

PROGRAM¹

MONDAY, 25 MAY

8.00 – 9.50 REGISTRATION OF THE CONFERENCE PARTICIPANTS

10.00 – 10.15 OPENING CEREMONY

SESSION I INTEGRATED SYSTEMS

Chairmen **Dr. B.S. Rivkin**, Russia
Mr. L. Camberlein, France

INVITED PAPER

10.15 – 11.00 1.² **Didier Faivre** (*European Space Agency (ESA), France*)
European GNSS Programme EGNOS and GALILEO.
Operational Results and Programmatic Perspectives

PLENARY PAPER

11.00 – 11.20 2. **M.W.A. Khan, R. Piche, E.S. Lohan** (*Tampere University of Technology, Finland*)
9³ Experimental study of fusion of UWB ranging and RTK
The paper will be presented online.

11.20 – 11.45 COFFEE BREAK

PLENARY PAPERS

11.45 – 12.05 3. **G.I. Emelyantsev, A.P. Stepanov, B.A. Blazhnov, I.V. Semenov** (*Concern CSRI Elektropribor, JSC, ITMO University, Russia*)
100 GLONASS Data Processing in GPS Compass with Antenna Base Equal to Carrier Wavelength

¹ The Conference Program Committee reserves the right to make alterations in the final Conference Program

² Paper no. in the Conference Program

³ Paper no. in CoMS-Elektropribor system

- | | |
|-----------------------------------|---|
| 12.05 – 12.25 | 4. Liu Yang, Li Sihai, Xiao Xun (<i>Northwestern Polytechnical University, China</i>)
38 INS-Aided GNSS Spoofing Detection Based on Raw Pseudorange and Carrier Phase Measurements |
| POSTER PAPERS ¹ | |
| 12.25 – 12.45 | 5. V.I. Baburov, N.V. Ivantsevich, O.I. Sauta (<i>JSC VNIIRa, Scientific and Technical Center Navigator, Russia</i>) Joint Use of Navigation Fields of GNSS and Ground-Based Landing Systems in Onboard Equipment
44 |
| 103 | 6. I. V. Belokonov (<i>Samara State Aerospace University, Russia</i>), V. A. Borovkov (<i>Space Rocket Centre Progress, Russia</i>) Onboard and Ground GNSS Receiver Data Fusion for Increasing Micro/Nano Satellite Positioning Accuracy |
| 104 | 7. S.A. Brodsky, A.V. Nebylov, A.I. Panferov (<i>State University of Aerospace Instrumentation, Russia</i>) Measurement Optimization for Optimal Control of Aeroelastic Object Motion
134 |
| | 8. H. Benzerrouk (<i>University of Blida, Algeria</i>), A.V. Nebylov (<i>International Institute for Advanced Aerospace Technologies of Saint-Petersburg State University of Aerospace Instrumentation, Russia</i>) Square Root High Degree Cubature Kalman Filter with Application to Inertial Sensors Fusion with Low-Orbit Satellite Signals |
| | 9. S.N. Sharov, S.G. Tolmachev (<i>JSC «Concern Granit-Elektron», Russia</i>) A Decision Making Algorithm for an Integrated System of UAV Landing on the Moving Ship Gripper |

¹ The authors of poster papers are given 3 min **at the plenary session** to present the main idea of the paper with 1-2 slides, if any; further discussion will continue at the poster boards.

- 138** 10. **K. Müller, P. Crocoll, G.F. Trommer** (*Karlsruhe Institute of Technology, Germany*)
Wind Estimation for a Quadrotor Helicopter in a Model-Aided Navigation System

12.45 – 13.00

DISCUSSION OF THE POSTER PAPERS

13.00 – 14.00

LUNCH

Chairmen **Dr. Yu.A. Litmanovich**, Russia
Dr. J. Mark, USA

PLENARY PAPERS

- 14.00 – 14.20 11. **J. Ruppelt, G. F. Trommer** (*Karlsruhe Institute of Technology, Germany*)
41 A Performance Demonstration of Stereo Visual Odometry for Outdoor Areas and in Dark Indoor Environments
- 14.20 – 14.40 12. **K. K.Veremeenko, D.A. Antonov, M.V. Zharkov, R.Yu. Zimin, I.M. Kuznetsov, A.N. Pron'kin** (*Moscow Aviation Institute, Russia*)
94 An Integrated Fault-Tolerant Computer Vision-Aided Navigation System for an Unmanned Vehicle

POSTER PAPERS¹

- 14.40 – 14.55 13. **Yu.V. Bolotin, M. Fatehrad** (*Lomonosov Moscow State University, Russia*)
10 Pedestrian Inertial Navigation with Foot Zero Velocity Update
- 87 14. **A. A. Panyov, A.S. Smirnov, V.V. Kos'yanchuk** (*Navigine corp., Russia*)
Indoor Navigation Using a Foot-Mounted IMU Aided with Heterogeneous Additional Information
- 49** 15. **V.I. Kortunov, A.A. Molchanov** (*National Aerospace University named after N. Zhukovsky «KhAI», Ukraine*)
Video Camera Motion Detection According to the Optical Flow

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16. **A.S. Mit'kin, V.A. Pogorelov** (*Rostov-on-Don Research Institute of Radio Communication, Russia*),
V.D. Meyerovich, S.V. Sokolov (*Rostov State Transport University, Russia*)
Nonlinear Filtering of Vehicle Motion Parameters in an Integrated Navigation System Using Electronic Map Data
- 131**

14.55 – 15.15

DISCUSSION OF THE POSTER PAPERS

15.15 – 15.40

COFFEE BREAK

PLENARY PAPER

- 15.40 – 16.00 17. **A.A. Belash, S.S. Gurevich, G.I. Emel'yansev, B.E. Landau, S.L. Levin, S.G. Romanenko** (*Concern CSRI Elektropribor, JSC, Russia*), **M.I. Gotsuliak** (*Space Rocket Center Progress, Russia*)
102
Development and Verification of Calibration Method for ESG-Based Strapdown Attitude Reference System Onboard a Spacecraft

POSTER PAPERS ¹

- 16.00 – 16.55 18. **D.A. Bedin, A.G. Ivanov, A.A. Fedotov** (*Institute of Mathematics and Mechanics, Russian Academy of Sciences, Russia*), **S.A. Ganebny** (*LLC NITA, Russia*)
48
Package of Algorithms for a Posteriori Determination of Radar Systematic Errors for Several Radars
19. **A.V. Shafranyuk, A.I. Sokolov, P.V. Yukhta, I.V. Pashkevich** (*Concern CSRI Elektropribor, JSC, Russia*)
106
Use of a Multibeam Echosounder in Submersible Vehicle Positioning
20. **V.A. Tupysev, Yu.A. Litvinenko** (*Concern CSRI Elektropribor, JSC, Russia*)
111
Comparative Analysis of Different Types of Federated Filters as Applied to the Problems of Navigation Data Processing

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21. **S.B. Berkovich, N.I. Kotov, A.V. Sholokhov** (*Serpukhov Institute of Engineering Physics, Russia*)
117 Parameter Estimation by the Net-point Method Using a Priori Information on Weights of Nodes
- 6 22. **Ye. Somov, S. Butyrin, S. Somov** (*Samara State Technical University, Russia*)
Digital and Pulse-Width Control of Land-Survey Mini-Satellite
- 7 23. **Ye. Somov, S. Butyrin, T. Somova** (*Samara State Technical University, Russia*)
Analytical Representation of Guidance Laws for a Land-Survey Satellite at Scanning Observation
- 68 24. **Yu.N. Gorelov** (*Institute for Control of Complex Systems, Russian Academy of Sciences, Russia*), **A.I. Manturov**, **V.E.Yurin, N.I. Pyrinov** (*Space Rocket Centre Progress, Russia*)
Production of Satellite Attitude Control Programs for Stereo Imaging
- 59 25. **T. Brunner, S. Changey** (*ISL, Saint-Louis, France*), **J.-P. Lauffenburger, M. Basset** (*MIPS - UHA, France*)
Multiple MEMS-IMU Localization: Architecture Comparison and Performance Assessment
- 72 26. **A.V. Chernodarov, A. P. Patrikeev** (*NaukaSoft Experimental Laboratory, JSC, Russia*); **V. N. Kovregin, G. M. Kovregina** (*Zaslon, JSC, Russia*)
Synchronization of Inertial and Satellite Measurements in the Micronavigation System for a Synthetic-Aperture Radar
- 77 27. **R.M. Farhadi, V.I. Kortunov** (*National Aerospace University named after N. Zhukovsky «KhAI», Ukraine*), **A. Mohammadi** (*MUT, Iran*)
UAV Motion Model and Estimation of its Uncertainties with Flight Test Data
- 78 28. **O.S. Amosov** (*Komsomolsk-on-Amur State Technical University, Russia*), **S.G. Baena** (*ITMO University, Russia*)
Using Wavelets for Nonlinear Filtering in Navigation and Motion Control

- 90** 29. **M.B. Bogdanov, A.V. Prokhortsov, V.V. Savelyev, V.A. Smirnov** (*Tula State University, Russia*)
Integration of INS Sensors with Different Accuracy and Response Speed Characteristics
- 91** 30. **D.V. Stepanov, G.T. Bukia** (*Concern Avrora Scientific and Production Association, JSC, Russia*)
Maneuvering Target Motion Analysis
- 96** 31. **S.G. Chernyi, V.Yu. Budnik** (*Kerch State Maritime Technological University, Russia*)
Elements of the Introspective Analysis to Evaluate Software in Navigation

16.55 – 17.20

DISCUSSION OF THE POSTER PAPERS

17.30 – 21.00

SIGHT-SEEING GUIDED TOUR OF SAINT PETERSBURG

TUESDAY, 26 MAY

SESSION I INTEGRATED SYSTEMS (Continued)

Chairmen **Dr. A.V. Sokolov**, Russia
Prof. G. Trommer, Germany

PLENARY PAPERS

- 9.00 – 9.20 32. **N.I. Krobka** (*NII PM named after Academician V.I. Kuznetsov, Russia*), **S.A. Aksenov, S.A. Bober, E.V. Efremova, I. V. Logashina, A.V. Tukmakov, Yu.V. Fedorenko, E.N. Chumatchenko** (*Moscow Institute of Electronics and Mathematics, Russia*)
Distributed Integrated Navigation Systems for Planetary Defense Tasks Against Asteroids
- 9.20 – 9.40 33. **F.S. Dubrovin** (*Far Eastern Federal University, Russia*), **A.F. Scherbatyuk** (*Institute of Marine Technology Problems, Russian Academy of Sciences, Russia*)
Development of Algorithms for an Autonomous Underwater Vehicle Navigation With a Single Mobile Beacon: The Results of Simulations and Marine Trials
- 80** 135

POSTER PAPERS¹

- 9.40 – 10.00 34. **I.N. Burdinskii, S.A. Otcheskii** (*Pacific National University, Russia*)
- 45** Autonomous Underwater Vehicle Localization Using a Single Transponder Acoustic Positioning System
- 13** 35. **E.G. Kharin, I.A. Kopylov, V.A. Kopelovich, A.V. YASENOK** (*M.M. Gromov Flight Research Institute, Russia*)
Automatic Evaluation of Aircraft Navigation Along Standard Instrument Departure and Arrival Routes
- 51** 36. **I.L. Ermolov, A.N. Sukhanov** (*Moscow State University of Technology STANKIN, Russia*), **M.M. Knyazkov, A.A. Kryukova**, (*Institute for Problems in Mechanics, Russian Academy of Sciences, Russia*), **B.I. Kryuchkov, V.M. Usov** (*Yu.A. Gagarin Research and Test Cosmonaut Training Center, Russia*)
A Sensory Control and Orientation System of an Exoskeleton
- 53** 37. **A.A. Frolov, D.S. Pecheritsa** (*VNIIFTRI, Russia*)
Integration of Test Equipment to Evaluate the INS/GNSS Navigation Equipment Specifications
- 67** 38. **Wen Liu, Yingjun Zhang, Xuefeng Yang** (*Dalian Maritime University, China*)
Research on Pan-Tilt-Zoom Control Methods Based on MEMS Inertial Sensors in an Onboard Video Stabilization System

10.00 – 10.15

DISCUSSION OF THE POSTER PAPERS

10.15 – 10.45

COFFEE BREAK

¹ The authors of poster papers are given 3 min **at the plenary session** to present the main idea of the paper with 1-2 slides, if any; further discussion will continue at the poster boards.

SESSION II GRAVIMETRIC SYSTEMS

Chairmen **Dr. A.V. Sokolov**, Russia
Dr. L.F. Vitushkin, Russia

PLENARY PAPERS

- 10.45 – 11.05 39. **L.F. Vitushkin** (*D.I. Mendeleyev Institute for Metrology (VNIM), ITMO University, Russia*)
 132 Current Status of Gravimetry
- 11.05 – 11.25 40. **V.G. Peshekhanov, A.V. Sokolov, L.S. Elinson, A.A. Krasnov** (*Concern CSRI Elektropribor, JSC, ITMO University, Russia*)
 127 A New Air-Sea Gravimeter: Development and Test Results
- 11.25 – 11.45 41. **Wang Wenjing, Luo Cheng, Xue Zhengbing, Li Dongming, Xing Xiangming, Ma Jie, Zhang Haitao** (*Beijing Institute of Aerospace Control Devices, China*)
 18 Flight and Marine Test Results for Laser Strapdown Airborne Gravimeter in China
- 11.45 – 12.05 42. **V.N. Koneshov, V.N. Solovyev, M.N. Drobyshev** (*Schmidt Institute of Physics of the Earth, Russian Academy of Sciences, ITMO University, Russia*), (*Schmidt Institute of Physics of the Earth, Russian Academy of Sciences, Russia*), **V.B. Nepoklonov** (*Moscow State University of Geodesy and Cartography, Russia*)
 112 Error Estimation of Earth Gravity Field Anomaly Models by Airborne Gravimetric Surveys

POSTER PAPERS ¹

- 12.05 – 12.25 43. **O.A. Stepanov, D.A. Koshaev, A.V. Motorin** (*Concern CSRI Elektropribor, JSC, ITMO University, Russia*)
 116 Adaptive Filtering in Airborne Gravimetry Problems

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44. **Yu.L. Smoller, S.Sh. Yurist** (*Gravimetric Technologies, Russia*), **A.A. Golovan, L.Yu. Yakushik** (*Lomonosov Moscow State University, Russia*)
Using a Multiantenna GPS Receiver in the Airborne Gravimeter Gt2a for Surveys in Polar Areas
45. **Yu.V. Bolotin, V.S. Vyazmin** (*Lomonosov Moscow State University, ITMO University, Russia*)
Multiscale Gravity Anomaly Estimation from Airborne Gravimetry Data Using l_2 and Minimax Optimization
46. **A.V. Sokolov, A.A. Krasnov, L.P. Starosel'tsev, A.N. Dzyuba** (*Concern CSRI Elektropribor, JSC, ITMO University, Russia*)
A Gyro Stabilization System with Fiber-Optic Gyroscopes for an Air-Sea Gravimeter
- 140 47. **A.V. Loparev, A.N. Dzyuba** (*Concern CSRI Elektropribor, JSC, ITMO University, Russia*)
Correction Algorithm of Gyro Stabilized System for Airborne Gravimeter
- 12.25 – 13.00 **DISCUSSION OF THE POSTER PAPERS**
- 13.00 – 14.00 LUNCH

SESSION III INERTIAL SYSTEMS AND SENSORS

Chairmen **Prof. I.M. Okon**, Russia, USA
Prof. H. Sorg, Germany

PLENARY PAPER

- 14.00– 14.20 48. **D.A. Bordachev, P.A. Ilyushin, B.A. Kazakov, I.E. Shustov, A.A. Volyntsev** (*NII PM named after Academician V.I. Kuznetsov, Russia*)
Advanced Angular Rate Measurement Device for Spacecraft: Ground Test Results

POSTER PAPERS¹

- 14.20 – 14.55 49. **Yu.N. Chelnokov** (*Institute of Precision Mechanics and Control, Russian Academy of Sciences, Russia*),
S.E. Perelyaev (*Moscow Institute of Electromechanics and
Automatics, Russia*), **L.A. Chelnokova** (*Saratov State
University, Russia*)
15 Ultrafast, Fast and Slow Loops in Orientation Algorithms
 for Strapdown INS
50. **L.V. Vodicheva, Yu.V. Parysheva, E.L. Alievskaya**
(*Semikhatov Scientific Production Association of Automat-
ics, Russia*)
60 Prelaunch Alignment and Calibration of a Hybrid Inertial
 Measurement System: Rotation of a Strapdown Unit about
 a Horizontal Axis
51. **V.M. Kutovoy, D.A. Kutovoy, O.I. Maslova,
S.Yu. Perepelkina, P.V. Sitnikov, A.A. Fedotov**
(*Semikhatov Scientific Production Association of Automat-
ics, Russia*)
61 Use of Allan Variance for Practical Assessment of Noise
 Structure of SINS Sensing Elements
52. **I.V. Bychkov, E.I. Druzhinin, Yu.I. Ogorodnikov** (*Insti-
tute of Systems Dynamics and Control Theory, Russian
Academy of Sciences, Russia*), **B.B. Belyaev,**
A.I. Ul'yashin (*Lavochkin Research and Production Asso-
ciation, Russia*)
113 On Kinematic Configuring of Power Gyrosystems
53. **V.A. Illarionov, V.M. Nikiforov** (*Academician Pilyugin
Center, Russia*)
114 Some Features of Coordinate Transformation Realization in
 a Triaxial Gyrostabilizer

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54. **Yu.V. Sadomtsev, E.V. Shchukina, Yu.A. Ul'yanina**
(*Yuri Gagarin State Technical University of Saratov, Russia*)
121 Correction of a SINS Vertical Channel by Noisy Altitude and Vertical Velocity Information on the Basis of H2-optimization
55. **A.W. Khalaf, B.I. Chouaib, C.M. Wainakh** (*Higher Institute of Applied Sciences and Technology, Syria*)
126 Self-Corrective Initial Alignment of Strap-Down INS Based on Robust Kalman Filter
56. **B.V. Klimkovich, A.M. Tolochko** (*OKB TSP NP OOO, Belarus*)
133 Navigation-Grade SINS Calibration in Inertial Operation Mode
57. **Guo Wei, Xingwu Long, Xudong Yu** (*College of Optoelectric Science and Engineering, National University of Defense Technology, China*)
Research on High Precision Rotating Inertial Navigation System with Ring Laser Gyroscope
58. **D. Lukyanov, S. Shevchenko, A. Kukaev** (*Saint-Petersburg Electrotechnical University LETI, Russia*)
139 Multiphysical Simulation of a Surface Acoustic Wave Gyroscope
59. **A.P. Panov** (*Academy of Navigation and Motion Control Kyiv, Ukraine*), **S.A. Ponomarenko** (*Department of Aircraft and Space Systems NTTU KPI, Ukraine*),
V.V. Tsysarzh (*RDI Quantum-Radar, Ukraine*)
Groups and Algebras of Non-Gamiltonian Quaternions of Half-Rotation in the Problems of Strapdown Inertial Systems
60. **Xing Xiangming, Wang Guodong, Yang Yanguang, Zhang Ze** (*Beijing Institute of Aerospace Control Devices, China*)
Covariance Analysis of Errors of a High-Precision Marine FOG-Based Inertial System

61. Zhou Yuan, Zhang Jinyun, Yan Lu, Yu Pei (*Beijing Institute of Aerospace Control Devices, China*)
Directional Multi-Position Calibration of PIGA of Inertial Platform System

14.55 – 15.10

DISCUSSION OF THE POSTER PAPERS

15.10 – 15.30

COFFEE BREAK

Chairmen Prof. Yu.V. Filatov, Russia
Prof. G. Trommer, Germany

PLENARY PAPERS

- 15.30 – 15.50 62. C. Negri, E. Labarre, C. Lignon, E. Brunstein,
E. Salaün (*Sagem Defence and Security, France*)
120 A New Generation of IRS with Innovative Architecture
Based on HRG for Satellite Launch Vehicles
- 15.50 – 16.10 63. A.V. Molchanov (*Moscow Institute of Electromechanics
and Automatics, Russia*), V.A. Belokurov, M.V. Chirkin,
93 V.I. Koshelev, V.Yu. Mishin, D.A. Morozov (*Ryazan'
State Radio-Engineering University, Russia*)
Precision Laser Gyro with a Digital Channel for Quadrature
Signal Processing

POSTER PAPERS ¹

- 16.10 – 16.45 64. M.A. Barulina, V.M. Pankratov (*Institute of Precision
Mechanics and Control, Russian Academy of Sciences,
Russia*), M.V. Efremov (*Scientific Production Enterprise
ANTARES, Russia*)
8 Stress-Strain State of a Fiber-Optic Gyroscope Coil in the
Conditions of Nonstationary Periodic Thermal Influence

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65. A.A. Volyntsev, O.N. Efanova, S.A. Krasnov,
E.A. Kuznetsov, S. O. Maksimov, A.I. Tereshkin,
D.A. Turkin (*NII PM named after Academician
V.I.Kuznetsov, Russia*), V.S. Ryzhkov (*Rocket and Space
Corporation Energia named after S.P. Korolev, Russia*)
Development and Flight Test Results of a Small-Size Gyro
Unit Based on Fiber-Optic Gyroscopes
66. V.P. Doronin, M.S. Kuznetsova, V.I. Lebedeva,
A.V. Soloviev, A.N. Tarasov (*NII PM named after
Academician V.I.Kuznetsov, Russia*)
Micromechanical Vibratory Gyroscope: Development,
Production and Test Results
67. A.A. Maslov, I.V. Merkuryev, V.V. Podalkov (*Moscow
Power Engineering Institute, Russia*)
83 External Vibration and Shock Impact on the Dynamics of
Micromechanical Gyroscopes
68. Ya.A. Nekrasov (*Concern CSRI Elektropribor, JSC, ITMO
University, Russia*), R.G. Lyukshonkov (*Concern CSRI
Elektropribor, JSC, Russia*)
122 Results from Studies of MEMS Gyros with Thermal Self-
Compensation
- 123 69. Ya.A. Nekrasov, S.V. Pavlova, N.V. Moiseev (*Concern
CSRI Elektropribor, JSC, ITMO University, Russia*)
Optimization of Electrode Structure of RR-type MEMS
Gyro
- 118 70. Yu.V. Filatov, E.V. Shalymov, V.Yu. Venediktov
(*St. Petersburg Electrotechnical University LETI, Russia*)
Microoptical Gyros Based on Passive Ring Cavities
71. A.N. Koleda, E.S. Barbin, T.G. Nesterenko (*Tomsk Poly-
technic University, Russia*)
57 Three-Component Microelectromechanical Accelerometer
72. S.A. Volobuev, O.L. Mumin, V.G. Rozentsvein,
L.P. Ryabova, V.V. Sviatyi (*Concern CSRI Elektropribor,
JSC, Russia*)
101 Triaxial Accelerometer with an Extended Range of
Temperatures and Measured Accelerations

73. **A.E. Fedorov, V.A. Zborovsky, D.A. Rekunov, N.V. Uspekhev, N.S. Pleshakov, P. D. Motov**
108 (*JSC «Ramenskoye Instrument Engineering Plant», Russia*)
Mirror Adjustment and Laser Gyroscope Resonator Loss Measurement
74. **Yu.Yu. Broslavets, E.A. Polukeev, A.A. Fomichev** (*Moscow Institute of Physics and Technology State University, Russia*)
66 Deformation of Nonplanar Cavity Optical Circuit in a Laser Gyro and its Effect on Zero Drift

16.45 – 17.10

DISCUSSION OF THE POSTER PAPERS

18.30

DRINK RECEPTION

WEDNESDAY, 27 MAY

SESSION III INERTIAL SYSTEMS AND SENSORS (Continued)

Chairmen **Dr. B.S. Rivkin**, Russia
Mr. L. Camberlein, France

PLENARY PAPERS

- 9.00 – 9.20 75. **N.B. Vavilova, A.A. Golovan, A.V. Kozlov, I.V. Nikitin, A.A. Panyov, N.A. Parusnikov** (*Lomonosov Moscow State University, Russia*), **I.A. Solovykh, S.V. Nikiforov, A.M. Lavryrev, S.V. Morozov, A.V. Afanasyev** (*Orgenergogaz, JSC «Saratovorgdiagnostika», Russia*), **I.V. Vesnovskiy, A.V. Konon, A.A. Laptiev, D.V. Turusikov** (*JSC «Baker Hughes Technologies and Pipeline Service», Russia*)
82 A Navigation System of a Pipeline Inspection System for Oil and Gas Pipelines: The Results of the Development and Testing

POSTER PAPERS ¹

- 9.20 – 10.20 76. **Ya.I. Binder, A.L. Gutnikov, T.V. Paderina**
(Elektromekhanika, JSC, Concern CSRI Elektropribor, JSC, Russia), S.F. Konovalov, D.V. Mayorov P.G. Rusanov, A.G. Sidorov, V.E. Chulkov (*Bauman Moscow State Technical University, Russia*)
Acoustic Azimuth Correction System of an Inclinometer
- 62 76. **Ya.I. Binder, A.L. Gutnikov, T.V. Paderina**
(Elektromekhanika, JSC, Concern CSRI Elektropribor, JSC, Russia), S.F. Konovalov, D.V. Mayorov P.G. Rusanov, A.G. Sidorov, V.E. Chulkov (*Bauman Moscow State Technical University, Russia*)
Acoustic Azimuth Correction System of an Inclinometer
- 63 77. **K.O. Baryshnikov, A.I. Balandin** (*NII PM named after Academician V. I. Kuznetsov, Russia*)
Application of the Empirical Mode Decomposition Method to Gyroscopic Systems by an Example of a Hybrid Inclinometer
- 129 78. **Ya.I. Binder, T.V. Paderina, B.E. Landau** (*Concern CSRI Elektropribor, JSC, Russia*)
Application of a Gimballess Electrostatic Gyroscope in the Navigation System of an Intelligent Pig for Pipeline Inspection
- 2 79. **B.S. Lunin** (*Lomonosov Moscow State University, Russia*), M.A. Basarab, V.A. Matveev, A.V. Yurin (*Bauman Moscow State Technical University, Russia*), Ye.A. Chumakin (*Arzamas Research and Production Enterprise TEMP-AVIA, JSC, Russia*)
Resonator Materials for Coriolis Vibratory Gyroscopes
- 3 80. **M.A. Basarab, V.A. Matveev** (*Bauman Moscow State Technical University, Russia*), **B.S. Lunin** (*Lomonosov Moscow State University, Russia*), Ye.A. Chumakin (*Arzamas Research and Production Enterprise TEMP-AVIA, JSC, Russia*)
Algorithms and Technologies for Surface Balancing of Hemispherical and Cylindrical Resonator Gyroscopes
- 43 81. **O.V. Bakhmetieva** (*Academician Pilyugin Center, Plant Zvezda, Russia*), V.M. Nikiforov, A.K. Kovalev (*Academician Pilyugin Center, Russia*)
Influence of a Hysteresis Gyromotor Boost Supply Voltage on the Readiness Time of a Gyro Unit

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- 47** 82. **A.V. Polushkin, R.V. Ermakov, N.A. Kaldymov, S. F. Nakhov** (*Academician Pilyugin Center, Production Association KORPUS, Russia*), **P.K. Plotnikov** (*Yuri Gagarin State Technical University of Saratov, Russia*)
Model of Rotary Table Shaft Nonuniform Movement and its Use to Improve the Calibration Accuracy of Navigation Devices
- 119** 83. **Yu.V. Filatov, A.M. Boronakhin, V. B. Dao, V. T. Le** (*St. Petersburg Electrotechnical University «LETI», Russia*)
Dynamic Calibration of an Accelerometer Triad on a Two-Axis Test Bed
- 50** 84. **V. A. Soldatenkov, Yu. K. Gruzevich, V. M. Achil'diev, Yu. N. Yevseeva** (*Geofizika-NV, JSC, Russia*)
Attitude and Heading Reference System Based on a Microelectromechanical Strapdown Inertial Unit
- 55** 85. **V.I. Grebennikov, L.Ya. Kalikhman, D.M. Kalikhman, S.F. Nakhov, V.V. Skorobogatov** (*Academician Pilyugin Center, Production Association KORPUS, Russia*), **A.I. Sapozhnikov, E.S. Smirnov** (*Academician Pilyugin Center, Russia*)
Vibrostability of the Quartz Pendulum Accelerometer with Digital Feedback
- 56** 86. **D.A. Burov** (*JSC «VNII Signal», Russia*)
New Engineering Solutions for Orientation Systems Exploitation in High-Latitude Areas
- 65** 87. **K.O. Baryshnikov, A.I. Balandin** (*NII PM named after Academician V. I. Kuznetsov, Russia*)
Application of Wavelet Thresholding in a Strapdown Attitude Control System
- 88.** **I.I. Savelyev, A.O. Sinel'nikov** (*Polyus Research and Development Institute named after M. F. Stel'makh, Russia*)
The Influence of the Pumping Current on the Zeeman Laser Rotation Sensor Output Parameters
- 88** 89. **Z. Liu, Y. Qin, S. Li, X.Cui** (*Northwestern Polytechnic University, China*)
A New IMU-based Method for Relative Position Determination

- 11 90.** **M.V. Antonova, D.S. Borodulin, A.A. Volyntsev, E.Ju. Kovaleva, L. Z. Novikov, A.I. Tereshkin, I.I. Zhegalin** (*NII PM named after Academician V.I. Kuznetsov, Russia*)
Modular Strapdown Inertial Units for a Wide Range of Rocket-Space Applications
- 14 91.** **A.H. Baghiyan** (*Military Aviation Institute named after Marshal A. Khanpheryants, Armenia*)
High-Precision Sensor of Quaternion
- 54 92.** **A.I. Sapozhnikov, Ye.S. Smirnov** (*Academician Pilyugin Center, Russia*), **L.Ya. Kalikhman, D.M. Kalikhman, S.F. Nakhov** (*Academician Pilyugin Center, Production Association KORPUS, Russia*)
Procedures for Ground-Based Testing of an Angular Rate Measurement Unit after Mounting in the Rocket Control System
- 95 93.** **N.V. Dmitriev, A.V. Polushkin, R.V. Ermakov, N.A. Kaldymov, S.F. Nakhov** (*Academician Pilyugin Center, Production Association KORPUS, Russia*), **P.K. Plotnikov** (*Yuri Gagarin State Technical University of Saratov, Russia*)
Evaluation of Gyrocompass Instrumental Errors with a High-Precision Rotary Table
- 98 94.** **V.Ya. Raspopov, S.V. Telukhin** (*Tula State University, Russia*)
The Electric Drive of Gyro Device Rotor with Motoring and Generating Operating Modes

SESSION IV SATELLITE SYSTEMS

Chairmen **Dr. B.V. Shebshaevich**, Russia
Prof. O.A. Stepanov, Russia

INVITED PAPER

- 10.20 – 11.05 95. **V.V. Pasynkov** (*Research and Production Corporation «Precision Instrument Making Systems», Russia*)
Status and Prospects of the Global Precision Navigation Systems (Differential Subsystems with the Global Working Range)

11.05 – 11.25 **DISCUSSION OF THE POSTER PAPERS**

11.25 – 11.40 COFFEE BREAK

PLENARY PAPERS

- 11.40 – 12.00 96. **P.P. Bogdanov, T.V. Primakina** (*Russian Institute of Radianavigation and Time, JSC, Russia*)
74 GLONASS Time Scale
- 12.00 – 12.20 97. **A.G. Milkovskiy, S.V. Seredin, S.N. Karutin, E.I. Ignatovich, I.A. Zolkin, A.F. Schekutiev** (*TSNIImash, Russia*)
99 Lines of Development of Methods and Means of GLONASS SVs Time Scales High Accuracy Synchronization Using Intersatellite Navigation-Link Technologies
- 12.20 – 12.40 98. **K.L. Kalagireva, B.I. Vassilev** (*Technical University of Sofia, Bulgaria*)
1 Comparative Analysis of the Algorithms for Determination of the EGNOS Performance Indicators

POSTER PAPERS ¹

- 12.40 – 12.55 99. **V.I. Baburov, N.V. Vasilyeva, N.V. Ivantsevich** (*JSC VNIIR, Scientific and Technical Center Navigator, Russia*)
12 Analyzing the Information Significance of GNSS

¹ The authors of poster papers are given 3 min **at the plenary session** to present the main idea of the paper with 1-2 slides, if any; further discussion will continue at the poster boards.

- Constellation Components
- 42 100.** **V.V. Lyubimov, S.V. Podkletnova, A.A. Osipov** (*Samara State Aerospace University, Russia*)
Simulating the Process of Microsatellite Angular Velocity Decrease Using Various Laws of Electromagnetic Coil Control
- 73 101.** **I.N. Kornilov, E.A. Kornilova, N.V. Ergashev** (*Ural Federal University, Russia*)
Development of a Public Local Differential GLONASS/GPS Subsystem
- 97 102.** **N.V. Mikhailov, V.V. Chistyakov** (*RNav Ltd., Russia*)
Digital Simulator of Future GLONASS Signals
- 103.** **Wang Guodong, Yang Yanguang, Xing Xiangming** (*Beijing Institute of Aerospace Control Devices, China*)
Improved GNSS Receiver Positioning Method Under the Condition of Weak Satellite Geometry
- 12.55 – 13.10 **DISCUSSION OF THE POSTER PAPERS**
- 13.10 – 14.15 **LUNCH**
- 14.15 – 14.30** **CLOSING CEREMONY**
- 14.30 – 17.00** **PANEL DISCUSSION «Methods for Navigation Sensor Performance Determination»**
- Moderators:** **Dr. David W. Allan** (*Allan's TIME, USA*)
Prof. O.A. Stepanov (*Concern CSRI Elektropribor, JSC, ITMO University, Russia*)
- David W. Allan** (*Allan's TIME, USA*)
Historicity, Strengths, and Weaknesses of Allan Variances and Their General Applications
- N. I. Krobka** (*Federal State Unitary Enterprise “Center for Ground-Based Space Infrastructure Operation” (Branch “Research Institute of Applied Mechanics named after Academician V.I. Kuznetsov”), Russia*)
On the Topology of the Allan Variance Graphs and Typical Misconceptions in the Interpretation of the Structure of the Gyros Noise (Based on the Examples of Reports at the St. Petersburg International Conference on Integrated Navigation Systems)

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O.A. Stepanov (*Concern CSRI Elektropribor, JSC, ITMO University, Russia*), **I.B. Chelpanov** (*State Polytechnic University, Russia*), **A.V. Motorin** (*Concern CSRI Elektropribor, JSC, ITMO University, Russia*)
Accuracy of Sensor Bias Estimation and its Relationship with Allan Variance

DISCUSSION