

PROGRAM

MONDAY, 30 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***
 Prof. G.F. Trommer, *Germany*

PLENARY PAPERS

- 10.15–10.35 1. **M.Yu. Belyaev, O.N. Volkov** (*S.P. Korolev Rocket and Space Corporation Energia, Korolev, **Russia***), **O.N. Solomina, G.M. Tertitski** (*Institute for Geography of RAS, Moscow, **Russia***)
Results of Russian Program of Animal Migration Research Using ICARUS Scientific Equipment aboard the ISS RS
- 10.35–10.55 2. **R.R. Bikmaev** (*Institute of Engineering Physics, Serpukhov, **Russia***)
A Globally Consistent Solution to the Simultaneous Localization and Mapping Using Keyframes as Prior Information
- 10.55–11.25 COFFEE BREAK

PLENARY PAPER

- 11.25–11.45 3. **Tianyi Liu, Yicheng Zhou** (*Xi'an Modern Control Technology Institute, **China***)
Distributed Cooperative Navigation for Unmanned Aerial System Based on Dynamic Priority

POSTER PAPERS¹

- 11.45–13.00 4. **M.E. Rulev, V.M. Achildiev** (*Scientific Production Company GEOPHIZIKA-NV, JSC, Moscow, Mytischki Branch of Bauman Moscow State Technical University, Mytischy, **Russia***), **Yu.K. Gruzevich** (*Scientific Production Unity GEOPHIZIKA-NV, JSC, Moscow, Bauman Moscow State Technical University, **Russia***), **N.A. Bedro** (*Scientific Production Company GEOPHIZIKA-NV, JSC, Moscow, **Russia***)
Primary Processing of Biophysical Signals of Electroreismocardiography System

¹ The authors of poster papers **at the plenary session** are given 3 min **to present the main idea of the paper** with 1-2 slides, if any; 2 min are given for Q&A (1-2 questions).

5. **Guohu Feng, Maosong Wang, Chan Liu** (*National University of Defense Technology (NUDT), Changsha, **China***)
Fault Tolerant Damping Method of Marine Navigation
6. **D.A. Trofimov, S.D. Petrov** (*St. Petersburg State University, **Russia***), **I.V. Chekunov, V.A. Usachev** (*Bauman Moscow State Technical University, **Russia***)
Alignment of Inertial Navigation Systems Based on Radio Interferometric Observations of Bright Natural and Artificial Radio Sources
7. **A. Dumitrascu, R.I. Ticu** (*Constanta Maritime University, **Romania***)
Integrated INS-GPS System for Performance Analysis in Motorsports
8. **A.V. Sholokhov, S.B. Berkovich, N.I. Kotov** (*Institute of Engineering Physics, Serpukhov, **Russia***)
Formation of Inertial Kinematic Parameters for Simulation of Terrain Navigation Systems Aided with Geospatial Data
9. **A.V. Chernodarov** (*NaukaSoft Experimental Laboratory, Ltd., MAI University, Moscow, **Russia***), **A.P. Patrikeev** (*NaukaSoft Experimental Laboratory, Ltd., Moscow, **Russia***), **S.E. Perelyaev** (*Ishlinsky Institute for Problems in Mechanics of RAS, Moscow, **Russia***), **A.A. Polyakova** (*NaukaSoft Experimental Laboratory, Ltd., Bauman Moscow State Technical University, **Russia***)
Geophysical Invariants and Observability of Integrated Inertial Navigation Systems
10. **A.V. Chernodarov** (*NaukaSoft Experimental Laboratory, Ltd., MAI University, Moscow, **Russia***), **A.P. Patrikeev** (*NaukaSoft Experimental Laboratory, Ltd., Moscow, **Russia***), **S.P. Timoshenkov** (*MIET University, Moscow, **Russia***), **S.A. Ivanov** (*Ramensky Instrument Engineering Plant, JSC, Ramenskoe, **Russia***)
Dynamical Calibration and Testing of MEMS Unit Using a Reference Inertial Satellite Navigation System

11. **I.G. Ninalalov, O.V. Kubryak, I.V. Merkuryev, S.V. Astakhov**
(*National Research University MPEI, Moscow, Russia*)
Methods for Improving the Accuracy of an Autonomous
Orientation and Navigation System Based on Micromechanical
Gyroscopes and Optoelectronic Sensors
12. **V.A. Smirnov, A.V. Prokhortsov, N.I. Babukhin** (*Tula State
University, Russia*)
A Method for Integration of Optical and Inertial Data to Determine
the Parameters of Orientation and Navigation
13. **V.N. Kovregin, G.M. Kovregina, A.S. Murzaev**
(*St. Petersburg State University of Aerospace Instrumentation,
Russia*)
Unified Method for Adaptive-Robust Observation of an Aerial
Object with a Complex Spectrum in Radars with Quasi-
Continuous Chirp Radiation and (Micro)Navigation
14. **K.S. Lel'kov, A.I. Chernomorsky** (*Moscow Aviation Institute
(MAI), Russia*)
Integrated Navigation System for Ground Wheeled Robot

13.00–14.00

LUNCH

Chairmen: **K.K. Veremeenko, Ph.D., Russia**
A.V. Motorin, Ph.D., Russia

PLENARY PAPER

- 14.00–14.20 15. **A.V. Motorin, O.A. Stepanov, A.A. Krasnov, A.V. Sokolov**
(*Concern CSRI Elektropribor, JSC, ITMO University,
St. Petersburg, Russia*)
Joint Estimation of Gravity Anomaly and Vertical Motion
from a Marine Vessel

POSTER PAPERS¹

- 14.20–15.30 16. **Bo Wang, Tijing Cai** (*School of Instrument Science and Engineering, Southeast University, Nanjing, China*)
A Joint Gravity Matching Algorithm with Less Constraint by Gravity Fields
17. **O.A. Stepanov** (*Concern CSRI Elektropribor, JSC, ITMO University, St. Petersburg, Russia*), **V.A. Vasil'ev** (*Concern CSRI Elektropribor, JSC, ITMO University, St. Petersburg State Electrotechnical University LETI, St. Petersburg, Russia*), **A.B. Toropov** (*Concern CSRI Elektropribor, JSC, St. Petersburg, Russia*)
Map-Aided Navigation Algorithms Taking into Account the Variability of Position Errors of the Corrected Navigation System
18. **V.I. Baburov, V.A. Boyko, I.L. Fidlín, V.V. Khudoshin** (*Navigator, JSC, St. Petersburg, Russia*), **N.V. Ivantsevich** (*Navigator, JSC, D.F. Ustinov Baltic State Technical University Voennmeh, St. Petersburg, Russia*)
A Simulator for Testing and Debugging the Algorithms for an Aircraft Collision-Avoidance and Air-Surveillance System
- 81 19. **H. Benzerrouk** (*École de technologie supérieure, Montreal, Canada*), **A.V. Nebylov, V.A. Nebylov** (*St. Petersburg State University of Aerospace Instrumentation, Russia*)
Multi Pulsars Based Positioning, Navigation, and Timing in Deep Space Based on Uncertain Information Fusion Algorithms
20. **V.B. Pudlovskiy** (*State Scientific Center of the Russian Federation VNIIFTRI, Mendeleevo, Russia*, *National Research University MPEI, Moscow, Russia*), **N.I. Petukhov, A.A. Chugunov, A.P. Malyshev**, (*National Research University MPEI, Moscow, Russia*), **A.A. Frolov** (*State Scientific Center of the Russian Federation VNIIFTRI, Mendeleevo, Russia*)
Joint Processing of GNSS and UWB Signals for Seamless Navigation in Urban Environments

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21. **M.Yu. Tkhorenko, E.V. Karshakov** (*V.A. Trapeznikov Institute of Control Sciences of RAS, Moscow, **Russia***)
Estimating the Potential Accuracy of Magnetic Navigation Based on Magnetic Survey Data
22. **I.V. Belokonov, W.A. Cardenas D., J.G. Quijada P.** (*Samara National Research University, **Russia***)
Investigation of the Possibility of Using a Convolutional Neural Network to Detect the Sun in the Mode of Unstabilized Motion of a Nanosatellite
23. **I.N. Burdinsky, A.S. Mironov** (*Pacific National University, Khabarovsk, **Russia***)
Using Configurable On-Chip Systems in a Sonar Navigation System Receiver for Mobile Autonomous Robotic Complexes
24. **V.N. Kovregin, G.M. Kovregina, A.S. Murzaev** (*St. Petersburg State University of Aerospace Instrumentation, **Russia***)
Method of Observation/Recognition/Classification of a Helicopter by Chirp Echo Signals in Pulse-Doppler Helicopter Radars with Radio-Inertial Micronavigation
25. **P.K. Kuznetsov, B.V. Martemyanov, G.N. Myatov** (*Samara State Technical University, **Russia***), **G.I. Leonovich** (*Samara Research Centre of RAS, **Russia***)
A Technique for Rapid Detection, Recognition and High-Precision Determination of Vessel Motion Parameters From the Images of Trails Left on the Water Surface

15.30–16.00

COFFEE BREAK

SESSION II – CONTROL SYSTEMS

Chairmen: **Prof. I.V. Belokonov, *Russia***
Dr. Ye.V. Karshakov, *Russia*

PLENARY PAPER

- 16.00–16.20 26. **A.A. Galkin, A.S. Timoshenkov** (*Laboratory of Microdevices, JSC, Moscow, **Russia***), **P.V. Erkin, V.P. Zaharov** (*National Research University of Electronic Technology, Moscow, **Russia***), **N.A. Solomkina, E.S. Kochurina** (*Laboratory of Microdevices, JSC, Moscow, **Russia***)
Development of Precision Airdrop System Based on GKV-6 MEMS IMU

POSTER PAPERS¹

- 16.20–17.50 27. **A.V. Molodenkov, Ya.G. Sapunkov** (*Institute for Precision Mechanics and Control Problems of RAS, Saratov, **Russia***), **T.V. Molodenkova** (*Yu.A. Gagarin State Technical University of Saratov, **Russia***)
Analytical Quasi-Optimal Algorithm for the Time-Minimal Reorientation of a Spacecraft under Arbitrary Boundary Conditions
28. **I.A. Pankratov** (*Saratov National Research State University; Institute for Precision Mechanics and Control Problems of RAS, Saratov, **Russia***), **Yu.N. Chelnokov** (*Institute for Precision Mechanics and Control Problems of RAS, Saratov, **Russia***)
Quaternion Models and Algorithms for Solving the General Problem of Optimal Reorientation of the Spacecraft Orbit and Its Plane
29. **Ye.I. Somov, S.A. Butyrin, T.Ye. Somova** (*Samara State Technical University, **Russia***)
Control of a Space Robot while Changing Fuel Tanks of a Geostationary Satellite Propulsion Unit
30. **Ye.I. Somov, S.A. Butyrin, S.Ye. Somov** (*Samara State Technical University, **Russia***)
Autonomous Guidance and Control of a Geostationary Communications Satellite during Long-Term Conservation
31. **A.M. Popov, D.G. Kostrygin, P.V. Krashanin, A.A. Shevchik** (*D.F. Ustinov Baltic State Technical University Voennmeh, St. Petersburg, **Russia***)
Development of an Algorithm for Guiding the Swarm of Unmanned Aerial Vehicles
32. **E.V. Barinova, I.V. Belokonov, I.A. Timbai** (*Samara National Research University, **Russia***)
Motion Features of Aerodynamically Stabilized CubeSat 6U Nanosatellites
33. **I.V. Belokonov, M.S. Shcherbakov, D.P. Avaryaskin** (*Samara National Research University, **Russia***)
Investigation of a Single-Axis Control Algorithm for the Inspection Motion of a Gravitationally Stabilized Nanosatellite

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34. **A.V. Nebylov, V.A. Nebylov** (*St. Petersburg State University of Aerospace Instrumentation, **Russia***)
Relative Navigation and Joint Control of Aerospace Plane and Ekranoplane for the Purpose of Their Docking
35. **A.V. Nebylov, A.A. Kuznetsov** (*St. Petersburg State University of Aerospace Instrumentation, **Russia***)
Study of the Methods for Analysis of the Maximum Control Error
36. **Jianfeng Yi, M.S. Selezneva, K.A. Neusypin** (*Bauman Moscow State Technical University, **Russia***)
Research of Intelligent Parking System
37. **A.M. Gruzlikov** (*Concern CSRI Elektropribor, JSC, St. Petersburg, **Russia***)
Short and Ultra-Short Baseline Navigation of the AUV for Bringing It to the Bottom Docking Device
38. **A.Yu. Knyazhsky, A.V. Nebylov, V.A. Nebylov** (*St. Petersburg State University of Aerospace Instrumentation, **Russia***)
Minimizing the Altitude of a Low-Flying Vehicle in the Absence of an Altitude Map
39. **D.O. Prokhorova, V.I. Shiriaev** (*South Ural State University, Chelyabinsk, **Russia***)
Analysis of the Pitch Angle Stabilization System with Consideration of Sensor Noise
40. **N.A. Elisov, A.V. Kramlikh, I.A. Lomaka** (*Samara National Research University, **Russia***)
An Approach to the Control of the Nanosatellite's Longitudinal Axis Reorientation
41. **V.M. Nikiforov, A.A. Gusev, K.A. Andreev, A.S. Shiryaev** (*Academician Pilyugin Center, Moscow, **Russia***),
A.A. Nizhegorodov (*Peter the Great Military Academy of Strategic Rocket Forces, Serpukhov, **Russia***)
Elimination of Self-Oscillations at Terminal Control Endpoint by Kalman Filtering

42. **Lihui Deng** (*Harbin Engineering University, Tianjin Navigation Instrument Research Institute, China*), **Hongjian Wang** (*Harbin Engineering University, China*), **Rubin Yuan, Tingting Guo** (*Tianjin Navigation Instrument Research Institute, China*), **Zhikang Chi** (*Harbin Engineering University, China*)
Research on Path Following Control of Unmanned Surface Vehicle Based on Model Predictive Control with Improved Artificial Bee Colony Algorithm
43. **Haoqian Huang, Ruitong Liu, Shuang Zhang, Peng Wu** (*Hohai University, Nanjing, China*)
Horizontal Trajectory Tracking of AUV Based on Fixed-Time Sliding Model Control

TUESDAY, 31 MAY

SESSION III – INERTIAL SYSTEMS AND SENSORS

Chairmen: **Prof. Yu.V. Filatov, Russia**
N.G. Skidanov, Ph.D., Russia

PLENARY PAPER

- 9.30 – 9.50 44. **A.O. Makalov, V.A. Smirnov, A.V. Prokhortsov** (*Tula State University, Russia*)
Inertial Acoustic Electronic Auscultation System for the Diagnosis of Lung Diseases

POSTER PAPERS¹

- 9.50–10.30 45. **Y.V. Bolotin, A.V. Savin** (*Moscow Lomonosov State University, Russia*)
Calibration of a Micromechanical Inertial Measurement Unit on a Turntable in the Spectral Domain
46. **Jing Cai, Jianhua Cheng, Yuehang Xu, Jiaxin Liu** (*Harbin Engineering University, China*)
Application of Unscented Kalman Filter with Neural Network in the Polar Rapid Transfer Alignment

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47. **L.V. Vodicheva, L.N. Belsky, Yu.V.Parysheva** (*Academician N.A. Semikhatov Scientific and Production Association of Automatics, Yekaterinburg, Russia*)
A Technique for Initial Self-Alignment of a Strapdown INS for Space Launch Vehicles
48. **M.S. Selezneva, K.A. Neusypin, A.V. Proletarsky** (*Bauman Moscow State Technical University, Russia*), **Chen Danhe** (*Nanjing University of Science and Technology, China*)
Algorithms for Integrating an Inertial Navigation System with Angular Acceleration Sensors
49. **D.A. Burov** (*VNII Signal, Kovrov, Russia*)
Peculiarities of Platform and Strapdown Angular Orientation Gyro Systems Application as Part of Ground Mobile Objects
50. **Jian Liu, Xiangxiang Lu, Dongliang Pei, Junfeng Zhang, Weiren Liu, Xiaoming Zhao** (*Tianjin Navigation and Instrument Institute, China*)
Angular Alignment of Separated Raman Beams Based on Optical Interference in Atom-Interferometer Gyroscopes
51. **S.Yu. Perepelkina, A.A. Fedotov** (*Academician N.A. Semikhatov Scientific and Production Association of Automatics, Yekaterinburg, Russia*)
Determination of Significant Characteristics of Strapdown Inertial Navigation Systems as Part of a Control Object, Using Typical Motion Sections
52. **Xiaoge Ning** (*Shanghai Jiao Tong University (SJTU), Beijing Aerospace Times Optical-Electronic Co. Ltd, China*), **Jixun Huang** (*Beijing Institute of Aerospace Control Devices, China*), **Jianxun Li** (*Shanghai Jiao Tong University (SJTU), China*)
A New Method for Inertial Strapdown Navigation System Alignment under Large Misalignment Based on a Velocity Error Transformation

53. **R.S. Kulikov** (*National Research University MPEI, Moscow, Russia*), **O.V. Denisenko** (*State Scientific Center of the Russian Federation VNIIFTRI, Mendeleevo, Russia*), **O.V. Glukhov**, **I.V. Merkuryev** (*National Research University MPEI, Moscow, Russia*)
Modeling the Influence of Time Scale Instability on Inertial Navigation Error

10.30–11.00

COFFEE BREAK

PLENARY PAPERS

- 11.00–11.20 54. **A.B. Tarasenko, A.A. Fomichev, P.V. Larionov, P.A. Filatov** (*Moscow Institute of Physics and Technology, Dolgoprudny, Russia*), **A.B. Kolchev, D.E. Borodulin** (*JSC LASEX, Dolgoprudny, Russia*)
Flight Tests of a Compact Integrated Navigation System
- 11.20–11.40 55. **Cheng Li, Bo Yang, Xiang Zheng, Zhenyu Sun, Luqiang Zhou** (*Southeast University (SEU), Nanjing, China*)
A Seismic-Grade Optical MEMS Accelerometer with Force Feedback Control

POSTER PAPERS¹

- 11.40–13.00 56. **V.V. Matveev, V.V. Likhoshester, V.Ya. Raspopov, D.S. Streltsov** (*Tula State University, Russia*)
Identification of the Parameters of a Coriolis Vibratory Gyroscope with a Metal Resonator under Positional Excitation of a Standing Wave
57. **Kaiyong Yang, Xingyuan Tang, Yao Pan, Yonglei Jia, Libin Zeng, Yunfeng Tao** (*National University of Defense Technology, Changsha, China*)
Investigation on Influence of Surface Roughness on Q Factor of Cylindrical Resonator with Surface Metallization

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58. **S.E. Perelyaev** (*Ishlinsky Institute for Problems in Mechanics of RAS, Moscow, **Russia***), **S.B. Bodunov, B.P. Bodunov** (*RPE MEDICON, Miass, **Russia***)
Navigation Grade Wave Solid-State Gyro for Air-Space Applications
59. **Wenming Zhang, Haoyu Gu, Zhihui Lin, Qi Wei, Bin Zhou, Rong Zhang** (*Tsinghua University, Beijing, **China***)
The High Performance Synchronous Trimming Method for Fused Silica Hemispherical Resonator
60. **A.A. Maslov, D.A. Maslov, I.V. Merkuriev, V.V. Podalkov** (*National Research University MPEI, Moscow, **Russia***)
Scale Factor of the Wave Solid-State Gyroscope Operating in the Angular Velocity Sensor Mode
61. **M.A. Basarab, A.V. Proletarskiy** (*Bauman Moscow State Technical University, **Russia***), **B.S. Lunin** (*Lomonosov Moscow State University, **Russia***), **A. Giani, P. Combette, A. Kechaf** (*University of Montpellier, Institut d'Electronique et des Systèmes (IES), Montpellier, **France***)
Simulation of the Gas Flow Gyrometer Using the Meshless Techniques
62. **D.G. Gryazin, T.V. Paderina** (*Concern CSRI Elektropribor, JSC, St. Petersburg, **Russia***)
Adaptive Algorithms of an Inclinator Based on a Micromechanical Inertial Unit
63. **Yinan Zhang, Haoyu Gu, Qi Wei, Rong Zhang, Bowen Xing** (*Tsinghua University, Beijing, **China***)
A System-Level Synthetical Modeling Method for Lissajous Frequency-Modulated MEMS Gyroscope
64. **Yu.N. Korkishko, V.A. Fedorov, S.V. Prilutskiy, D.V. Obuhovich, V.E. Prilutskiy, V.G. Ponomarev, I.V. Fedorov, A.I. Zuev, V.K. Varnakov, S.M. Kostritskii, I.V. Morev** (*Optolink RPC LLC, Moscow, **Russia***)
Miniature Inertial Measurement Units IMU200 and IMU400 Based on FOG with MEMS-Accelerometers: Development and Studying of Characteristics

65. **A.V. Kalikanov, V.Ya. Raspopov, V.V. Matveev, V.V. Likhosherst, M.G. Pogorelov** (*Tula State University, Russia*)
Studying the Feasibility of Constructing a Roll-Angle Sensor Based on Coriolis Vibratory Gyroscopes
66. **A.V. Bolshakova, A.M. Boronakhin, E.D. Bokhman, D.Yu. Larionov, L.N. Podgornaya, A.N. Tkachenko, R.V. Shalymov** (*St. Petersburg Electrotechnical University LETI, Russia*)
The Possibility of Using Inertial Sensor Readings for Detection of Long Wavelength Rail Irregularities
67. **D.M. Kalikhman, E.A. Deputatova** (*Branch of Academician Pilyugin Center – Production Association Korpus, Saratov, Russia*), **S.V. Pchelintseva, V.O. Gorbachev** (*Yuri Gagarin State Technical University of Saratov, Russia*), **V.M. Nikiforov** (*Academician Pilyugin Center, Moscow, Russia*)
Development of a Design Concept for a Class of Precision Mechatronic Test Benches with Inertial Sensing Elements Combined with Precision Angle Sensors

13.00–14.00

LUNCH

Chairmen: **Prof. A.A. Golovan, Russia**
Yu.A. Litvinenko, PhD, Russia

PLENARY PAPER

- 14.00–14.20 68. **Da Li** (*Harbin Engineering University, Tianjin Navigation Instrument Research Institute, China*), **Lin Zhao** (*Harbin Engineering University, Harbin, China*), **Haina Weng, Hongwei Gao, Zhong Li** (*Tianjin Navigation Instrument Research Institute, Laboratory of Science and Technology on Marine Navigation and Control of China State Shipbuilding Corporation, Tianjin, China*), **Guoqing Ma** (*Jilin University, Changchun, China*)
Data Processing Method of Dynamic Gravity Gradiometer Based on Time-Frequency Combination

POSTER PAPERS¹

- 14.20–15.50 69. **E.A. Petrukhin** (*JSC Serpukhov plant Metallist, Serpukhov, Russia*), **A.S. Bessonov** (*MIREA - Russian Technological University, Moscow, Russia*)
Effect of Diffraction Nonreciprocity in a Laser Gyro
70. **Pei Zhang, Jianqing Wang, Kun Li, Honggang Chen, Wei Hong, Yun-Jiao Li, Bo Huang, Wei Jiang, Gang Wang** (*Xi'an Aerospace Precision Electromechanical Institute, China Aerospace Science and Technology Corporation, Xi'an; China*)
Research on the Technology for Suppressing Shupe Error of Fiber Optic Gyroscope Based on Structure That Integrates Thermal Conduction and Insulation
71. **Honggang Chen, Jianqing Wang, Xudong Hu, Pei Zhang, Wei Jiang, Hang Chen** (*Xi'an Aerospace Precision Electromechanical Institute, China Aerospace Science and Technology Corporation, Xi'an; China*)
Research on Rapid Thermal Balance Technology of Fiber Coil
72. **P.A. Filatov, I.S. Kruzhilin** (*Moscow Institute of Physics and Technology, Russia*), **P.V. Larionov, A.D. Morozov** (*JSC LASEX, Dolgoprudniy, Russia*), **A.A. Fomichev** (*Moscow Institute of Physics and Technology, JSC LASEX, Dolgoprudniy, Russia*), **A.B. Tarasenko** (*Moscow Institute of Physics and Technology, Russia*)
Evaluation of the Influence of the Vibration Base on the Accuracy of the Navigation System Based on Laser Gyroscopes with a Planar Circuit and Q-Flex Accelerometers
73. **G.O. Barantsev, A.V. Kozlov** (*Lomonosov Moscow State University, Russia*), **I.Kh. Shaimardanov, A.V. Nekrasov** (*JSC Inertial Technologies of Technocomplex, Ramenskoye, Russia*)
Model of the Elastic Dynamic Torsion of a Ring Laser Gyroscope Mechanical Dither and a Method for Its Calibration
74. **N.V. Tikhmenev** (*JSC GosNIIP, Moscow, Russia*), **A.V. Belov, I.V. Knyazev, V.A. Nikitin, M.A. Rogozhkina** (*PJSC Elektropribor, Tambov, Russia*)
Ignition Delay and Ignition Modes in Zeeman Laser Gyroscope

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75. **N.V. Tikhmenev** (*GosNIIP, Moscow, Russia*), **D.A. Bannikov**, **I.V. Knyazev**, **M.A. Rogozhkina** (*PJSC Elektropribor, Tambov, Russia*)
The Effect of Induced Absorption on Lock-in of Frequencies in a Laser Gyroscope
76. **N.V. Tikhmenev** (*GosNIIP, Moscow, Russia*), **D.A. Bannikov**, **S.E. Korshunov**, **I.G. Protsenko** (*PJSC Elektropribor, Tambov, Russia*)
Measuring Losses of Ring-Laser Precision Mirrors
77. **Yu.Yu. Broslavets**, **A.A. Fomichev**, **E.A. Polukeev**, **V.G. Semenov** (*Moscow Institute of Physics and Technology; JSC Lasex, Dolgoprudny, Russia*), **V.P. Surovtseva** (*Moscow Institute of Physics and Technology, Dolgoprudny, Russia*)
Multi-frequency YAG:Cr⁴⁺ Solid-State Laser Gyroscope, Perimeter Control and Dither Creation System, Operating Regimes
78. **Yu.Yu. Broslavets**, **A.A. Fomichev**, **V.G. Semenov**, **E.A. Polukeev** (*Moscow Institute of Physics and Technology; JSC LASEX, Dolgoprudny, Russia*)
Four-Frequency Zeeman Laser Gyro with Nonplanar Symmetric Resonator and Its Perimeter Control System
79. **I.N. Khokhlov**, **A.O. Sinelnikov**, **N.E. Fetisova** (*POLYUS Research Institute of M.F. Stelmakh, JSC, Moscow, Russia*)
Scale Factor Correction Model for Zeeman Laser Gyroscopes
80. **Ya.A. Zubarev**, **A.O. Sinelnikov**, **N.E. Fetisova** (*POLYUS Research Institute of M.F. Stelmakh, JSC, Moscow, Russia*)
A Study of the Temperature Stability of the Zeeman Laser Gyro Ring Resonator
81. **M.A. Barulina**, **A.V. Golikov** (*Institute for Precision Mechanics and Control Problems of RAS, Saratov, Russia*), **D.M. Kalikhman**, **L.Ya. Kalikhman**, **E.A. Deputatova**, **V.A. Turkin** (*Branch of Academician Pilyugin Center – Production Association Korpus, Saratov, Russia*)
Ensuring Temperature Stability of the Unit of Linear Acceleration Meters under Spaceflight Conditions

82. **V.M. Nikiforov, A.A. Gusev, K.A. Andreev, S.A. Osokin** (*Academician Pilyugin Center, Moscow, **Russia***),
D.M. Kalikhman, A.A. Akmaev (*Branch of Academician Pilyugin Center – Production Association Korpus, Saratov, **Russia***), **A.A. Nizhegorodov** (*Peter the Great Military Academy of Strategic Rocket Forces, Serpukhov, **Russia***)
Optimisation of the Parameters of a Compensation Pendulous Accelerometer Controller
83. **A.Kramlikh, P.N. Nikolaev, D.V. Rylko** (*Samara National Research University, **Russia***)
Implementation Features of Attitude Determination Algorithm for the SamSat-ION Nanosatellite

The paper is recommended by the Program Committee of the 24th Conference of Young Scientists “Navigation and Motion Control”
84. **D.A. Gontar’, E.V. Dranitsyna** (*Concern CSRI Elektropribor, JSC, St. Petersburg, **Russia***)
Improving the Efficiency of Polynomial Regression of Fiber-Optic Gyroscope Temperature Sensitivity

The paper is recommended by the Program Committee of the 24th Conference of Young Scientists “Navigation and Motion Control”
85. **D.G. Gilev** (*Perm State National Research University, Perm National Research Polytechnic University, **Russia***), **V.V. Krishtop** (*Perm Scientific-Industrial Instrument Making Company, Perm State University, Perm National Research Polytechnic University, **Russia***)
Using Methods for Processing the Resonant Peak to Increase the Sensitivity of the Angular Rate Sensor

The paper is recommended by the Program Committee of the 24th Conference of Young Scientists “Navigation and Motion Control”
86. **E.A. Popov** (*NPP Itelma Ltd., Moscow, **Russia***),
G.Yu. Kiryachenko (*Central Research Institute of Automation and Hydraulics, JSC, Moscow, **Russia***), **Yu.G. Egorov** (*Bauman Moscow State Technical University, **Russia***)
Research on Vector Meter Scalar Calibration Programs

The paper is recommended by the Program Committee of the 24th Conference of Young Scientists “Navigation and Motion Control”

SESSION IV – RELEVANT ISSUES OF THEORY

Chairmen: **Dr. Yu.A. Litmanovich, Russia**
O.V. Zaitsev, Ph.D., Russia

PLENARY PAPERS

- 16.20–16.40 87. **S.E. Perelyaev, V.F. Zhuravlev** (*Ishlinsky Institute for Problems in Mechanics of RAS, Moscow, Russia*)
Spatial Effect of Inertness of Elastic Waves on a Sphere. Technical Applications in Modern Gyroscopy
- 16.40–17.00 88. **Maoran Zhu, Yuanxin Wu** (*Shanghai Jiao Tong University, China*)
Lightweight Precision Inertial Computation Based on Chebyshev Polynomial Optimization

POSTER PAPERS¹

- 17.00–17.30 89. **Yu.N. Chelnokov** (*Institute for Precision Mechanics and Control Problems of RAS, Saratov, Russia*), **S.E. Perelyaev** (*Ishlinsky Institute for Problems in Mechanics of RAS, Moscow, Russia*)
Equations and Algorithms of Strapdown Inertial Navigation Systems to Determine Apparent, Gravitational and Relative Velocities and the Geographical Coordinates of a Moving Object
90. **Yu.N. Chelnokov, M.Yu. Loginov** (*Institute for Precision Mechanics and Control Problems of RAS, Saratov, Russia*)
Prediction and Correction of Spacecraft Motion Based on the Solutions of Regular Quaternion Equations in KS-Variables and Isochronous Derivatives
91. **I.V. Papkova, T.V. Yakovleva, A.V. Krysko, V.A. Krysko** (*Yuri Gagarin State Technical University of Saratov, Russia*)
General Theory of Porous Functionally Gradient MEMS/NEMS Beam Resonators Subjected to Temperature Field
92. **R.V. Ermakov, A.A. L'vov, D.Yu. Livshits** (*Yuri Gagarin State Technical University of Saratov, Russia*), **D.V. Kondratov** (*Yuri Gagarin State Technical University of Saratov, Institute of Precision Mechanics and Control Problems of RAS, Saratov, Russia*)
Vibrational Error Model Update for a Hemispherical Resonator Gyroscope

¹ The authors of poster papers **at the plenary session** are given 3 min to **present the main idea of the paper** with 1-2 slides, if any; 2 min are given for Q&A (1-2 questions). I

93. **O.S. Amosov, S.G. Amosova** (*V.A. Trapeznikov Institute of Control Science of RAS, Moscow, **Russia***)
Machine Learning with Reinforcement for Optimal and Adaptive Estimation Problems in Navigation Applications

WEDNESDAY, 1 JUNE

SESSION V – SATELLITE NAVIGATION SYSTEMS

Chairmen: **Dr. D.A. Koshaev, *Russia***
Prof. V.V. Ivashkin, *Russia*

P L E N A R Y P A P E R S

- 9.30–9.50 94. **N.S. Gujva, V.E. Prun, M.G. Lobanov, V.V. Postnikov, R.N. Sadekov, D.L. Sholomov** (*Cognitive Technologies, Moscow, **Russia***)
Using 3D Object Detection DNN in an Autonomous Tram to Predict the Behaviour of Vehicles in the Road Scene
- 9.50–10.10 95. **Saraswathi Sirikonda, Srinu Chittimalla, Laxminarayana Parayitam** (*NERTU, Osmania University, Hyderabad, **India***)
Evaluation of Positional Performance of NavIC Software Receiver with Inertial Sensor Measurements
- 10.10–10.30 96. **Bo Lu** (*Beijing Aerospace Automatic Control Institute (BAACI), **China***)
Double Residual Networks with Regional Position Encoding for Weak Satellite Navigation Signal Acquisition

P O S T E R P A P E R S ¹

- 10.30–11.15 97. **V.B. Ilyin, I.A. Kopylov, E.G. Kharin, V.A. Kopelovich, A.F. Yakushev, P.Yu. Zhabin** (*Gromov Flight Research Institute, Zhukovsky, **Russia***)
Flight Tests of Onboard SNS Equipment Characteristics during Operation with Different Global Navigation Satellite Systems
98. **A.V. Prokhortsov, V.A. Smirnov, O.V. Minina** (*Tula State University, **Russia***)
Highly Accurate Method of Determining the Angular Orientation of Unmanned Aircraft by Signals of Satellite Radionavigation System

¹ The authors of poster papers **at the plenary session** are given 3 min to **present the main idea of the paper** with 1-2 slides, if any; 2 min are given for Q&A (1-2 questions).

99. **D.A. Bedin** (*N.N. Krasovskii Institute of Mathematics and Mechanics of the Ural Branch of RAS, Yekaterinburg, **Russia***)
Positioning by Pseudorange Measurements Using the Bancroft Method: Approaches to the Description of the Nonlinear Error Distribution
100. **Jianhua Cheng, Jiaxiang Li, Chao Jiang, Jiachang Jiang, Chun Jia** (*Harbin Engineering University (HEU), **China***)
Assessment of BDS-3 Global Real-Time Kinematic Positioning Availability Based on Redundant Dual-Receivers Configuration
101. **Jianhua Cheng, Chao Jiang, Jiaxiang Li, Jiangjia Chang, Chun Jia** (*Harbin Engineering University, **China***)
Performance Analysis of Global Ambiguity Resolution for BeiDou Satellite Navigation System
102. **S.D. Petrov, P.V. Movsesian** (*St. Petersburg State University, **Russia***), **I.V. Chekunov, V.A. Usachev** (*Bauman Moscow State Technical University, **Russia***)
Control of the Pseudophase Continuity of Navigation Satellite Signals by Integration with Clocks and Inertial Systems
103. **A.A. Kumarin, S.V. Shafran, D.S. Malakhov, I.A. Kudryavtsev** (*Samara National Research University, **Russia***)
Navigation Receiver Signal Tracking Module Correction Based on Motion Data
104. **V.I. Baburov, N.V. Vasilyeva** (*Navigator, JSC, St. Petersburg, **Russia***), **N.V. Ivantsevich** (*Navigator, JSC, St. Petersburg, D.F. Ustinov Baltic State Technical University Voenmeh, St. Petersburg, **Russia***)
A Study of the Coordinate Correction Method in DGNSS Positioning Using Two Satellite Systems
105. **A.V. Nemov** (*Russian Institute of Radionavigation and Time, St. Petersburg, **Russia***), **D.Yu. Tyufiyakov** (*KB NAVIS, St. Petersburg, **Russia***)
Algorithms for Estimating the Number of Signals in Data Samples Processed by a GNSS Digital Antenna Array

PANEL DISCUSSION:
Navigational Support in the Moon Development

Chairmen: **Prof. I.V. Belokonov, *Russia***
Associate Prof. A.V. Kramlikh, *Russia*

11.45–13.00

Presentations:

106. **I.V. Belokonov** (*Samara National Research University, **Russia***)
The Relevance of the Navigation Problem at the Active
Exploration of the Moon and Pre-Lunar Space
107. **V.V Ivashkin** (*Keldysh Institute of Applied Mathematics
of RAS, Moscow, **Russia***), **E.S. Gordienko** (*Lavochkin Research
and Production Association, Khimki, **Russia***)
On Possibility of Creating a Lunar Navigation Satellite System
and a Lunar Orbital Base on the Basis of High Circular Orbits of
an Artificial Moon's Satellite
108. **V.E. Chebotarev** (*JSC Information Satellite Systems –
Reshetnev Company, Zheleznogorsk, **Russia***)
A Phased Approach to Navigation Information Support for Lunar
Missions

13.00–13.15

DISCUSSION

13.15–13.30

CLOSING CEREMONY

13.30–14.30

LUNCH