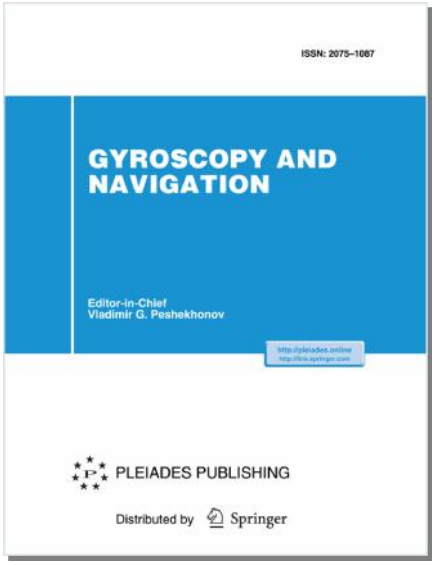
Dear readers,



We are pleased to announce the latest issue of ***Gyroscopy and Navigation,*** No. 2, 2020.

First of all, we would like to draw your attention to the new content-sharing initiative of the Springer Nature Publishing House, which is called SharedIt. It aims to help researchers share their scientific results easily and legally. The publisher has provided a mechanism for free online access to the full texts of articles in the read-only mode. You can share links to articles, post them anywhere, including social media platforms, author websites, and in institutional repositories. In this way, researchers can share the results with their colleagues and a wider audience. Such links, if any, will be included in the description of each of the articles.

The issue opens with article [1] by T.N. Siraya, Doctor of Technical Sciences (Concern CSRI Elektropribor, St. Petersburg). The author analyzes the application of the Allan variance to different tasks, among which is estimation of characteristics of navigation devices. Although this characteristic is widely used in many areas, sometimes it does not seem to be very effective; besides, its physical interpretation may be vague.

The paper considers the Allan variance definition based on a model of random processes with stationary increments that include both stationary and Wiener processes. In this model, the main characteristic is the structure function, whereas the Allan variance turns out to be its empirical estimate. This representation makes the statistical meaning of the Allan variance clear and explains its high effectiveness in the analysis of nonstationary signals and noise. It also allows the Allan variance to be used as a general characteristic describing stability of measuring and navigation devices, the one that is different from variance.

Article [2] is also presented by the authors from Concern CSRI Elektropribor. One of the promising ways of constructing quantum sensors is to use spin oscillators based on spin-exchange pumping of inert gas isotopes and optical detection of their states. The paper describes the structure and construction of the two-frequency spin oscillator as well as its main elements and units. Focus is made on the implementation of the feedback loop that provides stable two-frequency oscillation. The experimental results obtained with the spin oscillator breadboard on stationary and rotating bases are discussed. Their analysis has confirmed that the technical solutions implemented in this work are correct (the full text of the paper is available at https://rdcu.be/b50nQ).

Article [3] is presented by a group of authors from three Chinese universities. The main objective of the research is to find an accurate solution to the problem of pedestrian navigation in a multipath environment using the data of a GNSS receiver built into a smartphone and MEMS sensors mounted on it. The suboptimal extended Kalman filter algorithm is used to fuse the data of GNSS and pedestrian dead reckoning (PDR). The fusion results show that the prospective method explores the possibility to use smartphone navigation in any case when GNSS or PDR information is not available (the full text of the paper is available at https://rdcu.be/b50sc).

In article [4], the authors from three organizations of the Chinese Academy of Sciences compare the GPS velocity estimation performances of three different estimation models: the time-differenced carrier phase velocity estimation, Doppler observation velocity estimation, and precise point positioning velocity estimation. The results of static and vehicle kinematic experiments with the use of real GPS data are discussed (the full text of the paper is available at https://rdcu.be/b50sn).

In article [5], the scientists from S.P. Korolev Samara National Research University summarize the results obtained by this research team previously and present the latest results that

cover the probabilistic studies on the motion dynamics of nanosatellites with different types of passive stabilization systems that provide single- and three-axis orientation under the effect of aerodynamic and gravitational moments at the altitudes of up to 700 km. Two versions of the distribution laws for the components of the initial angular velocity vector (uniform and Rayleigh) are considered. Analytical distribution functions of the maximum angles of deviation of the nanosatellite axes from the required directions (orbital velocity vector and local vertical) are obtained. Formulas are derived and nomograms are constructed for selection of design parameters (geometric dimensions, static stability margin, moments of inertia) that provide the required orientation in circular orbits with a specified probability (the full text of the paper is available at https://rdcu.be/b50ts).

Article [6], presented by the Corresponding Member of the Russian Academy of Sciences O.A. Stepanov and postgraduate student A.S. Nosov (both from Concern CSRI Elektropribor and ITMO University), considers a new algorithm for geophysical map-aided navigation. The proposed algorithm does not need any preliminary estimation of the field measured along the vehicle trajectory. It uses a whole set of available geophysical field measurements and does not require any field model. The accuracy analysis applied to estimate the effectiveness of the proposed algorithm is described. The features and advantages of this algorithm are illustrated by an example of marine gravity-aided navigation (the full text of the paper is available at https://rdcu.be/b50tF).

Article [7] written by B.S. Rivkin, Deputy Editor-in-Chief of the journal ***Gyroscopy and Navigation*** (Concern CSRI Elektropribor) briefly describes the results of research and development activities undertaken in 2015–2019, aimed at the practical implementation of the e-Navigation concept. The current state of the practical application of S-mode, the only global product created within the concept, is analyzed. The author considers most of the new technologies developed under the main regional projects. Special focus is made on the situation with e-Navigation in Russia (the full text of the paper is available at https://rdcu.be/b50uh).

The issue ends with article [8] by V.G. Peshekhonov, Editor-in-Chief of the journal, Academician of the Russian Academy of Sciences. The paper presents a brief history of development of a precision gyroscope with electrostatic rotor suspension; the main problems of constructing a gyro with a hollow rotor, as well as their solutions found by the chief designer A.S. Anfinogenov are discussed (the full text of the paper is available at https://rdcu.be/b50uw).

The articles are available at https://link.springer.com/journal/13140/11/2

We wish our readers health and good luck. We hope that the materials published in the journal will be useful and you will not forget to cite them in your publications.

The editorial staff of the journal is happy to accept your articles for consideration!

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