

CURRICULUM VITAE



Dr. **Danil Ivanov** is Senior Researcher at the Keldysh Institute of Applied Mathematics of the Russian Academy of Science, Associate Professor at the Theoretical Mechanics Chair of the Moscow Institute of Physics and Technology.

Area of professional interest comprises spaceflight dynamics, attitude motion, attitude determination, satellite formation flying control algorithms, computer and laboratory methods of simulation of attitude dynamics and formation flying motion.

Education & Academic Background:

M.Sci.Degree from MIPT, Faculty of Control and Applied Mathematics, dissertation Thesis entitled “Development and Investigation of Satellite Kalman Based Attitude Determination Algorithm” (2010), graduated from MIPT in 2010.

PhD (in Physics and Mathematics), 2013 from the Keldysh Institute of Applied Mathematics of Russian Academy of Sciences – PhD Thesis “Satellite Attitude Determination at Laboratory Facility and On-Board During In-Flight Experiments”

Employment:

(2016-present) Senior Researcher of Keldysh Institute of Applied Mathematics RAS

(2014-2016) Researcher of Keldysh Institute of Applied Mathematics RAS

(2011-2014) Junior Researcher of Keldysh Institute of Applied Mathematics RAS

(2014-present) Associate Professor of the Theoretical Mechanics Chair at the Moscow Institute of Physics and Technology

(2010-2014) Assistant Professor of the Theoretical Mechanics Chair at the Moscow Institute of Physics and Technology

(2010-2013) Post-graduate Student at Keldysh Institute of Applied Mathematics RAS

(2004-2010) Student at Moscow Institute of Physics and Technology

Peer-reviewed journal articles

1. D. Ivanov, M. Kushniruk, M. Ovchinnikov. Study of satellite formation flying control using differential lift and drag // Acta Astronautica – 2018. In Press. 13p.

[DOI: 10.1016/j.actaastro.2018.07.047]

[URL: <https://www.sciencedirect.com/science/article/pii/S009457651830540X>]

2. D. Ivanov, M. Ovchinnikov. M. Sakovich. Relative Pose and Inertia Determination of Unknown Satellite Using Monocular Vision// International Journal of Aerospace Engineering. 2018. In Press. 16 p.

[DOI: 10.1155/2018/9731512]

[URL: <https://www.hindawi.com/journals/ijae/aip/9731512/>]

3. D. Ivanov, D. Roldugin, M. Ovchinnikov. Three-Axis Attitude Determination Using Magnetorquers// Journal of Guidance, Control, and Dynamics. 2018. In Press. 8p.

[DOI: 10.2514/1.G003698]

[URL: <https://arc.aiaa.org/doi/abs/10.2514/1.G003698>]

4. D. Ivanov, M. Koptev, M. Ovchinnikov, N. Proshunin, S. Tkachev, M. Shachkov. Flexible Microsatellite Mock-Up Docking with Non-Cooperative Target on Planar Air Bearing Test Bed // *Acta Astronautica* – 2018.
[DOI: 10.1016/j.actaastro.2018.01.054]
[URL: <https://www.sciencedirect.com/science/article/pii/S009457651731370X>]
5. D. Ivanov, M. Koptev, Y. Mashtakov, M. Ovchinnikov, N. Proshunin, S. Tkachev, A. Fedoseev, M. Shachkov. Determination of Disturbances Acting on Small Satellite Mock-Up on Air Bearing Table // *Acta Astronautica* – 2018. – V.142. P. 265-276.
[DOI: 10.1016/j.actaastro.2017.11.010]
[URL: <https://www.sciencedirect.com/science/article/pii/S0094576517307890>]
6. D.S.Ivanov, M.D.Koptev, Y.V.Mashtakov, M.Yu.Ovchinnikov, N.N.Proshunin, S.S.Tkachev, A.I.Fedoseev, M.O.Shachkov. Laboratory Facility for Microsatellite Mock-up Motion Simulation // *Journal of Computer and Systems Sciences International*, 2018, № 1, pp. 117-132.
[doi: 10.1134/S1064230717060077]
[URL: <https://link.springer.com/article/10.1134/S1064230717060077>]
7. D. Roldugin, M. Ovchinnikov, D. Ivanov, M. Shachkov, M. Koptev, O. Pantsyrnyi, I. Fedorov. Saving mission yet to be launched: Tight schedule for an unexpected project // *Advances in Astronautical Sciences* - 2018. – V. 163. P. 377-391.
[URL: <http://www.univelt.com/linkedfiles/v163%20Contents.pdf>]
8. D. Ivanov, D. Roldugin, M. Ovchinnikov, M. Shachkov. Microsatellite mock-up control using reinforcement learning technique // *Advances in Astronautical Sciences* - 2018. – V. 163. P. 377-391.
[URL: <http://www.univelt.com/linkedfiles/v163%20Contents.pdf>]
9. D. Ivanov, M. Ovchinnikov. Microsatellite Attitude Motion Determination Using Measurements of Electromotive Force in Magnetic Torquers // *Advances in Astronautical Sciences* – 2017. – V. 161. P. 963 - 977.
[URL: <http://www.univelt.com/book=6373>]
10. D.S. Ivanov, M.Yu. Ovchinnikov, V.I. Penkov, D.S. Roldugin, D.M. Doronin, A.V. Ovchinnikov. Advanced Numerical Study of the Three-axis Magnetic Attitude Control and Determination with Uncertainties // *Acta Astronautica*. – 2017 – V. 132, – P. 103-110.
[DOI: 10.1016/j.actaastro.2016.11.045]
[URL: <https://www.sciencedirect.com/science/article/pii/S009457651630371X>]
11. D.S. Ivanov, S.V. Meus, A.V. Ovchinnikov, M.Yu. Ovchinnikov, S.A. Shestakov, E.N. Yakimov. Methods for the Vibration Determination and Parameter Identification of the Spacecraft with Flexible Structures// *Journal Of Computer And Systems Sciences International*. – 2017. –V. 56, № 2. – P. 311-327.
[DOI: 10.1134/S1064230717010087]
[URL: <https://link.springer.com/article/10.1134/S1064230717010087>]
12. D. Ivanov, N. Ivlev, S. Karpenko, M.Ovchinnikov. Analytical study of microsatellite attitude determination algorithms // *Acta Astronautica*. – 2015 – V. 116, – P. 339-348.
[DOI: 10.1016/j.actaastro.2015.07.001]
[URL: <https://www.sciencedirect.com/science/article/pii/S0094576515002714>]

13. D. Ivanov, N. Ivlev, S. Karpenko, M. Ovchinnikov. Advanced Technique for Kalman Filter Adjustment and Its Implementation Onboard of "TabletSat" Microsatellite Series// Advances in Astronautical Sciences. – 2015 – V. 153. – P. 1055-1072.
[URL: <http://www.univelt.com/linkedfiles/v153%20Contents.pdf>]
14. S. Shestakov, D. Ivanov, M. Ovchinnikov. Formation Flying Momentum Exchange Control by Separate Mass// Journal of Guidance, Control, and Dynamics. – 2015 – V. 38, № 8. – P. 1534-1543.
[DOI: 10.2514/1.G001137]
[URL: <https://arc.aiaa.org/doi/10.2514/1.G001137>]
15. D. Ovchinnikov, D. Roldugin, D. Ivanov, V. Penkov. Choosing control parameters for three axis magnetic stabilization in orbital frame // Acta Astronautica – 2015. – V.116. P. 74-77.
[DOI: 10.2514/1.G001137]
[URL: <https://www.sciencedirect.com/science/article/pii/S0094576515002611>]
16. D. Ivanov, S. Shestakov, M. Ovchinnikov. Satellite Formation Flying Control by Mass Exchange//Acta Astronautica - 2014. - V. 102. - P. -392-401.
[DOI: 10.1016/j.actaastro.2014.02.028]
[URL: <https://www.sciencedirect.com/science/article/pii/S009457651400085X>]
17. D. Ivanov, M. Ovchinnikov, S. Karpenko, M. Sakovich. Satellite relative motion determination during separation using image processing// International Journal of Space Science and Engineering - 2014 - V.2, № 4 - P.365-379.
[DOI: 10.1504/IJSPACESE.2014.066963]
[URL: <http://www.inderscience.com/info/inarticle.php?artid=66963>]
18. D. Ivanov, N. Ivlev, S. Karpenko, D. Roldugin, M. Ovchinnikov, S. Tkachev. The results of Flight Tests of an Attitude Control System for the Chibis-M Microsatellite //Cosmic Research. – 2014 – V. 52., №3. – P. 205-215.
[DOI:10.1134/S0010952514020038]
[URL: <https://link.springer.com/article/10.1134/S0010952514020038>]
19. D. Ivanov, M. Ovchinnikov. Approach to Study of Satellite Attitude Determination Algorithm// Acta Astronautica. - 2014. - V. 98. - P. 133-137.
[DOI:10.1016/j.actaastro.2014.01.024]
[URL: <https://www.sciencedirect.com/science/article/pii/S009457651400037X>]
20. M. Ovchinnikov, D. Ivanov, N. Ivlev, S. Karpenko, D. Roldugin, S. Tkachev. Development, integrated investigation, laboratory and in-flight testing of Chibis-M microsatellite ADCS// Acta Astronautica. - 2014. - V. 93. - P. 23-33.
[DOI:10.1016/j.actaastro.2013.06.030]
[URL: <https://www.sciencedirect.com/science/article/pii/S0094576513002312>]
21. D. Ivanov, M. Ovchinnikov, V. Penkov. Laboratory study of magnetic properties of hysteresis rods for attitude control systems of minisatellites // Journal Of Computer And Systems Sciences International. – 2013. – V. 52, № 1. P. 145-164.
[DOI:10.1134/S1064230712060032]
[URL: <https://link.springer.com/article/10.1134/S1064230712060032>]

22. D. Ivanov, S. Karpenko, M.Ovchinnikov, D. Roldugin, S. Tkachev. Testing of attitude control algorithms for microsatellite "Chibis-M" at laboratory facility // Journal Of Computer And Systems Sciences International. – 2012. – V. 51, № 1. – P. 106-125.

[DOI:10.1134/S1064230711060104]

[URL: <https://link.springer.com/article/10.1134/S1064230711060104>]

23. D. Ivanov, M.Ovchinnikov, S. Tkachev. Attitude control of a rigid body suspended by string with the use of ventilator engines // Journal Of Computer And Systems Sciences International. – 2011. –V. 50, № 1. – P. 104-116.

[DOI:10.1134/S1064230711010114]

[URL: <https://link.springer.com/article/10.1134/S1064230711010114>]

24. D. Ivanov, Z. Ming, T. Walter, I. Zaramenskikh. Laboratory Facility for Simulation and Verification of Formation Motion Control Algorithms // Small Satellite Missions For Earth Observation: New Developments And Trends. – 2010. – P. 267-277.

[DOI:10.1007/978-3-642-03501-2_25]

[URL: <https://www.springerprofessional.de/en/laboratory-facility-for-simulation-and-verification-of-formation/3157872>]

25. M.Yu. Ovchinnikov, D. Bindel, D.S. Ivanov, G.V. Smirnov, S. Theil, I.E. Zaramenskikh. Development and Laboratory Verification of Control Algorithms for Formation Flying Configuration with a Single-input Control // Acta Astronautica, v. 67, 2010. P. 1157–1163.

[DOI: 10.1016/j.actaastro.2010.06.035]

[URL: <https://www.sciencedirect.com/science/article/pii/S0094576510002262>]

26. D. Bindel, I.E. Zaramenskikh, D.S. Ivanov, M.Yu. Ovchinnikov, N.G. Proncheva. A Laboratory Facility for Verification Of Control Algorithms For a Group of Satellites // Journal Of Computer And Systems Sciences International

[DOI:10.1134/S1064230709050128]

[URL: <https://link.springer.com/article/10.1134/S1064230709050128>]

Grants and Research Projects:

- (2017-2019) Grant N 17-01-00449_a "Investigation of orbital and angular motion of satellite formation flying", of the Russian Basic Research Foundation (I)
- (2016-2018) Grant N 16-01-00634_a "Modeling and control of the movement of the elastic extended space structures", of the Russian Basic Research Foundation (PI)
- (2014-2016) Grant N 14-11-00621 "New mathematical models and control algorithms for angular and orbital motion of small satellites for Moon and minor Solar system bodies investigation" of Russian Scientific Foundation (I)
- (2014-2015) Grant N 14-01-31313 "Small Satellites Formation Flying Relative Motion Investigation and Algorithms Development for Perspective Control Systems With Minimal Fuel Consumption" of the Russian Basic Research Foundation (PI)
- (2012-2013) Grant N 14.132.21.1588 "Controllable small satellite attitude motion in the magnetic field" of the Ministry of Education and Science of Russian Federation (I)
- (2012-2013) State contract no. 8281 "Research and Development of the economy de-orbiting methods for small satellites from typical Earth orbits" (I)
- (2013-2015) Grant N 13-01-00665 "Motion study and control algorithms development for dynamic reconfiguration of the microsatellite formation including its de-orbiting" of the Russian Basic Research Foundation (I)
- (2012-2014) Grant N CII-384.2012.3, Scholarship of the Russian Federation President (PI)

- (2010-2012) State contract no. 02.740.11.0860, “Design and research of the controllable orbit and attitude motion for the small spacecrafts in formation flying with the usage of the new generation engines” of the Ministry of Education and Science of Russian Federation (I)
- (2009-2011) Grant N 09-01-00431 “Dynamics and Control of Multi-Element Mobile Formation under Limitation for Measuring and Control” of the Russian Basic Research Foundation (I)
- (2007-2009) Grant N 07-01-92001 “Magnetic Attitude Control Systems for Small Satellites” of the Russian Basic Research Foundation and Taiwan National Council (I)
- (2007) Project DAAD “Magnetic Satellite Attitude Control” in framework of Leonhard Euler Program (Referat № 325)
- (2008-2009) Grant N NSh-1123.2008.1 “Support of Leading Scientific Schools of Russia” by President of Russia (I)
- (2006-2008) Grant N 06-01-00389 “Guarantee of the motion of small satellites and miniature flight vehicles at incomplete measurements and limited control” of the Russian Basic Research Foundation (I)
- (2006-2008) Project N 6827 “High school scientific potential elaboration” of the Ministry of Education and Science of Russian Federation (I)
- (2006-2007) Grant N NSh-2448.2006.1 “Support of Leading Scientific Schools of Russia” by President of Russia (I)
- (2012) Grant N 12-01-09203 to attend 1st IAA Conference on Dynamics and Control of Space Systems in Porto, Portugal
- (2008-2011) Project HPH.com N 218862 in Seventh Framework Program (FP7)

Industrial contracts

- (2015) “Damping system for attitude control motion of nanosatellite SamSat-QB50”, Contract # 13-15 with the Samara State Aerospace University named after acad. S. Korolev, (PI);
- (2014-2015) “Development of magneto-gyroscopic attitude control system within space-based system for radiation environment monitoring in near-Earth space”, Contract # 68-14 with JSC NIIEM; (I);
- (2014-2015) “Development of technique for high accuracy attitude determination and control of the low-earth orbit SC”, Contract #70-14 with JSC “Information Satellite Systems” named after Reshetnev; (PI);
- (2014-2015) “Development of control algorithms for attitude orientation and stabilization of SC with non-rigid large structure elements”, Contract #74-14 with JSC “Information Satellite Systems” named after Reshetnev; (I);
- (2014) “Satellite multiple solar panel dynamic model development”, Contract # NSPO-S-103132 with NSPO, Taiwan; (I);
- (2014) “Development and verification of the algorithm for landing particle coordinates determination”, Contract № 09-14 R&DC Rezonans Ltd, (PI);
- (2013) “Generic spacecraft dynamic simulation code development”, Contract № NSPO-S-102089 with the National Space Organization, Taiwan, (I);
- (2013) “Development of Software for Attitude Control System of “Tabletsat” Microsatellite Series”, Contract № 11-13 with “Sputnix” Ltd, (I);
- (2011-2012) “Developing the attitude sensors calibration technique and recommendations what to do in failure of during the microsatellite Chibis-M operation”, Contract № 1226/11-1 with “Sputnix” Ltd, (I);
- (2011-2013) «Study of Formation and Single Satellite Flight with regard to Information Support and Communication Apparatus Distribution among Satellites» (Code Telepribor-IPM) with JSC “Russian Space Systems”, Contract № 016/754-11/2, (PI);

- - (2008-2010) "Investigation of control algorithms, calibration of sensor and actuators and laboratory verification of ASC for small satellite Chibis-M" with JSC "RDC ScanEx", Contract N 9/0506-SP, (I);
- - (2009) «Development of Phase B project in Ballistics», Code of Partial Study: «Monitoring IPM», Customer JSC «Gasprom Space Systems», Contract № 23-09/K/476/ИПИМ-09 (I).

Educational experience:

Associate professor of the Theoretical Mechanics Chair and Applied Mathematics Chair of the Moscow Institute of Physics and Technology (MIPT), Moscow, Russia.

Leads laboratory works in the framework of the special course "Dynamics and control of complex mechanical systems" in the Innovation laboratory "Control and dynamics of complex intelligential mechanical systems" created at MIPT if the frame of Inovation eduacational program "High technology and innovation economics" (<http://teormech.mipt.ru/laboratory/>).

Supervises four bachelor and master students at Applied Mathematics Chair of the Moscow Institute of Physics and Technology.

In 2013 produced tutorial "Mesuarements processing methods" together with prof. Platonov A.K. In 2009-2012 produced two laboratory works tutorial for special course "Dynamics and control of complex mechanical systems".

As a Visiting Professor gave lectures about motion determination at 8th International Workshop and Advanced School "Spacecraft Dynamics and Control", Faculty of Sciences of Lisbon University, March 11-12, 2013, Lisbon, Portugal; and at VII International scientific summer school "Computer Technologies of Engineering Mechanical Problems", Moscow State University, July 1-30, 2013, Moscow.

Participated in organization and task designing for All-Russian student Olympiads of mechanics and mathematical simulations at MIPT in 2011-2013 years. Was a chief of MIPT student team at international Olympiads of theoretical mechanics in Gomel, Belarus in 2011-2012 years.

Lecturer of advance training course "Measurements processing methods" in 2014 year for specialists from ISS Resented company

Awards:

- Young scientist award of Moscow Government in nomination "Mathematics, Mechanics and Computer Science" with work "New Approaches to Motion Control of Modern Russian Satellites " (Moscow Government, 2015);
- Certificate of outstanding contribution in reviewing for journal Acta Astronautica (The Editors of Acta Astronautica, 2014);
- Young scientists grant of the Russian Federation President for challenging scientific investigations and developments of Russian economics priority branches in 2012-2014 years and in 2015-2017 years.
- Young scientists paper competition award at 7th International Workshop on Satellite Constellations and Formation Flying, Lisbon, Portugal, 2013 with work «Investigation of the Possibility of Formation Flying Control by Mass Exchange» (International Academy of Astronautics, 2013);
- Young scientists award at the contest dedicated to the Keldysh Institute of Applied Mathematics of RAS 60-years anniversary with work «Investigation, Development and Flight Testing of Chibis-M Scientific Satellite Attitude Control System» (KIAM RAS, 2013).
- Young scientists award at the contest dedicated to M.V. Keldysh 100-years anniversary with work «Small Satellites Attitude and Relative Orbital Motion Control with Geomagnetic Field Use» (KIAM RAS, 2011);

- Young scientists award at exhibition "Youth Scientific and Technological Creation-2011" with work «Laboratory Investigation of Chibis-M Attitude Control System». (Ministry of education and science of RF, 2011);
- Student paper competition award at 7th International Academy of Astronautics Symposium on Small Satellites for Earth Observation, Berlin, Germany, 2009 with work «Laboratory Facility for Simulation and Verification of Formation Motion Algorithms» (International Academy of Astronautics, 2009);

Trainings:

- There were trainings in 2008-2010 years during one month in each year at ZARM "Center of Applied Space Technology and Microgravity", Bremen University, Germany.

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