**"Gyroskopiya i Navigatsiya" №4, 2003**

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| **O.A.Babich, O.I.Fedoskin** | **Joint solution of aerospace navigation problems and Earth surface monitoring using the Earth frame** | **19** |
| The task of processing of the joint data coming from earth surface monitoring system, digital topographical map and reconnaissance plane's navigation system processing is considered. Mathematical expressions connecting these signals in view of earth's reference-ellipsoid geometry are developed. They may be used for the following tasks decision: to topographical map of new founded targets, to reconnaissance plane's navigation system correct and to draw earth surface image on the pilot's cockpit when in limited visibility conditions flight. |  |

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| **Ja.I.Binder, T.V.Paderina** | **Strapdown inertial measuring units: compassing and calibration under restriction of angular movements** | **29** |
| The paper gives investigation into variants of solving a problem of determining coefficients of angular velocity transducer (AVT) drift model, and determining accelerometer zero errors and similar parameters of an inertial measuring unit (IMU) with fixed values of azimuth and zenith angle. Here the type of inertial sensors being used is not stipulated. It is shown that for these two basic and practically significant cases of IMU angular motion restriction there is the possibility of efficient compassing and determination of all substantial AVT and IMU parameters without standardization in azimuth. Analysis is made of how main assumptions about a type of the model under identification and calibration procedure conditions influence on compassing results. The conclusion is made about expediency of developing the inertial mode of strapdown stabilized gyrocompass calibration in conditions of anchorage with change of bearings. |  |

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| **E.A.Izmailov** | **On the unified approach to the analysis of sources of inside electromechanical disturbances in inertial measuring converters** | **40** |
| A main error in inertial measuring transducers (IMT), that determines inertial navigation system's errors, is a zero signal or drift. For widely used electrome-chanical IMTs, internal electromechanical disturbances essentially contribute to a general error. The paper analyses physical nature of mechanisms that generate these disturbances for three different types of gyros and accelerometers of the considered IMT group. There were floating, magnetic suspended spherical, hemispherical gyros and a dry pendulum compensational accelerometer. Based on developed structural diagrams of error generation for each of the mentioned devices, a generalized structural diagram has been formed, that reveals the commonality of their functional ingredients and error generation mechanisms. This allowed to formulate a common methodological approach to the analysis of internal electromechanical disturbance sources for the whole electromechanical IMT group. |  |

**Brief  notes**

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| **V.Z.Gusinsky, Yu.A.Litmanovich** | **Accuracy Improvement of the Spacecraft Attitude Determination by the ESG/FOG Data Fusion** | **50** |
| Investigated are advantages of introducing fiber-optic gyros (FOG) into the attitude control system of low-orbit satellites, based on strapdown electrostatic gyros (SESG). It is shown that when differences of attitude control parameters, calculated by the data of various gyro groups, are used as measurements, two problems can be solved, which are typical for systems under consideration. One of them consists in necessity to smooth the noise of the electrooptical system, measuring angular position of SESG rotor, for increasing accuracy of terrestrial objects observation. The other problem consists in determining error angles between installation bases of SESG and a star scanner with a view to increase efficiency of SESG periodical correction by stars. In this paper formulated are the general principles of SESG and FOG data integration, and expressions are derived for difference measurement signals. These expressions are the basis for development of an algorithm of optimal estimation. Presented are the results of testing the prototype of one measurement channel on the one-coordinate dynamical testbed using the suboptimal estimation algorithm. The results show the efficiency of the method suggested. |  |

**Materials of the 10th Saint Petersburg International Conference
on Integrated Navigation Systems**

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| **Yu.Ikeda, Ba Nguyen, J. Panagos** | **Simulation Validation for an automatic air collision avoidance system in preparing for flight test** | **85** |
| This paper presents performance evaluation of an algorithm for an Automatic Air Collision Avoidance System (Auto ACAS or simply ACAS) that has been developed by the U.S. Air Force and its Swedish counter part, Forsvaret Materielverk (FMV). The algorithm uses the optimal coordinated escape maneuvers to avoid mid-air collision, while satisfying the imposed system requirements. In addition, the algorithm can simultaneously accommodate multiple aircraft in a collision course by activating the coordinated escape maneuvers. It also allows close formation flight and rejoin without activating the escape maneuver when certain conditions are met. The algorithm uses GPS and Navigational System for the universal time and position information. This information is exchanged through a data link between the in-netwrok neighboring aircraft to detect collision potentials, select the optimal escape maneuver, and execute the optimal escape maneuver when the collision becomes imminent. The algorithm has its own integrity management system to operate safely against failures and GPS / data link dropout. The functionality of the algorithm has been tested through layers of simulation evaluation with flight simulators. With the improvements made based on pilots' comments who flew the simulator, the algorithm is now nearly ready for flight test. |  |

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**Brief  note**

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