

# PRELIMINARY PROGRAM

MONDAY, 30 MAY

**8.00 – 9.50**      **REGISTRATION OF THE CONFERENCE PARTICIPANTS**

**10.00 – 10.15**      **OPENING CEREMONY**

## SESSION I - INERTIAL SYSTEMS AND SENSORS

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

## PLENARY PAPERS

10.15 – 10.35      1.    **V. B.Nikishin, A. I.Sinev** (*JSC Gazpriboravtomatikaservice, Saratov, **Russia***), **V.S.Shorin** (*Yuri Gagarin Saratov State Technical University, **Russia***)  
60                      Application of Micromechanical Inertial Units for Pig-Assisted Certification and Positioning of Main Pipelines

10.35 – 10.55      2.    **N. Kronenwett, J. Ruppelt, G.F. Trommer** (*Institute of Systems Optimization (ITE), Karlsruhe Institute of Technology (KIT), Karlsruhe, **Germany***), **G.F. Trommer** (*Institute of Systems Optimization (ITE), Karlsruhe Institute of Technology (KIT), Karlsruhe, **Germany**, ITMO University, St. Petersburg, **Russia***)  
8                      Motion Monitoring with a Foot Mounted Inertial Measurement Unit for Pedestrian Navigation Systems

10.55 – 11.25      COFFEE BREAK

## PLENARY PAPERS

11.25 – 11.45      3.    **R.V.Alaluev, V.V.Matveev, V.Ya.Raspopov, A.P.Schvedov** (*Tula State University, **Russia***)  
34                      Micromechanical Positioning System Based on Angular Rate Sensors

- 11.45 – 12.05      4. **W. J. Wu, Z. Li, J. Q. Liu** (*MOE Key Laboratory of Fundamental Physical Quantities Measurement, School of Physic, Huazhong University of Science and Technology, Wuhan, China*), **J. Fan, L. C. Tu** (*MOE Key Laboratory of Fundamental Physical Quantities Measurement, School of Physic, Huazhong University of Science and Technology, Institute of Geophysics, Huazhong University of Science and Technology, Wuhan, China*)  
**65**      A Novel Sandwich Capacitive in-Plane Nano-G Microelectromechanical Systems Accelerometer

## POSTER PAPERS <sup>1</sup>

- 12.05 – 12.40      5. **Ya.A. Nekrasov, N.V. Moiseev, R.G. Lyukshonkov, Ya.V. Belyaev, A.G. Tkachenko, A.S. Kovalev** (*Concern CSRI Elektropribor, JSC, St. Petersburg, Russia*)  
**7**      Temperature Stabilization of a MEMS Gyroscope Using Temperature Dependence of the Drive-Loop Q-factor
- 20      6. **Yu.V.Vakhtin, A.S.Mit'kin, V.A.Pogorelov, V.P.Sizov, I.P. Miroshnichenko** (*Research Institute of Radio Communication, Don State Technical University, Rostov-on-Don, Russia*)  
Modified Micromechanical Gyroscope
- 69      7. **J.X. Ren, R. Zhang** (*School of Automation, Northwestern Polytechnical University, Xi'an, P.R.China*)  
Research on Accuracy Improvement Method of MEMS Gyroscope Based on Robust Adaptive Fuzzy Sliding Mode Control
- 23      8. **D.M. Malyutin, Yu.V. Ivanov, V.Ya. Raspopov** (*Tula State University, Russia*), **D.G. Gryazin** (*Concern CSRI Elektropribor, JSC, St. Petersburg, Russia*)  
Orientation System of a Waverider Buoy on MEMS Accelerometers
- 66      9. **Z.Q. Wu, Y.F. Zhu, X. H.Zhu** (*Nanjing University of Science and Technology, Nanjing, China*)  
A Silicon Micro-Gyroscope with Closed Loop Sensing System

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<sup>1</sup> 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; further discussion will continue at the posters.

10. **A. A.Maslov, D.A. Maslov, I. V.Merkuryev, V.V.Podalkov** (*Moscow Power Engineering Institute, Russia*)  
**49** Influence of the Resonator Finite Deformations on the Dynamics of an Integrating Micromechanical Gyroscope on a Vibrating Base
11. **M. A.Basarab, V.A. Matveev, A.V.Yurin** (*Bauman Moscow State Technical University, Russia*), **B.S.Lunin** (*Moscow State University named after M.V. Lomonosov, Russia*), **D. A. Merkuhov, A.V. Nekrasov, A.V.Trebukhov, S.V.Fetisov** (*JSC “Inertial Technologies of Technocomplex” (ITT), Ramenskoe, Moscow region, Russia*), **E.A. Chumankin** (*JSC «ANPP «TEMP-AVIA», Arzamas, Russia*)  
**58** Numerical and Analytical Thermal and Thermoelastic Models of Coriolis Vibratory Gyroscopes
12. **I.H. Shaymardanov, A. A. Dzuev, V.P.Golikov** (*JSC “Inertial Technologies of Technocomplex”, Ramenskoye, Moscow region, Russia*)  
**33** Methods for Calibration of Strapdown Inertial Navigation Systems (SINS) of Various Classes of Accuracy
13. **N.B. Vavilova, A.A. Golovan, N.A. Parusnikov, I.A. Vasineva** (*Lomonosov Moscow State University, Russia*)  
**110** Calibration of Strapdown Inertial Navigation Systems on High-Precision Turntables
14. **A.V.Kozlov, I.E.Tarygin, A.A.Golovan** (*Moscow Lomonosov State University, Russia*)  
**88** Calibration of Inertial Measurement Unit on Low-Grade Turntable: Estimation of Temperature Time Derivative Coefficients

12.40 – 13.00

**DISCUSSION OF THE POSTER PAPERS**

13.00 – 14.00

**LUNCH**

Chairmen **Dr. Yu.A. Litmanovich, *Russia***  
**Prof. G.F. Trommer, *Germany***

## PLENARY PAPERS

- 14.00 – 14.20      15. **D.G. Gryazin, L.P. Staroseltsev, A.N. Dzyuba,**  
**98                    O.O. Belova** (*CSRI Elektropribor, JSC, St.Peterburg,*  
***Russia***)  
Application of MEMS IMU in Measurement of Sea Wave  
Parameters
- 14.20 – 14.40      16. **A.V. Trebukhov, D.A. Merkushev, A.V. Alekhin,**  
**28                    A.V. Nekrasov, I.Kh. Shaimardanov** (*JSC “Inertial*  
***Technologies of Technocomplex”, Ramenskoye, Moscow***  
***region, Russia***)  
Practical Development of Inertial Orientation and Navigation  
Systems Based on a Hemispherical Resonator Gyroscope for  
Highly Maneuverable Aircraft

## POSTER PAPERS <sup>1</sup>

- 14.40 – 15.15      17. **M.A.Barulina, V.M. Pankratov** (*Precision Mechanics and*  
**59                    Control Institute, Russian Academy of Sciences, Saratov,  
***Russia***); **M. V.Efremov** (*Scientific Production Enterprise*  
***ANTARES, Saratov, Russia***)  
The Temperature Effect on Fiber Optic Gyroscopes Based on  
Air-Core Photonic Crystal Fiber**
18. **S.Y. Zhang, G.C. Zhang, L. Ma, Y. Yang** (*Tianjin*  
**77                    Navigation Instruments Research Institute, China)  
Error Analysis and Improved Ways for Fiber Optic  
Gyroscope Output in Shock, Vibration and Half Cardinals  
Movement Experiments**
19. **E.A.Petrukhin** (*JSC “Serpukhov plant “Metallist”, Moscow*  
**36                    region, Serpukhov, Russia)  
Prediction of the Lock-in Threshold Value in a Ring Cavity  
of a Laser Gyro**

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- 38 20. **A.S. Bessonov, E.A. Petrukhin, V.Yu. Khodyrev** (*JSC "Serpukhov plant "Metallist", Moscow region, Serpukhov, Russia*)  
Setup for Integral Light Scattering Irregularities Measurements on the Surface of Laser Gyro Mirrors
- 71 21. **F.Gao, H.N. Weng, Y. F. Zhang, X.M. Hu, G.Q. Wu** (*Tianjin Navigation Instruments Research Institute, China*)  
Research on Application of Wavelet Analysis in North-Seeker System Using Dither Laser Gyroscope
22. **A.A. Aviev** (*Bauman State Technical University, Electrooptica Corp., Moscow, Russia*)  
Processing of Optoelectronic System Signals for Measuring Parameters of Dither Oscillations in a Ring Laser Gyro
- 84 23. **A.V.Molchanov** (*Moscow Institute of Electromechanics and Automatics, Russia*), **V.A.Belokurov, M.V.Chirkin, M.B.Kagalenko, V.I.Koshelev, V.Yu.Mishin, D.A. Morozov** (*Ryazan State Radio Engineering University, Russia*)  
The Application of Advanced Processing Technique to the Triad of Precision Laser Gyroscopes
- 64 24. **V.N. Gorshkov, M.E. Grushin, I. I.Saveliev, N. I. Khokhlov** (*Polyus Research & Development Institute, Moscow, Russia*); **E.G.Lariontsev** (*Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University, Russia*)  
Studying Nonlinearity of the Zeeman Laser Gyro Scale Factor at Rotation Rates near the Bias Frequency
- 123 25. **B.V. Klimkovich** (*Scientific Production Limited Liability Company "OKB TSP", Minsk, Belarus*)  
Complementary Filter for Single-axis Ring Laser Gyros on the Mechanical Dither
- 63 26. **Yu.Yu.Broslavets, G.I.Satdykova, A.A.Fomichev** (*Moscow Institute of Physics and Technology (State University), JSC "Lasex", Dolgoprudny, Moscow region, Russia*)  
Mode Locking in a Laser Gyroscope with a Solid State Active Medium

27. **L.V.Vodicheva, A.A.Lystsov, Yu.V. Parysheva**  
(JSC “Academician N.A. Semikhatov Scientific and  
Production Association of Automatics”, Yekaterinburg,  
**Russia**)  
6 Redundant Strapdown Inertial Measurement Unit: Fault-  
Tolerance Improvement
28. **Yu.N.Chelnokov** (RAS Institute of Precision Mechanics and  
Control, Chernyshevsky Saratov State University, Saratov,  
**Russia**), **S.E. Perelyaev** (OOO «AeroSpetsProekt», Moscow  
region, Zhukovski, **Russia**), **L.A.Chelnokova**  
53 (Chernyshevsky Saratov State University, **Russia**)  
Dual Strapdown Attitude and Navigation Equations and  
Algorithms with Biquaternion Skew-Symmetric Operators
29. **D.A. Burov** («All-Russian Scientific Research Institute  
«Signal» Joint Stock Company (AO «VNII «Signal»), Kovrov,  
**Russia**)  
32 The Algorithm of Initial Alignment of SINS with Course and  
Horizontally Stabilized Virtual Platforms

15.15 – 15.30

**DISCUSSION OF THE POSTER PAPERS**

15.30 – 16.00

COFFEE BREAK

**PLENARY PAPERS**

16.00 – 16.20

30. **O.S. Salychev** (TeKnol Ltd., Moscow, **Russia**)  
124 An Alternative Approach to Inertial Navigation

16.20 – 16.40

31. **V.V.Skorobogatov, V.I.Grebennikov, L.Ya. Kalikhman,**  
**D.M.Kalikhman, S.F. Nakhov, R.V. Ermakov**  
16 (Branch of the Federal State Unitary Enterprise  
“Academician Pilyugin Scientific-production Center of  
Automatics and Instrument-making” – Production  
Association “Korpus”, Saratov, **Russia**)  
The Results of Experimental Testing of a Thermally  
Invariant Quartz Pendulum Accelerometer with Digital  
Feedback and Reprogrammable Measurement Range

## POSTER PAPERS <sup>1</sup>

- 16.40 – 17.25
- 56 32. **V.Ph.Zhuravlev** (*Institute for Problems in Mechanics of the Russian Academy of Sciences, IPMech RAS, Moscow, Russia*), **P.K.Plotnikov**, **A. O. Kuznetsov** (*SSTU, Saratov, Russia*)  
An ESG-based Three-Axis Angular Rate Sensor
- 117 33. **P.K. Plotnikov** (*Yuri Gagarin State Technical University of Saratov, Russia*)  
Quaternion Solution for the Motion of a Symmetric Euler Gyroscope with Arbitrary Initial Angle Values
- 120 34. **V.M. Kutovoi**, **D.A. Kutovoi**, **S.Yu. Perepelkina**, **A.A. Fedotov** (*JSC "Academician N.A. Semikhatov Scientific and Production Association of Automatics", Yekaterinburg, Russia*)  
Influence of Noise in Inertial Measuring Channels on the Accuracy of Navigation
- 93 35. **N.I.Krobka**, **N.V.Trebulev**, **A.I.Bidenko** (*Branch of the FSUE "TSENKI" – "Scientific & Research Institute for Applied Mechanics named after Academician V.I. Kuznetsov", Moscow, Bauman Moscow State Technical University, Russia*)  
The Projects on Application of Atom Interferometers in Space and at Sea: Current State
- 9 36. **V.Ya. Raspopov** (*FBSEI HE "Tula State University", Russia*)  
Mechanics of Single-Rotor Gyro Drive with a Spherical Ball Bearing Suspension and Pivoting Mirror
- 85 37. **N. I. Krobka**, **A. I. Bidenko**, **N. V. Tribulev** (*Branch of the FSUE "TSENKI" – "Scientific & Research Institute for Applied Mechanics named after Academician V.I. Kuznetsov", Moscow, Bauman Moscow State Technical University, Russia*)  
Gyroscopes on Bose-Einstein Condensates of Hot Quasiparticles in Solids Instead of Cold Atoms: Illusion or the Possibility of Revolutionary Breakthrough in Miniaturisation?

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38. **S.F. Nakhov** (*Filial FGUP «NPCAP» - «PO «Corpus», Saratov, Russia*), **P. K. Plotnikov** (*Yuri Gagarin State Technical University of Saratov, Saratov, Russia*),  
**V.A. Golodov, B.A. Bolotin** (*Filial FGUP «NPCAP» - «PO  
81 «Corpus», Saratov, Russia*)  
Rate Gyro on a Quartz Suspension with an «Electric Spring»
39. **A.V. Derevyankin, V.D. Dishel, A.I. Sapozhnikov,  
122 E.S. Smirnov** (*Academician Pilyugin Center, Moscow, Russia*)  
Accuracy Analysis of the Angular Rate Measurement Unit in the Flight Experiment Aboard the MKA-FKI Spacecraft
40. **W. Guan, D. D. Li** (*Beijing Institute of Aerospace Control  
70 Devices, China*)  
Testing Transverse Sensitivity of Linear Single-Axis Pendulous Accelerometer with Tri-Axial Vibration Generator—A Theoretical Investigation
41. **M.B. Bogdanov, V.V. Saveliev, V.A. Smirnov,  
15 N.D. Yudakova** (*Tula State University, Russia*)  
Experimental Study of Errors in Measuring Angular Velocity with Accelerometers
42. **X. X. Jiang, L. Ma, X.Y. Zhu, B/F. Liu, J.X. Wei** (*Tianjin  
72 Navigation Instruments Research Institute, China*)  
An Error Model Identification Method of High-Precision Accelerometer
43. **Y.C. Deng, W. Wang, Y.X. Liu, X.F. Wang, M. Shi  
76** (*Beijing Institute of Aerospace Control Device, Beijing, China*)  
A Non-Magnetic Heating System for the Nuclear Magnetic Resonance Gyroscope
44. **A.V. Polushkin, N.A. Kaldymov, N.V. Dmitriev,  
111 S.F. Nakhov** (*Branch of FSUE N.A. Pilyugin «NPCAP» - PC «KORPUS», Saratov, Russia*), **R.M. Yumagusin** (*FSUE N.A. Pilyugin «NPCAP», Moscow, Russia*), **P.K. Plotnikov** (*Saratov State Technical University Named after Gagarin Yu.A., Saratov, Russia*)  
Studying the Effect of Spatial Instability of the Rotary Table Platform Rotation Axis in Measurements on Test Results of Various Navigation Devices and their Components



- 113 45. **M.M.Tchaikovsky** (*Federal State Unitary Enterprise Academician Pilyugin Scientific-Production Center of Automatics and Instrument-Making, Moscow, V.A. Trapeznikov Institute of Control Sciences of Russian Academy of Sciences, Moscow, **Russia***), **V.M.Nikiforov, A.A.Gusev, K.A.Andreev** (*Federal State Unitary Enterprise Academician Pilyugin Scientific-Production Center of Automatics and Instrument-Making, Moscow, **Russia***)  
Digital Control of a Gyrostabilized Platform under the Influence of Uncertain Disturbances in the Presence of Measurement Noise

- 44 46. **E.I.Verzunov, I.A.Stolbova, I.I.Savateeva** (*«All-Russian Scientific Research Institute «Signal» Joint Stock Company (AO «VNII «Signal»), Kovrov, **Russia***)  
A Technique for Determining a Casing Error of a Self-Orientation Course and Roll Indication Gyro System

- 35 47. **V.V. Likhosherst, V.Ya. Raspopov, A.P. Schvedov** (*FSBEI HE "Tula State University", **Russia***)  
Roll Sensor for Roll Rotating Objects

17.25 – 17.50

## DISCUSSION OF THE POSTER PAPERS

18.00 – 21.30

SIGHT-SEEING GUIDED TOUR OF SAINT PETERSBURG

**TUESDAY, 31 MAY**

## SESSION II – INTEGRATED SYSTEMS

Chairmen **Dr. A.V. Sokolov, *Russia***  
**Mr. L. Camberlein, *France***

## PLENARY PAPERS

- 9.00 – 9.20 48. **P.Davidson, J.-P. Raunio, R. Piche** (*Tampere University of Technology, **Finland***)  
61 Accurate Depth Estimation from a Sequence of Monocular Images Supported by Proprioceptive Sensors

- 9.20 – 9.40      49. **A.A.Fomichev, T.N. Vahitov, A.A. Zhikhareva, A.B. Kolchev, P.V.Larionov, Yu. Yu. Broslavets, A.D. Morozov, K.Yu.Schastlivec, V.B. Uspensky** (*Moscow Institute of Physics and Technology (State University), Dolgoprudny, JSC “Lasex”, Dolgoprudny, Moscow region, Russia*), **V.D. Kedrov, A.M. Taz’ba** (*JSC «Granit-16», Saint Petersburg, Russia*)  
Development, Testing and Exploitation of NSI series Integrated INS/GNSS Systems by JSC LASEX
- 9.40 – 10.00      50. **Y.G. Yang, W.J. Wang, Y.L. Zhou, X.M. Xing, G.D. Wang, B.Y. Liu** (*Beijing Institute of Aerospace Control Devices, China*)  
97  
An Ultra-Tightly Coupled INS/GNSS Navigation System
- 10.00 – 10.20      51. **A.V.Yasenok, E. G.Kharin, I.A. Kopylov, V.A. Kopelovich, A.F. Yakushev** (*RF SRC JSC M. M. Gromov Flight Research Institute, Zhukovsky, Moscow region, Russia*)  
50  
Trajectory Measurements Based on INS/GNSS Data During Experimental Studies of Air Refueling from IL-96-400T Tanker Aircraft

## POSTER PAPERS <sup>1</sup>

- 10.20 – 10.45      52. **G.I. Emel’yantsev, A.P. Stepanov, M.I. Evstifeev** (*Concern CSRI Elektropribor, JSC, ITMO University, St. Petersburg, Russia*), **B.A. Blazhnov, D.A. Radchenko, I.Yu. Vinokurov, I.V. Semyonov, P.Yu. Petrov** (*Concern CSRI Elektropribor, JSC, St. Petersburg, Russia*)  
99  
GPS compass. Development and Test Results
53. **S. G. Park, Y.K. Kim, T. H. Fang, S. H. Lee** (*Korea Research Institute of Ships and Ocean Engineering, Daejeon, Republic of Korea*)  
95  
Resilient System Design of DGPS/INS Tightly Coupled Integration for Maritime Environment

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54. **A.V.Chernodarov, A. P. Patrikeev, O. O.Kaz'min** (*NaukaSoft Experimental Laboratory, Ltd., Moscow, Russia*),  
**A.V. Khrushchev** (*Bauman Moscow State Technical University, Moscow, Russia*), **I.V. Ovchinnikov** (*Vega Radio Engineering Corporation, JSC Branch, St. Petersburg, Russia*)  
92 Flight Tests of a Gravity-and-Satellite Data-Aided Inertial Navigation System
55. **W. Liu, Y.J. Zhang, X.F. Yang** (*Dalian Maritime University, Dalian, China*)  
18 Camera Motion Estimation by Fusing Measurements from MEMS Inertial Sensors and Vision Sensors
56. **Yu.V.Sadomtsev, E.V.Shchukina** (*Yuri Gagarin State Technical University of Saratov, Russia*)  
82 Discrete Correction of the SINS Vertical Channel under Noise in the Measurement Data !
57. **L.J. Ye, H. Zhu** (*Shanghai Institute of Spaceflight Control Technology, Shanghai Key Laboratory of Aerospace Intelligent Control Technology, ShangHai, China*)  
67 An Algorithm of Fast Compensation for Gyro Constant Drift
58. **E.V.Baranov** (*MDB «Compas», Moscow, Russia*),  
**O. N. Bogdanov, A.A. Golovan** (*Moscow Lomonosov State University, Russia*), **S. M. Kokorev, D.Yu. Kulikov, M.I.Pestakov** (*MDB «Compas», Moscow, Russia*),  
87 **M.Yu. Popelensky** (*Moscow Lomonosov State University, Moscow, Russia*)  
A Satellite Radio Signal Simulator with a Unit for Synchronous Simulation of SINS Algorithms
59. **R. M. Farhadi, V. I. Kortunov** (*KhAI – National Aerospace University named after N. Zhukovsky “KhAI”, Kharkov, Ukraine*), **A. Mohammadi** (*MUT, Tehran, Iran*)  
127 Robust Control of the UAV with Mini Autopilot

10.45 – 10.55

**DISCUSSION OF THE POSTER PAPERS**

10.55 – 11.25

**COFFEE BREAK**

## PLENARY PAPERS

- 11.25– 11.45      60. **A.V.Chernodarov, A.P.Patrikeev** (*NaukaSoft Experimental Laboratory, Ltd., Moscow, **Russia***), **V.N.Kovregin, G.M.Kovregina** (*«Zaslon» JSC, St. Petersburg, **Russia***)  
80 Using an Inertial Satellite Navigation System for Determination of Motion Parameters of the Radar Antenna Phase Center
- 11.45– 12.05      61. **Q.W. Fu, Y. Liu, X. Xiao, S. Li** (*Northwestern Polytechnical University, Xi'an, **China***)  
55 Implementation Details and Test Results of a Real-Time INS Aided GNSS Spoofing Detection System

## POSTER PAPERS <sup>1</sup>

- 12.05– 12.50      62. **A.V.Nebylov** (*State University of Aerospace Instrumentation, St. Petersburg, **Russia***)  
86 An Analytical Justification of the WIG-Craft Altitude Control Law and Its Implementation to Ensure the Maximum Transport Efficiency
63. **X. Xiao, Y. Liu, Q.W. Fu, S. Li** (*Northwestern Polytechnical University, Xi'an, **China***), **S.C. Li** (*Shaanxi Zhongtian Rocket Technology Co., Ltd, Xi'an, **China***)  
79 Design of a High Fidelity Automatic Trajectory Generator for All-Earth Navigation
64. **N.I.Krobka** (*Research Institute for Applied Mechanics named after Academician VI Kuznetsov (FSUE «TsENKI»), Moscow, **Russia***), **N.N.Krobka** (*Russian Foreign Trade Academy, Moscow, **Russia***), **P.N.Krobka** (*Federal Security Service of the Russian Federation, Moscow, **Russia***)  
94 Structural schemes of a distributed integrated navigation system of the ligament «target asteroid»-«projectile asteroid» and anti-asteroid planetary defense complex

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65. **T.Ye. Somova** (*Samara State Technical University, Russia*)  
 3 Polynomial Guidance Laws and Animation for in-Flight Support of a Satellite Attitude Determination and Control System
66. **Ye. Somov, S. Butyrin, S. Somov** (*Samara State Technical University, Russia*)  
 2 Adaptive-Robust Attitude and Orbit Control of a Small Satellite
67. **Ye. Somov, S. Butyrin** (*Samara State Technical University, Russia*), **H. Siguerdidjane** (*Supelec University, Gif-sur-Yvette, France*)  
 1 Precise Image Motion Stabilization in a Land-Survey Space Telescope
68. **R.V. Ermakov**, (*Industrial Automatics Design Bureau JSC, Saratov, Russia*), **D.M.Kalikhman, L.Ya.Kalikhman, S.F.Nakhov, V.A Turkin** (*Production Association «KORPUS», Saratov, Russia*); **A.A.L'vov, Yu.V. Sadomtsev** (*Yuri Gagarin State Technical University of Saratov, Russia*), **A.A.Yankovsky, E. P.Krivtsov** (*D.I.Mendeleyev Institute for Metrology, St.Petersburg, Russia*)  
 12 Fundamentals of Developing Integrated Digital Control of Precision Stands with Inertial Sensors using Signals from an Angular Rate Sensor, Accelerometer, and an Optical Angle Sensor
69. **A.V. Kramlikh, M.E. Melnik, P.N.Nikolaev** (*Samara State Aerospace University Named after Academician S.P. Korolev (National Research University), Russia*)  
 17 Attitude Determination and Stabilization Algorithms of the SamSat-218D Nanosatellite
70. **S.I. Tomashevich** (*Institute of Problems of Mechanical Engineering, ITMO University, St. Petersburg, Russia*), **A.O. Belyavskiy** (*ITMO University, St. Petersburg, Russia*)  
 24 2DOF Indoor Testbed for Quadrotor Identification and Control

71. **S. P. Gulevich** (*RTI Aerospace systems LLC, Moscow, Russia*), **I.V.Sergushov, E.N. Skrypal', A. V. Abakumov** (*Industrial Automatics Design Bureau, JSC, Saratov, Russia*)  
26 Use of Modern Angular Rate and Linear Acceleration Sensors for Automatic Aircraft Landing Approach
72. **J. H. Wang, L. H. Liu, G. J. Tang** (*National University of Defense Technology, Changsha, China*)  
31 Backstepping Attitude Controller Design of a Hypersonic Vehicle via the Extended State Observer
73. **V.M.Nikiforov, M.M.Tchaikovsky, A.A.Gusev, K.A.Andreev, A.K.Kovalev, D.V.Mikhalyova** (*Academician Pilyugin Scientific-Production Center of Automatics and Instrument-Making, Moscow, Russia*)  
37 Synthesis of a Digital Stabilization System for a Single-Axis Gyrostabilized Platform on the Basis of  $H_2/H_\infty$  Control
74. **O.S. Amosov, S.G. Baena, E.A. Malashevskaya** (*Komsomolsk-on-Amur State Technical University, Russia*)  
39 High-Speed Neurofuzzy Algorithms for Filtering the Mobile Object Trajectory Parameters
75. **A.S. Nosov, A.V. Motorin** (*Concern CSRI Elektropribor, JSC, ITMO University, St. Petersburg, Russia*)  
Comparative Analysis of the Gravity Estimation Algorithms
76. **V.S. Vyazmin, A.A. Golovan, I.A. Papusha, M.Yu. Popelensky** (*Lomonosov Moscow State University, Russia*)  
42 Informativeness of Vector Magnetometer Measurements and Global Geomagnetic Field Models in the Aircraft INS Aiding

12.50 – 13.00

**DISCUSSION OF THE POSTER PAPERS**

13.00 – 14.00

LUNCH

Chairmen **Prof. I.M. Okon, *Russia, USA***  
**Prof. Yu.V. Filatov, *Russia***

## INVITED PAPER

14.00 – 14.45 77. **N.V. Mikhaylov** (*ITMO University, St. Petersburg, **Russia***)  
Spacecraft Navigation – Solutions, Trends and Tendencies

## PLENARY PAPERS

14.45 – 15.05 78. **L.V. Kiselev** (*The Federal State Budgetary Scientific  
Institution «Institute of Marine Technology Problems»,  
21 FEB RAS, Vladivostok, **Russia***)  
Optimization Problems of Identifying Navigation and  
Dynamic Characteristics of Autonomous Underwater Robots

15.05 – 15.25 79. **Yu.V. Vaulin, F.S. Dubrovin, A.Ph. Scherbatyuk** (*IMTP  
FEB RAS, FEFU, Vladivostok, **Russia***)  
119 About Unknown Initial AUV Position Estimation Using One  
Beacon Mobile Navigation System

## POSTER PAPERS <sup>1</sup>

15.25 – 15.55 80. **Yu.V. Matviyenko, Yu.V. Vaulin** (*The Federal State  
Budgetary Scientific Institution «Institute of Marine  
22 Technology Problems», FEB RAS, Vladivostok, **Russia***)  
The Navigational Support of Autonomous Underwater  
Vehicles for Extreme Ocean Depths

81. **A.I. Mashoshin** (*Concern CSRI Elektropribor, JSC,  
St. Petersburg, **Russia***)  
19 Studying the Accuracy of Single-Beacon Navigation of  
Autonomous Underwater Vehicles

82. **G.A.Subkhankulova, N.B. Vavilova** (*Lomonosov Moscow  
State University, Moscow, **Russia***)  
11 Accuracy Analysis for the Navigation Algorithm of the  
Underwater Vehicle with a Strapdown Inertial Navigation  
System

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<sup>1</sup> 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; further discussion will continue at the posters.

83. **P. Ma, F. Zhang, S. Liu** (*Northwestern Polytechnical University, Xi'an, China*)  
**4/10** Observability Analysis of Multiple AUV Cooperative Localization Based on Condition Number
84. **I.N.Burdinsky, S.A.Otcheskii**, (*Pacific National University, Khabarovsk, Russia*)  
**48** Method for Bringing an Autonomous Underwater Vehicle to a Reference Signal Source
85. **V.A.Tupysev, Yu.A. Litvinenko, N.K.Ivanov** (*CSRI Elektropribor, St.Peterburg, Russia*)  
**96** Optimal Correction of Suboptimal Estimates in Navigational Data Processing
86. **A. S. Galkina, I. V. Platoshin** (*JSC SRC Progress, Samara, Russia*)  
**100** Evaluation of Accuracy Characteristics of an Earth Remote Sensing Satellite Control System over Observation Intervals
87. **S.G.Chernyi, A.A. Zhilenkov, A.S. Bordug** (*Kerch State Maritime Technological University, Kerch, Russia*)  
**102** Relative-to-Horizon Positioning of Water Transport Facility as a Part of Multicomponent System
88. **A.V. Polushkin, N.A. Kaldymov, N.V. Dmitriev, S.F. Nakhov** (*Branch of FSUE N.A.Pilyugin «NPCAP»-PC «KORPUS», Saratov, Russia*), **R.V. Bessonov, N.N. Brysin, I.V. Polyanskij**,(*Space Research Institute of the Russian Academy of Sciences, Moscow, Russia*)  
**104** Methods and Tools to Assess the Technical Characteristics of the Star Trackers During Ground Tests
89. **C. Doer, G. Scholz** (*Institute of Systems Optimization (ITE), Karlsruhe Institute of Technology (KIT), Germany*), **G. F. Trommer** (*Institute of Systems Optimization (ITE), Karlsruhe Institute of Technology (KIT), Germany; National Research University of Information Technologies, Mechanics and Optics (ITMO), Saint Petersburg, Russia*)  
Grid-Based Laser SLAM for Micro Aerial Vehicles

15.55 – 16.05

**DISCUSSION OF THE POSTER PAPERS**

16.05 – 16.30

**COFFEE BREAK**



## PLENARY PAPERS

- 16.30 – 16.50      90. **J. F. Wagner** (*Institute of Statics and Dynamics of Aerospace Structures, University of Stuttgart, Germany*)  
**118** Inertial and Integrated Motion Measurement Systems in Biomechanics
- 16.50 – 17.10      91. **S. G. Chernyi, A. A. Zhilenkov, V. Yu. Budnik** (*KSMTU, Kerch, Russia*)  
**101** Hardware and Software Package for the Information Support in Dynamic Positioning of the Offshore Facilities in the Dual-Mass Systems
- 17.10 – 17.30      92. **Y. Liu, G. Yang** (*Shanghai Institute of Aerospace Control Technology, Shanghai, China*)  
**73** Autonomous Optical and Pulsar Hybrid Navigation Method for a Deep Space Probe

## POSTER PAPERS <sup>1</sup>

- 17.30 – 17.45      93. **V. M. Nikiforov, M. M. Tchaikovsky, A. A. Gusev, K. A. Andreev, A. K. Kovalev, D. V. Mikhaleva** (*Academician Pilyugin Center, Moscow, Russia*)  
**57** Damping an Electromagnetic Torque Ripple of Power Stabilization Motor of Gyrostabilized platform by Mixed  $H_2 / H_\infty$  Control Method
94. **R. V. Senchenko, N. V. Krapukhina** (*National University of Science and Technology «MISIS», Moscow, Russia*)  
**114** Simulation Model of Urban Traffic Management
95. **V. N. Kuznetsov, A. P. Nyrkov, S. S. Sokolov, S. G. Chernyi, M. R. Bukharmetov, D. G. Mamunts** (*Admiral Makarov State University of Maritime and Inland Shipping, Saint Petersburg, Russia*)  
**108** Decision Support Systems Based on Bayes' Theorem

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96. **R.N.Akhmetov, V.P.Makarov, A.V.Sollogub** (*Space Rocket Center «Progress» Joint Stock Company, Samara, Russia*)  
109 Bypass Principles of Automated Spacecraft Survivability Control

17.45– 18.00

## DISCUSSION OF THE POSTER PAPERS

18.30

## DRINK RECEPTION

## WEDNESDAY, 1 JUNE

### SESSION II – INTEGRATED SYSTEMS (continued)

Chairmen **Prof. O.A. Stepanov, Russia**  
**Dr. N.V. Mikhailov, Russia**

## PLENARY PAPERS

- 9.00 – 9.20 97. **S.B.Berkovich, N.I. Kotov, R.N.Sadekov, A.V.Sholokhov, V.A.Tsishnatii** (*IPO «Institute of Engineering Physics», Serpukhov, Russia*)  
25 Use of Visual Systems and Digital Road Maps to Improve Positioning Accuracy of a Vehicle

## POSTER PAPERS <sup>1</sup>

- 9.20 – 9.50 98. **A. I. Manturov, V. E. Yurin, N. I. Pyrinov** (*JSC SRC Progress, Samara, Russia*), **Y. N. Gorelov** (*Samara State University, Russia*)  
83 Evaluating the Dynamic Performance of the Motion Control System for Earth Remote Sensing Spacecraft
- 62 99. **D. Cilden, Ch. Hajiyev** (*Istanbul Technical University, Turkey*)  
Integrated Single-Frame Method and EKF for Attitude Determination of Small Satellites in Sun - Eclipse Phases

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<sup>1</sup> 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; further discussion will continue at the posters.

100. **N.V. Ivanosky, D.G. Kutsenko** (*Kerch State Maritime Technological University, Kerch, **Russia***),  
**P.A. Daragan** (*Branch of the Admiral Ushakov State*  
**105** *Maritime Academy, Sevastopol, **Russia***)  
Algorithm Design for a Fishing Vessel's Manoeuvring  
when Searching Target Fish Shoals
101. **J. H. Wang, L. H. Liu, G. J. Tang** (*National University of*  
*Defense Technology, Changsha, **China***)  
**54** Integrated Guidance and Control Scheme for a Horizontal  
Landing Hypersonic Vehicle
102. **V.V. Shavrin, V.I. Tislenko, V.A. Filimonov,**  
**A.S. Konakov, A.P. Kravets** (*Tomsk State University of*  
*Control Systems and Radioelectronics, **Russia***)  
Adaptive Algorithm of Joint Coherence Filtering of Signal  
Parameters in the Autonomous Space Navigation System
103. **I.N.Kornilov** (*Ural Federal University, Yekaterinburg,*  
***Russia***)  
**27** Interference Protection of GLONASS/GPS Receivers for  
User Small-Size Equipment
104. **V.I.Baburov, N.V.Vasilyeva, N.V.Ivantsevich**  
(*JC AUSRIRE, STC Navigator, St. Petersburg, **Russia***)  
**14** Analysing the Structural Characteristics of the GLONASS  
Navigation Field in the Arctic Region of Russia
105. **A.M. Aleshechkin, A.Yu. Strokova, A.N. Frolov**  
(*Federal State Autonomous Educational Institution of*  
*Higher Professional Education «Siberian Federal*  
**13** *University», Krasnoyarsk, **Russia***)  
Two Methods to Increase the Reliability of Navigation  
Parameter-Determination in the Phase Radio Navigation  
Systems
106. **N.V. Mikhaylov, V.V. Chistyakov** (*ITMO University,*  
*St. Petersburg, **Russia***), **A.V. Nemov, D.A. Nemov**  
(*Russian Institute of Radionavigation and Time,*  
*St. Petersburg, **Russia***)  
**121** Analysis of Anti-Jamming Performance of GNSS/INS  
equipment

107. **O.A.Stepanov, D.A. Koshaev** (*CSRI Elektropribor, JSC, ITMO University, Saint Petersburg, Russia*), **M. E. E. Mansour** (*ITMO University, Saint Petersburg, Russia*)  
Indoor Navigation Using a Laser Range Finder with a Known Environment Map
108. **A.M.Boronakhin, L.N.Podgornaya, E.D.Bokhman, D.Yu. Larionov, R.V. Shalymov** (*Saint Petersburg Electrotechnical University "LETI", St. Petersburg, Russia*).  
Using Inertial Data for Recognition of the Optical Image of the Railhead

9.50– 10.00

## DISCUSSION OF THE POSTER PAPERS

10.00 – 10.30

COFFEE BREAK

**10.30 – 12.50**

## PANEL DISCUSSION “Integrated Navigation Systems in Case of Absence or Severe Degradation of Satellite Information”

Moderators: **Prof. G.F. Trommer, Germany**  
**Prof. O.A. Stepanov, Russia**

## INVITED PAPER

- 10.30-11.15      109. **Gert Trommer** (*Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany, ITMO University, Saint Petersburg, Russia* )  
Autonomous Intrusion and Indoor Reconnaissance in Buildings
- Speeches**
- 11.15 – 11.25      110. **P. Davidson** (*Tampere University of Technology, Finland*)  
Inertial and Visual Sensor Fusion
- 11.25 – 11.35      111. **V.A. Chernodarov** (*NaukaSoft Experimental Laboratory, Ltd., Moscow, Russia*)  
Integrated Information Processing in Geoinertial Systems
- 11.35 – 11.55      112. **O.A. Stepanov** (*CSRI Elektropribor, JSC, ITMO University, Saint Petersburg, Russia*)  
Navigation by Geophysical Field Maps, Indoor Map-Matching Navigation, and Fingerprinting. Differences and Relationship

- 11.55 – 12.05      113. **K.K. Veremeenko** (*Moscow Aviation Institute (National Research University), **Russia***)  
Detection of Satellite Navigation System Faults in the Integrated Navigation System
- 12.05 – 12.15      114. **S.B. Berkovich** (*IPO «Institute of Engineering Physics», Serpukhov, **Russia***)  
High-Precision Ground-Based Navigation in Conditions of Poor Availability of Satellite Signals
- 12.15 – 12.50      **General Discussion**
- 12.50 – 13.00**      **CLOSING CEREMONY**
- 13.00 – 14.00      LUNCH