

PROGRAM

MONDAY, 28 MAY

8.00 – 9.50 REGISTRATION OF CONFERENCE PARTICIPANTS

10.00 – 10.15 **OPENING CEREMONY**

SESSION I – INERTIAL SYSTEMS AND SENSORS

Chairmen – **Prof. D.P. Lukyanov**, Russia
Prof. H. Sorg, Germany

INVITED PAPER

10.15 – 11.00 1. **Douglas Meyer, David Rozelle** (*Northrop Grumman Navigation Systems Division, Woodland Hills, USA*)
Milli-HRG Inertial Navigation System

11.00 – 11.30 COFFEE BREAK

PLENARY PAPERS

11.30 – 11.50 2. **Ya.I.Binder, A.S.Lysenko, T.V.Paderina, V.G.Rozentsvein** (*Concern CSRI Elektropribor, JSC, St. Petersburg, Russia*)
Autocompensation of Drifts of an Angular Rate Sensor of a Continuous Gyroscopic Inclinometer by Discrete Modulation Rotations

11.50 – 12.10 3. **A.G.Kuznetsov, V.I.Galkin, A.V.Molchanov, B.I.Portnov, A.M.Yakubovich** (*Moscow Institute of Electromechanics and Automatics, Moscow, Russia*)
Micromechanical Unit Development and Flight Tests Results

POSTER PAPERS ¹

- 12.10 – 12.50
4. **I.V. Merkuriev, V.V. Podalkov, E.S. Sbytova** (*Moscow Power Engineering Institute (National Research University), Moscow, **Russia***)
Dynamics of the Micromechanical Gyroscope with the Monocrystal Disk Resonator
 5. **Ya.V. Belyaev, Ya.A. Nekrasov** (*Concern CSRI Elektropribor, JSC, St. Petersburg, **Russia***)
Experimental Study of RR-type MEMS Gyro Operation in Matched Mode with High Sense Loop Q-Factors
 6. **M.A. Basarab, M.A. Ivoilov, V.A. Matveev** (*Bauman Moscow State Technical University, Moscow, **Russia***)
Utilization of a Neural Network Algorithm for Balancing of Hemispherical Resonator Gyro
 7. **E.A. Chumankin** (*JSC “Arzamas Research and Production Enterprise “TEMP-AVIA, Arzamas, **Russia***)
Development Results of Angular Rate Sensor Based on Hemispherical Resonator Gyroscope
 8. **N.I. Krobka, A.I. Bidenko, N.V. Tribulev, V.S.Chernichenko** (*Branch of the Center for Ground-Based Space Infrastructure Facilities Operation “Scientific & Research Institute for Applied Mechanics named after academician V.I.Kuznetsov”, Moscow State Technical University named after Bauman, **Russia***)
Project Hyper of European Space Agency Versus Project Gravity Probe B of Stanford University
 9. **I.G. Ancev, S.V. Bogoslovsky, G.A. Sapozhnikov** (*JSC Radar mms, Saint Petersburg, **Russia***)
Mirror Topology for Differential SAW Sensor

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; further discussion will continue at the posters.*

10. **Yu.Yu. Broslavets, M.A. Georgieva, A.A. Fomitchev** (*Moscow Institute of Physics and Technology (State University), JSC "Lasex", Dolgoprudny, Moscow region, Russia*)
Influence of Spectral Characteristics of the Broadband Active Medium on the Stability of Bidirectional Generation and Mode Locking in a Ring YAG:Cr⁴⁺ Laser

11. **S.Y.Alekseev, M.V.Chirkin, V.Y.Mishin, D.A.Morozov** (*Ryazan State Radio Engineering University, Ryazan, Russia*), **M.V.Borisov, A.V.Molchanov, M.A.Zaharov**, (*Moscow Institute of Electromechanics & Automatics, Moscow, Russia*)
Technological Aspects of Precision Ring Laser Production: Synchronization Threshold Measurements in Manufacture and Operation

12. **V.I.Vinogradov** (*Plant "Elektropribor", Tambov, Russia*)
Recombination Process of Atomic Motion in Direct Current Discharge and its Application in Ring Lasers

13. **P.K. Plotnikov, Yu.A. Zaharov, S.G. Naumov** (*Saratov State Technical University, Saratov, Russia*)
Comparative Analysis of the Errors of the Gimbal Suspension Gyroscopic Devices with the Use of Various Friction Force Models Describing Predisplacement Effect

14. **L.A. Melnikov, P.K. Plotnikov** (*Saratov State Technical University, Saratov, Russia*)
A Contribution to the Theory and Applications of Microwave Gyros

12.50 – 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 15. **A.E. Fyodorov, , V.V. Pchelin, D.A. Rekunov** (*Open Society «Ramensky Instrument Engineering Plant» (RPZ), Ramenskoye, Moscow region, **Russia***)
Inertial Measurement Unit IBL-2 Based on Trinary Laser Gyroscope
- 14.20 – 14.40 16. **Yu. M.Zlatkin, A. N.Kalnoguz, V.G.Voronchenko** (*RPE «Hartron-Arkos», Kharkov, **Ukraine***), **N.I. Likholit, A.Yu. Vakhlov, A.M. Sladkiy** (*KP SPS «Arsenal», Kiev, **Ukraine***), **V.M. Slyusar** (*«NTUU «KPI», Kiev, **Ukraine***)
Laser Sins for Cyclone-4 Launch Vehicle

POSTER PAPERS ¹

- 14.40 – 15.20 17. **S.F. Kononov, D.V. Mayorov, Y.A. Ponomarev, A.A.Trunov** (*Bauman Moscow State Technical University, Moscow, **Russia***), **T.L. Egorova, A.S. Larshin** (*Center for Ground-Based Space Infrastructure Facilities Operation – FGUP «TSENKI», Moscow, **Russia***)
Micromechanical Compensation Accelerometer with Magnetolectric Torquers
18. **N.I.Likholit, A.M.Shostak, Yu.Yu.Yur'yev, I.V.Nikonov** (*Arsenal Special Device Production State Enterprise, Kiev, **Ukraine***), **N.G.Chernyak** (*National Technical University of Ukraine "Kiev Polytechnical Institute", Kiev, **Ukraine***).
Accelerometers for Strapdown Inertial Navigation Systems

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19. **V.E. Dzhashitov, V.M. Pankratov, A.V. Golikov** (*Precision Mechanics and Control Institute, Russian Academy of Sciences, Saratov, Russia*)
Practical, Educational and Research Tasks with Computer-Based Express Test of Knowledge on the Theory of Gyroscopes
20. **D.M.Kalihman, L.Y.Kalihman, Y.V.Sadomcev, E. A.Deputatova, S. F. Nahov** (*NPCAP im. Pilugina, Saratov, Russia*)
The Triax Universal Stand with a Digital Control System for the Control of Gyroscopic Devices
21. **M.V.Chirkin, V.V.Klimakov, V.N.Melekhin, A.I.Ulitenko** (*Ryazan State Radio Engineering University, Ryazan, Russia*),
A.V.Molchanov (*Moscow Institute of Electromechanics & Automatics, Moscow, Russia*)
Passive Heat Removal Elements Integrated into the Design of the Strapdown Inertial Navigation System
22. **Yu.G. Egorov, S.V. Smirnov** (*Bauman Moscow State Technical University, Moscow, Russia*)
Simulation of Adaptive Correction Algorithms of Radio Telescope Inertial Orientation System
23. **V.G. Andreyev, V.A. Belokurov, V.I.Koshelev** (*Ryazan State Radio Engineering University, Ryazan, Russia*)
Coarse Alignment of Strapdown Inertial Navigation System with Compensation of the Carrier's Vibration
24. **L.Belsky, L.Vodicheva, E.Alievskaya, Yu.Parysheva** (*FSUE "Academician N.A.Semikhatov Scientific and Production Association of Automatics", Yekaterinburg, Russia*)
Accuracy Improvement of Strapdown INS Gyrocompassing under Prelaunch Lifting of a Spacecraft
25. **A.V.Derevyankin, A.I.Matasov** (*Moscow Lomonosov State University, Moscow, Russia*)
Limiting Accuracies for Bench Calibration of Strapdown Inertial Navigation Systems

26. **P.P. Paramonov, A.V.Shukalov, Yu.I.Sabo** (*FSUE "Saint Petersburg Development Design Bureau Electroavtomatika named after P.A. Efimov", Saint Petersburg, Russia*);
V.Y.Raspopov, Yu.V.Ivanov, A.P.Shvedov, A.V.Ladonkin, V.V.Matveev (*FSBE IHPE "Tula State University", Tula, Russia*)
 Backup Strapdown Attitude Control System on Russian-Made Measuring Base
27. **V.V. Avrutov, S.V. Golovach, T.Yu. Mazepa** (*National Technical University of Ukraine (Kiev Polytechnic Institute), Ukraine*)
 On Scalar Calibration of an Inertial Measurement Unit
28. **B.V. Klimkovich** (*OJSC Minsk Watch Plant Luch, Minsk, Belarus*)
 Applying Nonholonomic Constraints for Correcting Inertial Navigation Systems of Land Wheeled Vehicles

15.20 – 15.40

Discussion of the poster papers

15.40 – 16.10

COFFEE BREAK

PLENARY PAPERS

16.10 – 16.30

29. **Hervé C. Lefèvre** (*iXBlue SAS, Marly le Roi, France*)
 The Fiber-Optic Gyroscope: Achievement and Perspective

16.30 – 16.50

30. **B.E. Landau, S.L. Levin, S.S. Gurevich, G.I. Yemelyantsev, V.I. Zavgorodny, S.G. Romanenko B.V. Odintsov**, (*Concern CSRI Elektropribor, JSC, St.Petersburg, Russia*)
 Strapdown Inertial Attitude Reference System for Arbitrary Oriented Orbital Spacecraft: Optimizing the Calibration Method in Ground Conditions

17.00 – 21.00

SIGHT-SEEING GUIDED TOUR
 OF SAINT PETERSBURG

TUESDAY, 29 MAY

SESSION II – INTEGRATED SYSTEMS

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

INVITED PAPER

- 9.30 – 10.15 31. **Peter Vörsmann, Claus Kaschwich, Thomas Krüger, Philipp Schnetter, Claus-Sebastian Wilkens** (*Institute of Aerospace Systems, Technische Universitaet Braunschweig, Braunschweig, Germany*)
MEMS Based Integrated Navigation Systems for Adaptive Flight Control of Unmanned Aircraft - State of the Art and Future Developments

PLENARY PAPERS

- 10.15 – 10.35 32. **A.V. Ladonkin, V.Ya. Raspopov** (*Tula State University, Tula, Russia*)
Optical Orientation Systems in Control Circuit of Unmanned Aerial Vehicle
- 10.35 – 10.55 33. **G.A. Avanesov, R.V. Bessonov, A.N. Kurkina, E.A. Mysnik, A.S. Liskiv** (*Space Research Institute of Russian Academy of Science, Moscow, Russia*), **M.B. Lyudomirskiy, I.S. Kayutin, N.E. Yamshchikov** (*Electrooptika Corp., Moscow, Russia*)
Development of Autonomous Strapdown Stellar-Inertial Navigation System
- 10.55 – 11.25 COFFEE BREAK
- 11.25 – 11.45 34. **Ronan Arraes Jardim Chagas, Jacques Waldmann** (*ITA - Instituto Tecnológico de Aeronáutica, São José dos Campos, Brazil*)
Geometric Inference-Based Observability Analysis Digest of INS Error Model with GPS/Magnetometer/Camera Aiding

- 11.45 – 12.05 35. **S.L.Bulghakov, Yu.P.Mikheenkoy, V.N.Kryuchkov, O.I.Fedoskin, D.A.Khilevich** (*JSC «LaserService», Moscow, Russia*)
Integrated Inertial Satellite Navigation System for Synthetic Aperture Radar

POSTER PAPERS¹

- 12.05 – 12.40 36. **A.K. Volkovitsky, E.V. Karshakov, E.V. Moilanen, B.V. Pavlov** (*ICS RAS, Moscow, Russia*)
Integration of Magnetic Gradiometer Correlation-Extremal and Inertial Navigation Systems
37. **Yu.L.Smoller, S.Sh.Yurist** (*ZAO NTP "Gravimetric Technologies", Moscow, Russia*), **O.N. Bogdanov, Yu.V. Bolotin, A.A. Golovan, A.V. Kozlov** (*Moscow State Lomonosov University, Russia*)
Results of Tests of the Strapdown Gravimeter GT-X on a Yacht
38. **Leandro Ribeiro Lustosa, Jacques Waldmann** (*ITA - Instituto Tecnológico de Aeronáutica, São José dos Campos, Brazil*)
Addressing the Statistical Consistency of Extended Kalman Filtering for Aided Inertial Navigation Using Adaptive Techniques
39. **V.V. Voronov, O.Yu. Kupervasser** (*R.E.T.Kronshtadt, ZAO, Moscow, Russia*)
Correcting Errors of an Inertial Navigation System by Methods of Visual Navigation
40. **V.V. Avrutov, I.Yu. Shturma** (*National Technical University of Ukraine "Kiev Polytechnic Institute", Kiev, Ukraine*)
Inertial Measurement Unit with USB-Port

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41. **A.S. Populovskiy, D.I. Ishchuk** (*FSUE Central Research Institute of Chemistry and Mechanics, Moscow, **Russia***)
Small-Size Autonomous Underwater Navigation System Based on MEMS Inertial Sensors and Doppler Sonar Log
42. **A.F. Dyumin** (*Samara Technical University, Samara, **Russia***)
The Use of Kalman Filter in the Problem of Calibration of Errors of Inertial System of Definition of a Space Vehicle Orientation

12.40 – 13.00 **Discussion of the poster papers**

13.00 – 14.00 LUNCH

Chairmen – **Dr. A.V. Sokolov**, Russia
Dr. A.V. Zbrutsky, Ukraine

PLENARY PAPERS

- 14.00 – 14.20 43. **Jochen Roth, Thomas Schaich, Gert F. Trommer** (*Institute of Systems Optimization (ITE), Karlsruhe Institute of Technology, **Germany***)
Cooperative GNSS-Based Method for Vehicle Positioning
- 14.20 – 14.40 44. **V.D.Dishel, A.K.Bikov, N.V.Sokolova, V.G.Sulimov, E.U. Jigulevcseva** (*Academician Pilyugin Center, Moscow, **Russia***)
General Conclusions from 3-Year Use of Integrated Inertial-Satellite GNC Systems for Space Launchers

POSTER PAPERS¹

- 14.40 – 15.10 45. **D.V Sukhomlinov, A.V.Chernodarov, A.P.Patrikeev** (*Research & Production Association «Mobile Information Systems», Moscow, **Russia***)
Seminatural Development of the Math-Based Software for a Strapdown Terrain-Aided Inertial Navigation System

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46. **Hamza Benzerrouk** (*PhD student at the Saint Petersburg State University of Aerospace Instrumentation, **Algeria***), **Alexander Nebylov** (*International Institute for Advanced Aerospace Technologies, Saint Petersburg State University of Aerospace Instrumentation, **Russia***)
Real Time Implementation of Integrated Navigation System INS/GNSS under non Gaussian Measurement Noise
47. **A. V. Prokhortsov, V.V. Savel'ev, V.A. Smirnov** (*Tula State University, **Russia***)
A Method of Orientation Data Correction of a Strapdown Inertial Navigation System by Signals Received from One Satellite Navigation System Antenna
48. **Liu Wen, Zhang Yingjun, Yang Xuefeng, Zhu Feixiang** (*Navigation College of Dalian Maritime University, Dalian, **China***)
Applications of Inertial Navigation for Tracking the Personnel Motion During a Ship Fire Extinguishing
49. **Y.M. Zlatkin, S.V. Oleynik, Yu.A. Kuznetsov** (*RPE Hartron-Arkos, Kharkov, **Ukraine***), **V.B. Uspenskiy; I.A. Bagmut** (*NTU "KhPI", Kharkov, **Ukraine***)
Technology and Results of Tests of the Strap-Down Star-Inertial Unit for Control Systems of Spacecrafts
50. **Ye.I. Somov, S.A. Butyrin** (*Research Institute of Mechanical Systems Reliability, Samara State Technical University, Samara, **Russia***)
In-Flight Alignment of a Space Telescope and a Star Tracker Cluster at a Scanning Observation of the Earth Marked Objects

15.05 – 15.30

Discussion of the poster papers

15.30 – 16.00

COFFEE BREAK

Chairmen – **Prof. I.M. Okon**, Russia, USA
Prof. G. Trommer, Germany

PLENARY PAPERS

- 16.00 – 16.20 51. **Pavel Davidson, Jarmo Takala** (*Department of Computer Systems, Tampere University of Technology, Finland*)
Algorithm for Pedestrian Navigation Combining IMU Measurements and Gait Models
- 16.20-16.40 52. **Alain Cohen** (*Sagem Défense Sécurité, Paris, France*),
A.V. Trebukov (*Inertial Technologies of Technokomplex, Ramenskoye, Moscow region, Russia*)
LINS-100RS New Generation INS/GPS/GLONASS System for Airborne Applications
- 16.40 – 17.00 53. **T.N. Vakhitov, A.B. Kolchev, P.V. Larionov, K.Yu. Schastlivets** (*JS «LASEX», Dolgoprudny, Moscow region, Russia*), **V.B. Uspensky, A.A. Fomitchev** (*MIPT, Dolgoprudny, Moscow region, Russia*)
Design and Trial of Integrated Inertial-Satellite Navigating System NSI-2000MTG with the Enhanced Availability of Satellite Data

POSTER PAPERS¹

- 17.00 – 17.35 54. **Abílio Azenha, Luis Peneda, Adriano Carvalho** (*Institute for Systems and Robotics, Faculty of Engineering, University of Porto, Porto, Portugal*)
Beacons Spatial Distribution Influence on Radio Frequency Indoors Localization Performance
55. **K.K. Veremeenko, D.A. Antonov, R.Yu. Zimin, M.V. Zharkov, I.M. Kuznetsov, A.N. Pronkin** (*Moscow Aviation institute, Moscow, Russia*)
Small-Sized Integrated Navigation and Landing Complex of Variable Structure

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56. **V.I. Baburov, N.V. Ivantsevich, N.V. Vasilyeva** (*Open Joint Stock Company «AUSRIRE», Saint Petersburg, Russia*)
Application of Ground Radionavigation Stations to Increase the Accuracy of GNSS Positioning on User's Antenna Roll
57. **E.L. Mezheritskiy, V.M. Nikiforov** (*Federal State Unitary Academician Pilyugin Scientific-Production Center of Automatics and Instrument-Making, Moscow, Russia*),
M.M. Tchaikovskiy (*Institute of Control Sciences of Russian Academy of Sciences, Moscow, Russia*), **N.D. Egupov** (*The Kaluga Branch of Bauman Moscow State Technical University, Kaluga, Russia*)
Robust Stabilization of Dynamic Systems under Uncertain External Disturbing Factors by Convex Optimization
58. **R.N. Akhmetov, V.P. Makarov, A.V. Sollogub** (*TsSKB-Progress, Samara, Russia*)
Criterion Approach to the Earth Remote Sensing Unmanned Spacecraft Survivability Control System Building
59. **A.S. Galkina, A.I. Manturov, N.I. Pyrinov, V.E. Yurin** (*State Research and Production Space Rocket Centre TsSKB-Progress, Samara, Russia*)
Optimal Choice of Angular Motion Control Program in On-board Control Systems of Earth Remote Sensing Satellites
60. **Yu.N. Gorelov, L.V. Kurganskaya, M.V. Morozova** (*Institution of the Russian Academy of Sciences Institute for the Control of Complex Systems of RAS, Russia*),
S.B. Danilov (*Samara State University, Russia*)
Optimal Planning of Remote Earth Sensing from Space
61. **Ye.I. Somov, S.A. Butyrin** (*Research Institute of Mechanical Systems Reliability, Samara State Technical University, Samara, Russia*)
Long-Term Target Planning at a Gyromoment Guidance of the Information Satellites
62. **M.V. Zhelamskiy** (*"Transas – Aviation" Company, Saint Petersburg, Russia*)
Magnetic and Electromagnetic Tracking of the Mobile Objects

17.35 – 17.50

Discussion of the poster papers

18.00

DRINK RECEPTION

WEDNESDAY, 30 MAY

SESSION III – SATELLITE SYSTEMS

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

INVITED PAPER

- 9.00 – 9.45 63. **S.G. Revnivykh** (*FSUE Central Research Institute of Machine Building, Korolyov, Moscow region, **Russia***)
Global Satellite Navigation Development Trends

PLENARY PAPERS

- 9.45 – 10.05 64. **B.V. Shebshayevich, A.E. Tulyakov, V.E. Druzhin, A.D. Styazhkin, A.I. Khandozhko, A.A. Skobelin, M.N. Utkin** (*“Russian Institute of Radionavigation and Time” JSC, Saint Petersburg, **Russia***), **V.E. Kosenko, V.A. Karnaukhov, Yu.S. Polyakov** (*“Information Satellite Systems” Reshetnev JSC, Moscow, **Russia***)
Some Test Results and Prospects for Development of “Glonass-K” GNSS Angle-Measuring Radiolink
- 10.05 – 10.25 65. **Yunja Yoo, Deuk-Jae Cho, Mi-Young Shin, Sang-Hyun Park** (*Korea Ocean Research & Development Institute, Daejeon, **South Korea***)
Atmospheric Anomalies Detection Using GNSS Measurements Corruption

POSTER PAPERS¹

- 10.25 – 10.50 66. **Ye.I. Somov, S.A. Butyrin, S.Ye. Somov** (*Research Institute of Mechanical Systems Reliability, Samara State Technical University, Samara, **Russia***)
Optimizing Arrangement of the Onboard Navigation Antennas on Accuracy of Satellite Attitude Determination

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67. **A. Cepe** (*Lomonosov Moscow State University, Moscow, Russia*)
True Heading Estimation Using Two GPS Receivers and Carrier Phase Observables
68. **V.V. Panfenov, A.A. Chekhov, I.N. Shestakov** (*The St. Petersburg State University of Civil Aviation, Russia*)
The Development of the Relative Method of Determination of the Coordinates of Consumers in the GNSS
69. **E.G. Kharin, I.A. Kopylov, V.A. Kopelovich, V.B. Ilyin** (*FRI, Zhukovsky, Moscow region, Russia*)
Estimating Errors of True Velocity Values Using Information from GPS and GLONASS Systems
70. **N.V. Mikhailov, A.L. Botchkovsky, D.E. Yudakin, P.V. Glushkov** (*Representative office of "White Dwarf Limited", British Virgin Islands*)
Multipath Mitigation with Extended GPS Signal Processing in Time and Frequency Domains
71. **N.V. Mikhailov, S.S. Pospelov, D.E. Yudakin, P.V. Glushkov** (*Representative Office of "White Dwarf Limited", British Virgin Islands*)
Precomputation of GNSS Message Modulating Sequence and Extra-Long Coherent Accumulation Method
72. **A.A. Chubykin, V.V. Sumerin, V.D. Shargorodskii** (*SEC "SPP", Moscow, Russia*), **I.A. Zolkin, E.I. Ignatovich, A.F. Schekutiev** (*TSNIImash, Korolyov, Moscow region, Russia*)
New Results in the Field of Processing and Using Intersatellite Measurements

10.50 – 11.10

Discussion of the poster papers

11.10 – 11.40

COFFEE BREAK

PLENARY PAPERS

11.40 – 12.00

73. **Ye.A. Mikrin, M.V. Mikhailov, S.N. Rozhkov,**

A.S. Semyonov, I.A. Krasnopolsky (*Rocket Space Corporation Energia, Korolyov, Moscow region, **Russia***)
A Method for Improving Accuracy and Longevity of GLONASS and GPS Ephemeris

- 12.00 – 12.20 74. **N.V. Mikhailov, V.V. Chistyakov** (*Representation of Commercial Company, "White Dwarf Limited", **British Virgin Islands***)
Use of the «SoftFlex» Approach in the User Equipment for Satellite Navigation
- 12.20 – 12.40 75. **A.A. Bermishev, V.L. Lapshin , L.A. Krivospitsky, S.G. Revnivykh** (*Tsniimash, Korolyov, Moscow region, **Russia***)
Results of the Study Navigation Conditions at the Transition of the Northern Sea Route in August-September 2011

12.40 – 13.00 CLOSING CEREMONY

13.00 – 14.00 LUNCH