer, which ensures high accuracy of inertial-class sensor calibration on conditions of a sufficiently low cost of testing. Analytic and iterative algorithms for solving the problem of gyroscope calibration are proposed, and corresponding numerical simulation is carried out using these algorithms.

Keywords: *actual orientation matrix, dynamically tuned gyroscope (DTG), calibration, drift model, turntable, analytic and iterative method*

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