**"Gyroskopiya i Navigatsiya" №1, 2005**

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The results of the stabilization system testing are presented. | |  |  |  |  |  | | --- | --- | --- | | **V.A.Vorobiov, I.V.Merkuriev, V.V.Podalkov** | **Hemispherical Resonator Gyro Errors with Allowance for Resonator Vibrations Nonlinearity** | **15** | | The method of the decision of a task of distribution of resources of management for systems of spatial dynamic positioning of sea mobile objects (SMO) with the large number of the power drives is considered. The method consists of two stages of controlling forces and moments synthesis created by the power drives. At the first stage the synthesis of the generalized forces and moments of management ensuring positioning of object is carried out; at the second stage the task of optimum distribution of the received forces and moments of the generalized management on the power drives (task of distribution of resources) is decided in view of features in the equations of distribution of the controlling moments. Is shown, that the decision of this task is possible only for the certain schemes of an power drives arrangement. The criterion of SMO controllability is formulated, which performance provides the decision of a task of distribution of resources of management. The offered method is illustrated by an example of synthesis of system of spatial dynamic positioning of sea mobile object. | |  |  |  |  |  | | --- | --- | --- | | **G.I.Yemelianzev, L.P.Staroseltsev, S.V.Ignatiev, A.G.Saunonen** | **Rhumbal Drifts of Strapdown Inertial Module on Fiber-Optic Gyros** | **22** | | Calibration and alignment of the so-called rhumbal drift of strapdown inertial measurement unit (SIMU) based on measurement unit on fiber-optic gyroscopes (FOG) with reverse modulation turn carried out at operation at sea is considered. Algorithms and errors of observational and autonomous modes of integrated orientation and navigation system (IONS) for marine movable vehicles (MMV) based on SIMU on FOG, GPS/GLONASS receivers and water log are being studied. Kalman filter algorithm with feedback is used for measurements results processing in IONS. FOG, accelerometers and measurement unit turn sensor data acquired during bench and sea trials is used as raw data. Data from GPS receivers, log and course measurements results were used at sea trials; this data was simulated for bench tests. The results of SIMU trials office studies and their analysis are given. | |  |  |  |  |  | | --- | --- | --- | | **V.M.Slusar** | **Extension of Navigation Sculling-Algorithms Design for Frequency Shaped IMU Data** | **30** | | Traditionally, the accuracy of the velocity algorithms in a vibrational environment is enhanced by incorporating a so-called "sculling" correction, which reduces system drift errors. Conventional approach that leads to the sculling algorithms optimization procedure assumes an ideal (or flat) IMU-sensors frequency response. However, in many instances, accelerometers and gyros exhibit complex frequency responses, which may lead to degradation of system performances in a sculling environment. This paper develops the mathematical basis for the calculation of the sculling algorithm coefficients for the case of frequency shaped IMU data. The velocity error model is expressed in terms of in-phase and quadrature frequency dependent normalized error functions that define the manner in which resultant rectification error depends on frequency responses of the system software and hardware implementation. Discussed here is a method of deriving sculling algorithms which are tailored to the dynamical characteristics of the particular type of accelerometers and gyros used. It is shown that the duality property of optimal coning and sculling algorithms can be extended for the case where the gyros and accelerometers exhibit the same frequency responses. A new formulation of the error minimization criterion is implemented in the algorithms design technique,which provides the error free system response at some fixed frequency of a vibrational input. Some characteristic problems involved in the sensor tailored algorithms design are considered. Also presented in the paper are the examples that demonstrate some typical application of the developed design procedure. | |  |  |  |  |  | | --- | --- | --- | | **S.K.Volovodov, M.G.Cherniaev, A.V.Smolnikov, A.Yu.Kaverinsky, S.S.Volovodov** | **Control Resource Allocation at Marine Movable Vehicles Positioning** | **43** | | The method of the decision of a task of distribution of resources of management for systems of spatial dynamic positioning of sea mobile objects (SMO) with the large number of the power drives is considered. The method consists of two stages of controlling forces and moments synthesis created by the power drives. At the first stage the synthesis of the generalized forces and moments of management ensuring positioning of object is carried out; at the second stage the task of optimum distribution of the received forces and moments of the generalized management on the power drives (task of distribution of resources) is decided in view of features in the equations of distribution of the controlling moments. Is shown, that the decision of this task is possible only for the certain schemes of an power drives arrangement. The criterion of SMO controllability is formulated, which performance provides the decision of a task of distribution of resources of management. The offered method is illustrated by an example of synthesis of system of spatial dynamic positioning of sea mobile object. | |  |  |  |  |  | | --- | --- | --- | | **S.P.Dmitriev, Yu.A.Litvinenko** | **Kalman Filter Guaranteeing Alignment at Navigation Systems Error Uncertainty** | **57** | | The paper is concerned with minimax Kalman Filter construction and its guaranteeing property for uncertainty of model parameters of state subvector X governing the errors of initial sensors of the navigation system and of external meters. Two alternative problems to be set up connected with the method of setting the error level are described: fixation of matrix Q intensity of generating white noise or fixation of variance of subvector X "output" component. For the purpose of illustration computational exercises are given. | |  |  |  |  |  | | --- | --- | --- | | **Ya.I.Binder, B.Volfson, P.M.Gasparov, P.A.Klushkin, V.G.Rozentsvein** | **Magnetic Disturbances Compensation in Flux-Gate Inclinometer** | **68** | | The problem of disturbances compensation in magnetometer signals at borehole deviation survey is considered. Usually magnetic disturbances generated by metal elements of the boring system are compensated by inserting nonmagnetic tubes between the inclinometer measurement unit and face drill.  An inclinometer comprising several flux-gates, constructed on the model of a gradiometer and without using non-magnetic tubes is suggested. According to flux-gates readings the magnetic disturbance generated by metal elements of the boring system is calculated and inclinometer output data is corrected.  The experiments show the possibility of substantial bounding inclinometer error in determining bore hole azimuth without using non-magnetic tubes. | |  |   **Brief  note**   |  |  |  | | --- | --- | --- | | **A.F.Dumin, V.V.Korabelschikov, S.N.Platonov, D.M.Surinsky** | **Increasing the Accuracy of Celestial Correction of Strapdown Inertial Orientation System on Electrically Suspended Gyros** | **76** | | A spacecraft strapdown inertial orientation system based on electrically suspended gyros that can be celestially corrected is considered. It is supposed that a quaternion of spacecraft orientation on inertial basis is generated by the strapdown inertial orientation system. Initial orientation of the basis of strapdown inertial orientation system is carried out during the celestial orientation by two celestial sighting devices that are stationary with respect to the spacecraft body. The small turn vector can be measured for the inertial basis generated by the strapdown inertial orientation system relatively to the basis generated by external celestial orientation sensor. Low accuracy of alleged relative position of astro- and gyro-systems reference axes is among the factors bounding the accuracy of celestial correction. As a result a number of expensive and complicated construction and technical tasks are in-corporated in spacecraft design. An alternative method of increasing the accuracy of celestial correction is suggested. The method is based on error estimation of alleged reference axes position during special calibrating rotations. The calibrating rotations through 360o in respect to nominal position of optical axes of two celestial sighting devices are carried out. The estimated errors are used to correct the readings of celestial sighting devices during following stages of celestial correction. | |  |   **Materials of the 6th Conference of Young Scientists  Navigation and Motion Control**   |  |  | | --- | --- | | **Paper abstracts** | **84** |   **International Public Association  The Academy of Navigation and Motion Control *Official information***   |  |  |  | | --- | --- | --- | | **O.A.Stepanov** | **Seminar for Young Scientists "Navigation and Motion Control"** | **115** |   **Pages of history**   |  |  |  | | --- | --- | --- | | **A.V.Novgorodsky** | **Inertial Navigation Complex "Tobol" for a Guided-Missile Cruiser** | **117** |   **Information**   |  |  | | --- | --- | | **Materials of joint session of Navigation Systems and their Sensors Section and Saint Petersburg Precise Gyroscopy Section of RAS Scientific Council on the Problems of Motion Control and Navigation** | **127** |  |  |  | | --- | --- | | **Russian and international conferences, symposiums and exhibitions** | **128** | |