



Sergey P. Trofimov

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EDUCATION

2012-2015	Doctor of Philosophy	Theoretical Mechanics, Moscow Institute of Physics and Technology (MIPT)
2010-2012	Master of Science (Magna cum Laude)	Applied Mathematics and Control, Moscow Institute of Physics and Technology (MIPT)
2006-2010	Bachelor of Science (Summa cum Laude)	Aerophysics and Space Research, Moscow Institute of Physics and Technology (MIPT)

PROFESSIONAL POSITIONS

2018-present	Researcher	Space Systems Dynamics Department, Keldysh Institute of Applied Mathematics (KIAM)
2017-2018	Researcher	Spaceflight Mechanics and Control Department, Keldysh Institute of Applied Mathematics (KIAM)
2014-2017	Junior Researcher	Spaceflight Mechanics and Control Department, Keldysh Institute of Applied Mathematics (KIAM)
2010-2013	Research Assistant	Spaceflight Mechanics and Control Department, Keldysh Institute of Applied Mathematics (KIAM)

TEACHING EXPERIENCE

2018-present	Associate Professor	Department of Mathematical Modeling and Applied Mathematics, MIPT
2012-2018	Assistant Professor	Department of Mathematical Modeling and Applied Mathematics, MIPT

Courses taught:

Systems and Methods of Earth and Space Navigation (since Fall 2012)
Advanced Space Flight Mechanics (since Fall 2014)
Advanced Analytical Mechanics (since Spring 2016)
Dynamical Systems I (since Spring 2018)

AWARDS

April 20, 2019

1. Medal of the Russian Academy of Sciences for Young Researchers (jointly with M. Shirobokov) in the area of mathematics for the research project “Development of Techniques for Design and High-Precision Modeling of Prospective Small Spacecraft Missions,” 2017.
2. Best paper among graduate students, Session “Theoretical Mechanics,” 54th MIPT Scientific Conference “Modern Issues of Fundamental and Applied Sciences,” 2011.
3. Best paper among graduate students, Session “Spaceflight Dynamics and Control,” 53rd MIPT Scientific Conference “Modern Issues of Fundamental and Applied Sciences,” 2010.
4. Best paper among undergraduate students, Session “Theoretical Mechanics,” 52nd MIPT Scientific Conference “Modern Issues of Fundamental and Applied Sciences,” 2009.

MEMBERSHIP IN EDITORIAL BOARDS AND CONFERENCE ORGANIZING COMMITTEES

1. Deputy Chair of the Spacecraft Dynamics and Motion Control session, 61st MIPT Scientific Conference, 2018

SCHOLARSHIPS

1. **RF President’s Scholarship**, 2012-2014, 2015-2017
2. **National Academic Scholarship**, 2011-2012
3. **Alexander Abramov Charity Foundation Scholarship**, 2007-2010
4. **Academic Senate Scholarship**, 2006-2012

RESEARCH INTERESTS

1. Orbital dynamics and control

- Orbital maneuvers optimization under constraints on the thrust direction
- Earth-orbiting formation flying concept and its science applications
- Deorbiting of retired satellites
- Orbital motion of spacecraft with a solar sail
- Interplanetary trajectory optimization
- Stationkeeping for unstable orbits around collinear libration points

2. Attitude dynamics

- Vision-based algorithms for identification of attitude motion
- Star pattern recognition algorithms for identification of attitude motion
- Attitude motion of spacecraft with a solar sail

PATENTS, CERTIFICATES, INVENTIONS

1. Russian software certificate No. 2018612958 “Software package for the design of periodic orbits in the vicinity of lunar L1 and L2 libration points,” authors: M. Shirobokov, **S. Trofimov**, M. Ovchinnikov, possessor of the rights: Keldysh Institute of Applied Mathematics, Russian Academy of Sciences, priority date: 6 December 2017.
2. Russian software certificate No. 2016619866 “Software package for forecasting lifetime of spacecraft with a solar sail under the action of gravitational, aerodynamic, magnetic, and solar radiation pressure forces,” authors/inventors: **S. Trofimov**, M. Ovchinnikov, S. Tkachev, D. Roldugin, possessor of the rights: Keldysh Institute of Applied Mathematics, Russian Academy of Sciences, priority date: 1 July 2016.
3. Russian software certificate No. 2014660159 “Software package for design of interplanetary trajectories with powered swing-bys using method of virtual trajectories,” authors/inventors: M. Shirobokov, **S. Trofimov**, M. Ovchinnikov, I. Ritus, possessor of the rights: Keldysh Institute of Applied Mathematics, Russian Academy of Sciences, priority date: 7 August 2014.
4. Russian software certificate No. 2012615775 “Software package for design and investigation of controlled orbital and attitude motion of formation flying spacecraft equipped with thrusters of new generation,” authors/inventors: M. Shirobokov, **S. Trofimov**, M. Ovchinnikov, S. Mirer, S. Tkachev, D. Ivanov, D. Roldugin, M. Sakovich, A. Ilyin, possessor of the rights: Keldysh Institute of Applied Mathematics, Russian Academy of Sciences, priority date: 10 July 2012.
5. Russian software certificate No. 2012615774 “Software package for design of interplanetary trajectories with deep space maneuvers and swing-bys using method of virtual trajectories,” authors/inventors: M. Shirobokov, **S. Trofimov**, M. Ovchinnikov, possessor of the rights: Keldysh Institute of Applied Mathematics, Russian Academy of Sciences, priority date: 10 July 2012.

MONOGRAPHS, CHAPTERS IN BOOKS

1. D. Ivanov, **S. Trofimov**, M. Shirobokov. Numerical Modeling of Spacecraft Orbital and Attitude Motion / ed. by M. Ovchinnikov. KIAM Publishing, Moscow, 2016. 118 p. (in Russian)
ISBN 978-5-98354-023-1, doi: 10.20948/mono-2016-trofimov
URL: <http://keldysh.ru/e-biblio/trofimov/>

PEER-REVIEWED PUBLICATIONS

1. Michael Koptev, **Sergey Trofimov**, Mikhail Ovchinnikov. Design and Deployment of a Tetrahedral Formation with Passive Deputy Nanosatellites for Magnetospheric Studies // Advances in Space Research, 2019 (in press). doi: 10.1016/j.asr.2019.03.007
URL: <https://www.sciencedirect.com/science/article/pii/S0273117719301863>
2. Maksim Shirobokov, **Sergey Trofimov**. Low-Thrust Transfers Between Lunar L1/L2 Halo Orbits and Near-Moon Orbits // Cosmic Research, 2019 (in press).
URL: ?
3. **Sergey Trofimov**, Anastasia Tselousova, Maksim Shirobokov. Two Direct Low Thrust Trajectory Optimization Techniques // Journal of Computer and Systems Sciences International, 2018, V. 57, No. 6, p. 989-1000. doi: 10.1134/S1064230718060114
URL: <https://link.springer.com/article/10.1134%2FS1064230718060114>
4. Maksim Shirobokov, **Sergey Trofimov**, Mikhail Ovchinnikov. Design of Interplanetary Trajectories with Passive Gravity Assists and Deep Space Maneuvers // Cosmic Research, 2018, V. 56, No. 4, p. 317-330. doi: 10.1134/S0010952518040044
URL: <https://link.springer.com/article/10.1134/S0010952518040044>

5. **Sergey P. Trofimov**, Mikhail Yu. Ovchinnikov. Performance Scalability of Square Solar Sails // Engineering Note, Journal of Spacecraft and Rockets, 2018, V. 55, No. 1, p. 241-245. doi: 10.2514/1.A33894
URL: <https://doi.org/10.2514/1.A33894>
6. **Sergey P. Trofimov**, Mikhail Yu. Ovchinnikov. Sail-Assisted End-of-Life Disposal of Low-Earth Orbit Satellites // Engineering Note, Journal of Guidance, Control, and Dynamics, 2017, V. 40, No. 7, p. 1794-1803. doi: 10.2514/1.G002300. doi: 10.2514/1.G002300
URL: <https://arc.aiaa.org/doi/abs/10.2514/1.G002300>
7. Maksim Shirobokov, **Sergey Trofimov**, Mikhail Ovchinnikov. Survey of Station-Keeping Techniques for Libration Point Orbits // Journal of Guidance, Control, and Dynamics, 2017, V. 40, No. 5, p. 1085-1105. doi: 10.2514/1.G001850
URL: <https://arc.aiaa.org/doi/abs/10.2514/1.G001850>
8. Maksim Shirobokov, **Sergey Trofimov**, Mikhail Ovchinnikov. Recovery of Halo Orbit Missions in Case of Contingent Station-Keeping Maneuver Delay // Advances in Space Research, 2016, V. 58, No. 9, p. 1807-1818. doi: 10.1016/j.asr.2016.07.003
URL: <http://www.sciencedirect.com/science/article/pii/S0273117716303623>
9. **Sergey Trofimov**, Mikhail Ovchinnikov. Optimal Multiple-Impulse Circular Orbit Phasing // Engineering Note, Journal of Guidance, Control, and Dynamics, 2016, V. 39, No. 7, p. 1675-1678. doi: 10.2514/1.G001513
URL: <http://arc.aiaa.org/doi/abs/10.2514/1.G001513>
10. Anna Guerman, Michael Ovchinnikov, Georgi Smirnov, **Sergey Trofimov**. High-Precision Single-Input Control of Relative Motion in Spacecraft Formation // Acta Astronautica, 2014, V. 94, No. 1, p. 375-382. doi: 10.1016/j.actaastro.2013.02.014
URL: <http://www.sciencedirect.com/science/article/pii/S0094576513000714>
11. Michael Ovchinnikov, Maksim Shirobokov, **Sergey Trofimov**. Method of Virtual Trajectories for the Design of Gravity Assisted Missions // Cosmic Research, 2013, V. 51, No. 6, p. 439-451. doi: 10.1134/S001095251306004X
URL: <https://link.springer.com/article/10.1134/S001095251306004X>
12. Michael Ovchinnikov, Maksim Shirobokov, **Sergey Trofimov**. Method of Virtual Trajectories for the Design of Gravity Assisted Missions // Academy Transactions Note, Acta Astronautica, 2013, V. 91, p. 137-140. doi: 10.1016/j.actaastro.2013.06.003
URL: <http://www.sciencedirect.com/science/article/pii/S0094576513001938>
13. Michael Yu. Ovchinnikov, **Sergey P. Trofimov**, Hao-Chi Chang. Radio Occultation Constellation Deployment via Impulses along the Geomagnetic Field // Acta Astronautica, 2013, V. 82, No. 1, p. 80-87. doi: 10.1016/j.actaastro.2012.04.032
URL: <http://www.sciencedirect.com/science/article/pii/S0094576512001476>
14. Anna D. Guerman, Michael Yu. Ovchinnikov, Georgi V. Smirnov, **Sergey P. Trofimov**. Closed Relative Trajectories for Formation Flying with Single-Input Control // Mathematical Problems in Engineering, Special Issue "Mathematical Methods Applied to the Celestial Mechanics of Artificial Satellites," 2012, V. 2012, ID 967248, 20 p. doi: 10.1155/2012/967248
URL: <http://www.hindawi.com/journals/mpe/2012/967248/>
15. D. Ivanov, S. Tkachev, D. Roldugin, **S. Trofimov**, D. Nuzhdin, S. Karpenko. Analytical, Numerical, and Experimental Research of Microsatellite Attitude Control Algorithms // Bulletin of Lobachevsky State University of Nizhny Novgorod, 2011, V. 4, No. 2, p. 152-154. (in Russian)

16. Michael Yu. Ovchinnikov, Andrey A. Baranov, **Sergey P. Trofimov**. Development of Formation for Ionosphere Sounding Based on Two Satellites Equipped with a Passive Magnetic Attitude Control System // Journal of Aerospace, Engineering, Sciences and Applications, 2011, V. III, No. 1, p. 99-112.
URL: <http://www.aeroespacial.org.br/jaes/editions/repository/v03/n01/7-OvchinnikovBaranovTrofimov.pdf>

CONFERENCE PAPERS INDEXED IN WEB OF SCIENCE AND/OR SCOPUS DATABASES

1. Anastasia Tselousova, Maksim Shirobokov, **Sergey Trofimov**. High-Altitude Near-Circular Orbits for a Lunar Orbital Station // Advances in the Astronautical Sciences, 2019 (in press). Presented as AAS SciTech-062, IAA SciTech Forum 2018, Conference on Space Flight Mechanics, Moscow, Russia, November 13-15, 2018.
ISBN ?
URL: ?
2. **Sergey Trofimov**, Maksim Shirobokov, Anastasia Tselousova, Mikhail Ovchinnikov. Transfers Between Near-Rectilinear Halo Orbits and the Moon // Proceedings of the 69th International Astronautical Congress, Bremen, Germany, October 1-5, 2018, Paper IAC-18-C1.8.10, published by International Astronautical Federation & Curran Associates, 2019, V. ?, p. ????-????.
ISBN ?
URL: ?
3. Maksim Shirobokov, **Sergey Trofimov**, Mikhail Ovchinnikov. Station-Keeping of Sun-Venus L2 Libration Point Orbits for a Prospective Space Observatory Mission // Proceedings of the 68th International Astronautical Congress, Adelaide, Australia, September 25-29, 2017, Paper IAC-17-C1.7.4, published by International Astronautical Federation & Curran Associates, 2018, V. 11, p. 7391-7408.
ISBN 978-1-51085-537-3
URL: <http://www.proceedings.com/37978.html>
4. Michael Koptev, **Sergey Trofimov**, Sergey Shestakov, Yaroslav Mashtakov. Design and Keeping of Nanosatellite-Based Highly Elliptical Orbit Formation // Advances in the Astronautical Sciences, 2018, V. 161, p. 1097-1109. Presented as Paper IAA-AAS-DyCoSS3-039, 3rd IAA Conference on Dynamics and Control of Space Systems, Moscow, Russia, May 30-June 1, 2017.
ISBN 978-0-87703-643-2
URL: <http://www.univelt.com/linkedfiles/v161%20Contents.pdf>
5. Maksim Shirobokov, **Sergey Trofimov**, Mikhail Ovchinnikov. Pareto-Optimal Low-Thrust Lunar Transfers with Resonant Encounters // Advances in the Astronautical Sciences, 2018, V. 161, p. 485-498. Presented as Paper IAA-AAS-DyCoSS3-033, 3rd IAA Conference on Dynamics and Control of Space Systems, Moscow, Russia, May 30-June 1, 2017.
ISBN 978-0-87703-643-2
URL: <http://www.univelt.com/linkedfiles/v161%20Contents.pdf>
6. Maksim Shirobokov, **Sergey Trofimov**. Parametric Analysis of Low-Thrust Lunar Transfers with Resonant Encounters // Advances in the Astronautical Sciences, 2016, V. 158, p. 579-603. Presented as Paper AAS 16-481, AAS/AIAA Space Flight Mechanics Meeting, Napa, CA, USA, February 14-18, 2016.
ISBN 978-0-87703-633-3
URL: <http://www.univelt.com/linkedfiles/v158%20Contents.pdf>
7. **Sergey Trofimov**, Mikhail Ovchinnikov. Fast and Efficient Sail-Assisted Deorbiting Strategy for LEO Satellites in Orbits Higher Than 700 km // Advances in the Astronautical Sciences, 2016, V.

156, p. 1869-1888. Presented as Paper AAS 15-595, AAS/AIAA Astrodynamics Specialist Conference, Vail, CO, USA, August 9-13, 2015.
ISBN 978-0-87703-629-6
URL: <http://www.univelt.com/linkedfiles/v156%20Contents.pdf>

8. Mikhail Ovchinnikov, Maksim Shirobokov, **Sergey Trofimov**. Recovery of Lunar Libration Point Missions in Case of Contingency Correction Maneuver Delay // Proceedings of the 66th International Astronautical Congress, Jerusalem, Israel, October 12-16, 2015, Paper IAC-15-C1.7.5, published by International Astronautical Federation & Curran Associates, 2016, V. 8, p. 5771-5791.
ISBN 978-1-51081-893-4
URL: <http://www.proceedings.com/29485.html>
9. Maksim Shirobokov, **Sergey Trofimov**. Thruster Failure Recovery Strategies for Libration Point Missions // Advances in the Astronautical Sciences, 2015, V. 153, p. 1383-1391. Presented as Paper IAA-AAS-DyCoSS2-14-12-07, 2nd IAA Conference on Dynamics and Control of Space Systems, Rome, March 24-26, 2014.
ISBN 978-0-87703-617-3
URL: <http://www.univelt.com/linkedfiles/v153%20Contents.pdf>
10. Michael Yu. Ovchinnikov, **Sergey P. Trofimov**. Optimal Low-Thrust Deorbiting of Passively Stabilized LEO Satellites // Proceedings of the 64th International Astronautical Congress, Beijing, China, September 23-27, 2013, Paper IAC-13-C1.6.4, published by International Astronautical Federation & Curran Associates, 2014, V. 7, p. 5224-5229.
ISBN 978-1-62993-909-4
URL: <http://www.proceedings.com/21288.html>
11. Maksim Shirobokov, **Sergey P. Trofimov**, Michael Yu. Ovchinnikov. Method of Virtual Trajectories for the Preliminary Design of Multiple Gravity-Assist Interplanetary Trajectories // Proceedings of the 64th International Astronautical Congress, Beijing, China, September 23-27, 2013, Paper IAC-13-C1.4.1, published by International Astronautical Federation & Curran Associates, 2014, V. 7, p. 4984-4990.
ISBN 978-1-62993-909-4
URL: <http://www.proceedings.com/21288.html>

OTHER CONFERENCE PAPERS AND ABSTRACTS

1. **Sergey Trofimov**, Mikhail Ovchinnikov. Safe Post-Mission Disposal of Small Spacecraft in a Low-Earth Orbit // Abstracts of the Conference "Space Debris: Fundamental and Practical Aspects of the Threat," IKI RAS, Moscow, April 17-19, 2019, p. 80. (in Russian)
2. Maksim Shirobokov, **Sergey Trofimov**, Anastasia Tselousova, Michael Koptev. Parallel Computing in Astrodynamics // Parallel Computing Technologies 2019, Kaliningrad, April 2-4, 2019. (in Russian)
3. Artemy Sorokin, Maksim Shirobokov, **Sergey Trofimov**. Artificial Neural Networks for Control and Prediction of Low-Thrust Spacecraft Motion // Proceedings of XLIII Academic Readings on Astronautics, Session 5, Paper 8, Moscow, January 29 – February 1, 2019. (in Russian)
ISBN 978-5-7038-5094-7
4. Anastasia Tselousova, Maksim Shirobokov, **Sergey Trofimov**. Analysis of Transfers from Low Earth Orbits to High Circular Near-Polar Orbits Around the Moon // Proceedings of XLIII Academic Readings on Astronautics, Session 5, Paper 14, Moscow, January 29 – February 1, 2019. (in Russian)
ISBN 978-5-7038-5094-7

5. Maksim Shirobokov, **Sergey Trofimov**. Parallel Computing in Astrodynamical Problems // Proceedings of XLIII Academic Readings on Astronautics, Session 5, Paper 27, Moscow, January 29 – February 1, 2019. (in Russian)
ISBN 978-5-7038-5094-7
6. Anastasia Tselousova, Maksim Shirobokov, **Sergey Trofimov**. High-Altitude Circular Orbits Around the Moon for Placing an Orbital Station // Proceedings of the 61th MIPT Scientific Conference, Moscow-Dolgoprudny-Zhukovsky, November 19-25, 2018. Applied Mathematics and Computer Science. (in Russian)
ISBN 978-5-7417-0689-3
7. Artemy Sorokin, Maksim Shirobokov, **Sergey Trofimov**, Yusuf Khudaiberdiev. Prediction and Control of Low-Thrust Spacecraft Trajectories Using Artificial Neural Networks // Proceedings of the 61th MIPT Scientific Conference, Moscow-Dolgoprudny-Zhukovsky, November 19-25, 2018. Applied Mathematics and Computer Science. (in Russian)
ISBN 978-5-7417-0689-3
8. **Sergey Trofimov**, Maksim Shirobokov, Michael Koptev. Semianalytical Design of Libration Point Formations // 7th International Conference on Astrodynamics Tools and Techniques (ICATT), Oberpfaffenhofen, Germany, November 6-9, 2018, 11 p.
URL: https://indico.esa.int/event/224/papers/3890/files/240-Manuscript_UPD.pdf
9. Maksim Shirobokov, **Sergey Trofimov**, Mikhail Ovchinnikov. Construction of Interplanetary Trajectory Database on a Multiprocessor System // Russian Supercomputing Days 2018, Moscow, Russia, September 24-25, 2018, 2 p. (in Russian)
10. Michael Koptev, **Sergey Trofimov**. Improved Design and Deployment Analysis for a HEO Tetrahedral Formation with Passive Deputy Nanosatellites // Small Satellites Systems and Services (4S) Symposium, Sorrento, Italy, May 28 – June 1, 2018, 14 p.
URL:
https://www.researchgate.net/publication/329276855_Improved_Design_and_Deployment_Analysis_for_a_HEO_Tetrahedral_Formation_with_Passive_Deputy_Nanosatellites
11. Maksim Shirobokov, **Sergey Trofimov**. Station-Keeping of Sun-Venus L2 Libration Point Orbits // Proceedings of XLII Academic Readings on Astronautics, Session 18, Paper 9, Moscow, January 23-26, 2018. (in Russian)
12. **Sergey Trofimov**. 60 years later: Spaceflight mechanics in the XXI century // School of Young Researchers “Mathematical Modeling, High-Precision Algorithms, and Software for Supercomputers,” Keldysh Institute of Applied Mathematics, Moscow, December 11-13, 2017. (in Russian)
13. Yusuf Khudaiberdiev, **Sergey Trofimov**. Global Optimization of Spacecraft Trajectories Using Space-Filling Curves // Proceedings of the 60th MIPT Scientific Conference, Moscow-Dolgoprudny-Zhukovsky, November 20-25, 2017. Applied Mathematics and Computer Science. (in Russian)
ISBN 978-5-7417-0652-7
14. Maksim Shirobokov, **Sergey Trofimov**. Resonant Encounters with the Moon in Small Spacecraft Flights to Lunar L1 Libration Point // Proceedings of VII Scientific and Technical Conference of Young Researchers and Specialists, Korolev, April 4-7, 2017, p. 182-188. (in Russian)
ISBN 978-5-85162-128-4
15. **Sergey Trofimov**, Mikhail Ovchinnikov. Performance-Invariant Scaling of Square Solar Sails // 4th International Symposium on Solar Sailing, Kyoto, Japan, January 17-20, 2017, 6 p.
URL:
http://www.jsforum.or.jp/ISSS2017/papers/paper/17032_Paper_Dr.%20Sergey%20Trofimov.pdf

16. **Sergey Trofimov**, Stepan Tkachev, Dmitry Roldugin. Sail-Assisted End-of-Life Disposal of High-LEO Satellites // 4th International Symposium on Solar Sailing, Kyoto, Japan, January 17-20, 2017, 7 p.
URL:
http://www.isforum.or.jp/ISSS2017/papers/paper/17031_Paper_Dr.%20Sergey%20Trofimov.pdf
17. Mikhail Ovchinnikov, Maksim Shirobokov, **Sergey Trofimov**. Small Spacecraft Interplanetary Missions. The Art of Trajectory Design // 10th International Workshop and Advanced School "Spaceflight Dynamics and Control," Covilha, Portugal, March 16-19, 2016.
URL:
https://www.researchgate.net/publication/299411406_Small_Spacecraft_Interplanetary_Missions_The_Art_of_Trajectory_Design
18. Mikhail Ovchinnikov, **Sergey Trofimov**. Coastwise Sailing: Prospects of Using Solar Sails in Near-Earth Orbits // 2nd IAA Latin American CubeSat Workshop, Florianopolis, Brazil, February 28 – March 3, 2016.
URL:
https://www.researchgate.net/publication/304328214_Coastwise_Sailing_Prospects_of_Using_Solar_Sails_in_Near-Earth_Orbits
19. Maksim Shirobokov, **Sergey Trofimov**. Options for Small Spacecraft Injection into the Orbits Around Sun-Earth L1/L2 Libration Points // 2nd Meeting of the Nano- and Microsatellite Session in the framework of the 11th Annual Conference "Plasma Physics in Solar System," Space Research Institute of the Russian Academy of Sciences, February 16, 2016. (in Russian)
20. M. Shirobokov, **S. Trofimov**. Parametric Analysis of Low-Thrust Lunar Transfers with Resonant Maneuvers // Proceedings of XL Academic Readings on Astronautics, Session 18, Paper 4, Moscow, January 26-29, 2016. (in Russian)
21. Mikhail Ovchinnikov, Maksim Shirobokov, **Sergey Trofimov**. Big Goals for Small Spacecraft: Missions to the Moon, Asteroids, Planets, and Interstellar Space // Paper IAA-CU-15-0S-0P, 3rd IAA Conference on University Satellite Missions, Rome, November 30 – December 5, 2015, 9 p.
22. M. Shirobokov, **S. Trofimov**. Strategy and Its Efficiency Evaluation for Stationkeeping near Lunar Libration Points in Case of Contingency Correction Maneuver Delay // Proceedings of the 58th MIPT Scientific Conference, Dolgoprudny, November 23-28, 2015. Applied Mathematics and Control. (in Russian)
23. M. Shirobokov, **S. Trofimov**. Design of Trajectories for a Transfer to Orbits around Earth-Moon Collinear Libration Points Using Resonant Encounters // Proceedings of XI Russian Congress on Basic Problems of Theoretical and Applied Mechanics, Session I-6 – Space Flight Mechanics Symposium, Kazan, August 20-24, 2015, p. 4223-4224. (in Russian)
24. **S. Trofimov**, M. Shirobokov. Survey of Stabilization Techniques for Unstable Orbits around Collinear Libration Points // Abstracts of the 7th Polyakhov's Readings on Mechanics, Session II "Dynamics of Natural and Artificial Celestial Bodies," Paper 4, Saint-Petersburg, February 2-6, 2015. (in Russian)
25. **S. Trofimov**. Deorbiting of Small Satellites in Sun-Synchronous Orbits Using Solar Sail // Proceedings of XXXIX Academic Readings on Astronautics, Session 5, Paper 12, Moscow, January 27-30, 2015. (in Russian)
26. **S. Trofimov**. Dynamically Invariant Scaling of Sailcraft Parameters // Proceedings of the 57th MIPT Scientific Conference devoted to 120th anniversary of acad. P.L. Kapitsa, Dolgoprudny, November 24-29, 2014. Applied Mathematics and Control. V. 2, p. 114-115. (in Russian)

27. M. Shirobokov, **S. Trofimov**. On the Choice of New Nominal Libration Point Orbit in Case of Contingency Correction Maneuver Delay // Proceedings of the 57th MIPT Scientific Conference devoted to 120th anniversary of Acad. P.L. Kapitsa, Dolgoprudny, November 24-29, 2014. Applied Mathematics and Control. V. 2, p. 112. (in Russian)
28. M. Ovchinnikov, S. Tkachev, D. Roldugin, D. Ivanov, **S. Trofimov**, M. Shirobokov, Y. Mashtakov. Program Package for Precision Modeling of Artificial Earth Satellite Orbital and Attitude Motion // Proceedings of XVII National Seminar on Navigation and Control of Aerial Vehicles, Samara, June 18-20, 2014, p. 121-123. (in Russian)
29. M. Shirobokov, **S. Trofimov**. Method of Virtual Trajectories for the Design of Interplanetary Missions with Swing-By Maneuvers // Proceedings of XXXVIII Academic Readings on Astronautics, Session 18, Paper 7, Moscow, January 28-31, 2014. (in Russian)
30. **S. Trofimov**. Optimal Multi-Impulse Solution of Circular Orbit Phasing Problem // Proceedings of XXXVIII Academic Readings on Astronautics, Session 5, Paper 18, Moscow, January 28-31, 2014. (in Russian)
31. M. Ovchinnikov, D. Ivanov, S. Tkachev, D. Roldugin, **S. Trofimov**, M. Shirobokov, S. Karpenko, N. Ivlev. Development, Investigation, and Laboratory Testing of Microsatellite Attitude Control Algorithms and Formation Flying Relative Motion Control Algorithms // Proceedings of the 6th International Conference "Earth from Space—the Most Effective Solutions," Moscow, October 2-4, 2013. ETC ScanEx, p. 244-245. (in Russian)
32. Michael Yu. Ovchinnikov, **Sergey P. Trofimov**. Propellantless Deorbiting of Small Satellites: Techniques and Perspectives // Digest of the 9th International Symposium of the International Academy of Astronautics "Small Satellites for Earth Observation," Berlin, April 8-12, 2013, p. 507-510.
33. **Sergey P. Trofimov**, Maksim G. Shirobokov. Advanced Method of Virtual Trajectories for the Preliminary Design of Gravity-Assist Missions // International Colloquium and Workshop "Ganymede Lander: Scientific Goals and Experiments," Moscow, March 4-8, 2013.
URL:
http://qlcw2013.cosmos.ru/sites/qlcw2013.cosmos.ru/files/presentations/qlcw_7_04_trofimov.pptx
34. M. Shirobokov, **S. Trofimov**. Application of Method of Virtual Trajectories for Design of Unpowered Gravity Assisted Missions // Proceedings of XXXVII Academic Readings in Astronautics, Session 5, Paper 4, Moscow, January 29 – February 1, 2013. (in Russian)
35. M. Shirobokov, **S. Trofimov**. Design of Interplanetary Trajectories with Passive Gravity Assists Using the Adapted Method of Virtual Trajectories // Proceedings of the 55th MIPT Scientific Conference "Modern Issues of Fundamental and Applied Sciences," Dolgoprudny, November 19-25, 2012. Applied Mathematics and Control. V. 2, p. 96. (in Russian)
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1. **Sergey Trofimov**. Horizon 2020. Astrodynamics Toolbox Development Project. Attitude Dynamics and Control Seminar, Spaceflight Mechanics and Control Department, Keldysh Institute of Applied Mathematics, Moscow, December 26, 2017.

2. Maksim Shirobokov, **Sergey Trofimov**. Change of Nominal Orbit in the Vicinity of a Collinear Libration Point in Case of Contingency Station-Keeping Maneuver Delay. Spacecraft Mechanics and Control Seminar, Spaceflight Mechanics and Control Department, Keldysh Institute of Applied Mathematics, Moscow, November 9, 2016.
3. Maksim Shirobokov, **Sergey Trofimov**. Parametric Analysis of Low-Thrust Lunar Transfers with Resonant Encounters. Spacecraft Mechanics and Control Seminar, Spaceflight Mechanics and Control Department, Keldysh Institute of Applied Mathematics, Moscow, May 18, 2016.
4. **Sergey Trofimov**. Deorbiting of Low-Earth Orbit Small Satellites (based on PhD Thesis). Alexander Yu. Ishlinsky Seminar on Applied Mechanics and Control (chairs: Prof. V.V. Alexandrov, Prof. N.A. Parusnikov, Prof. Yu.V. Bolotin), MSU Institute of Mechanics, Moscow, May 27, 2015.
5. **Sergey Trofimov**. Deorbiting of Low-Earth Orbit Small Satellites (based on PhD Thesis). Seminar of Spaceflight Mechanics and Control Department, Keldysh Institute of Applied Mathematics, Moscow, April 2, 2015.
6. Maksim Shirobokov, **Sergey Trofimov**. On the Choice of New Nominal Libration Point Orbit in Case of Contingency Correction Maneuver Delay. Vsevolod A. Egorov Seminar on Spaceflight Mechanics (chairs: Prof. V.V. Sazonov and Assoc. Prof. M.P. Zapletin), Moscow State University, Moscow, February 18, 2015.
7. **Sergey Trofimov**. Deorbiting of LEO Small Satellites Using a Solar Sail. Seminar "Dynamics of Relative Motion" (chairs: Corr. Memb. of RAS, Prof. V.V. Beletsky, Prof. Yu.F. Golubev, Prof. V.E. Pavlovsky, Prof. K.E. Yakimova, Prof. E.V. Melkumova), Moscow State University, Moscow, December 15, 2014.
8. **Sergey Trofimov**. Deorbiting of LEO Small Satellites Using a Solar Sail. Vsevolod A. Egorov Seminar on Spaceflight Mechanics (chairs: Prof. V.V. Sazonov and Assoc. Prof. M.P. Zapletin), Moscow State University, Moscow, December 3, 2014.
9. **Sergey Trofimov**. Deorbiting of LEO Small Satellites Using a Solar Sail. Attitude Dynamics and Control Seminar, Spaceflight Mechanics and Control Department, Keldysh Institute of Applied Mathematics, Moscow, November 13, 2014.
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11. **Sergey Trofimov**. Review of Astrodynamics Papers at 64th International Astronautical Congress (Beijing, September 23-27, 2013). Attitude Dynamics and Control Seminar, Spaceflight Mechanics and Control Department, Keldysh Institute of Applied Mathematics, Moscow, November 7, 2013.
12. Maksim Shirobokov, **Sergey Trofimov**. Method of Virtual Trajectories for the Design of Interplanetary Gravity-Assist Missions. Seminar "Dynamics of Relative Motion" (chairs: Corr. Memb. of RAS, Prof. V.V. Beletsky, Prof. Yu.F. Golubev, Prof. K.E. Yakimova, Prof. E.V. Melkumova), Moscow State University, Moscow, February 25, 2013.
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14. **Sergey Trofimov**. Single-Input Control of Orbital Motion of Single and Formation-Flying Spacecraft. Seminar of Spaceflight Mechanics and Control Department, Keldysh Institute of Applied Mathematics, Moscow, June 26, 2012.
15. **Sergey Trofimov**, Danil Ivanov. Laboratory Facility for Testing Small Satellite Attitude Control and Navigation Algorithms. Seminar "Dynamics of Relative Motion" (chairs: Corr. Memb. of RAS, Prof. V.V. Beletsky, Prof. Yu.F. Golubev, Prof. K.E. Yakimova, Prof. E.V. Melkumova), Moscow State University, Moscow, December 6, 2013.

GRANTS, CONTRACTS, PROGRAMS

1. (2019-2021) Russian Scientific Foundation (RSF), Grant No. 19-11-00256 "Spacecraft Dynamics and Navigation in Complex Gravity Fields," **principal investigator Prof. M.Yu. Ovchinnikov, D.Sc.**
2. (2018-2020) Russian Foundation for Basic Research (RFBR), Grant No. 15-31-20058-mol_a_ved "Study of Satellite Controlled Motion During Rendezvous and Capture of the Noncooperative Target," **principal investigator D.S. Ivanov, Ph.D.**
3. (2018-2020) Russian Foundation for Basic Research (RFBR), Grant No. 18-31-00403-mol_a "Neural Networks for Optimization and Correction of Spacecraft Trajectories," **principal investigator M.G. Shirobokov, Ph.D.**
4. (2017-2020) Contributor to the Report of International Academy of Astronautics (IAA) Study Group 4.23 "Post-Mission Disposal for Micro and Smaller Satellites: Concepts and Trade Studies," **co-chairs Darren McKnight, Ph.D., Alex da Silva Curiel, M.Sc., Peter Martinez, Ph.D., and Prof. Toshiya Hanada, Ph.D.**
5. (2017-2019) Russian Scientific Foundation (RSF), Grant No. 17-71-10242 "Spacecraft Trajectory Design and Optimization Using Multi-Core Computing Systems," **principal investigator S.P. Trofimov, Ph.D.**
6. (2017-2019) Russian Foundation for Basic Research (RFBR), Grant No. 17-01-00449-a "Study of Spaceflight Orbital and Attitude Dynamics for Formation Flying of Satellites," **principal investigator D.S. Ivanov, Ph.D.**
7. (2017-2018) Contract with PAO RSC "Energia" "Analysis and Rationale of a Near-Rectilinear Halo Orbit for Lunar Space Station," **principal investigator Prof. M.Yu. Ovchinnikov, D.Sc.**
8. (2016-2017) Russian Foundation for Basic Research (RFBR), Grant No. 16-31-00321-mol_a "Efficient Algorithms of Small Spacecraft Orbit and Attitude Control Using a Solar Sail," **principal investigator S.P. Trofimov, Ph.D.**
9. (2015-2018) Contributor to the Report of International Academy of Astronautics (IAA) Study Group 4.21 "Distributed, Networked, Smart, Cooperating Small Satellite Formations," **co-chairs Prof. Klaus Schilling, Ph.D. and Prof. Igor Belokonov, Ph.D.**
10. (2015-2016) Russian Foundation for Basic Research (RFBR), Grant No. 15-31-20058-mol_a_ved "Precise angular motion control algorithms for small satellite with limited control authority and sensor deficiency," **principal investigator D.S. Roldugin, Ph.D.**
11. (2014-2016) Contributor to the Report of International Academy of Astronautics (IAA) Study Group 4.16 "The Applications of Micro-Satellites and Cube-Sats to Planetary Science and Exploration Missions," **co-chairs Leon Alkalai, Ph.D., John D. Baker, Ph.D., and Prof. Filippo Graziani, Ph.D.**

12. (2014-2018) Russian Scientific Foundation (RSF), Grant No. 14-11-00621 "Development of New Dynamical Models and Control Algorithms for the Orbital and Attitude Motion of Small Spacecraft in Prospective Missions to the Moon, Planets, and Small Bodies of the Solar System," **principal investigator Prof. M.Yu. Ovchinnikov, D.Sc.**
13. (2014-2015) Russian Foundation for Basic Research (RFBR), Grant No. 14-01-31313-mol_a "Small Satellites Formation Flying Relative Motion Investigation and Algorithms Development for Perspective Control Systems With Minimal Fuel Consumption," **principal investigator D.S. Ivanov, Ph.D.**
14. (2014) Contract No. 09-14 with ZAO Resonance Research Center "Development and Performance Assessment of Impact Point Calculation Algorithms," **principal investigator Prof. M.Yu. Ovchinnikov, D.Sc.**
15. (2013-2015) Russian Foundation for Basic Research (RFBR), Grant No. 13-01-00665-a "Motion study and control algorithms development for dynamic reconfiguration of the microsatellite formation including its de-orbiting," **principal investigator Prof. M.Yu. Ovchinnikov, D.Sc.**
16. (2013) Contract No. 11-13 with OOO Sputnik "Development of attitude control system for microsatellite "Tabletsat"," **principal investigator Prof. M.Yu. Ovchinnikov, D.Sc.**
17. (2012-2014) Russian Foundation for Basic Research (RFBR), Grant No. 12-01-33045-mol_a_ved "Perspective algorithms and methods of the attitude and orbital motion control for small satellites and their formations," **principal investigator S.S. Tkachev, Ph.D.**
18. (2012-2014) 22nd RAS Presidium Program "Fundamental issues of investigations and exploration of solar system," project 9.3 "Ballistic scenarios and possible options for new missions," **principal investigator Prof. M.Yu. Ovchinnikov, D.Sc.**
19. (2012-2013) Agreement No. 8182 of 27 July 2012 with Russian Ministry of Education and Science about giving a grant for the research project No. 2012-1.1-12-000-2004-022 "Development and verification of efficient techniques for end-of-life disposal of small satellites from typical near-earth orbits" in the framework of federal target program "Scientific and Pedagogical Personnel of the Innovative Russia in 2009-2013," **principal investigator Prof. M.Yu. Ovchinnikov, D.Sc.**
20. (2011-2013) Contract No. 016/754-11/2 with JSC Russian Space Systems "Investigation of flights of single satellites and formations regarding information supply and distribution of information infrastructure among satellites," **principal investigator Prof. M.Yu. Ovchinnikov, D.Sc.**
21. (2011) Russian Foundation for Basic Research (RFBR), Grant No. 11-01-09209-моб_з "Participation in the 6th International Symposium "Spaceflight Dynamics and Control," Covilha, Portugal, 28-30 March, 2011".
22. (2010-2012) Contract No. 02.740.11.0860 with Russian Ministry of Education and Science "Design and investigation of controllable small spacecraft orbital and attitude motion using thrusters of new generation," **principal investigator Prof. M.Yu. Ovchinnikov, D.Sc.**
23. (2010-2011) Program for the support of leading Russian scientific schools HШ-6700.2010.1 "Spacecraft mechanics and control. Functioning and evolution of complex natural and technical systems," **principal investigators Acad. of RAS Timur M. Eneev, D.Sc., Corr. memb. of RAS Ephraim L. Akim, D.Sc.**
24. (2009-2011) Russian Foundation for Basic Research (RFBR), Grant No. 09-01-00431-a "Dynamics and control of multi-element mobile formation under limitation for measuring and control," **principal investigator Prof. M.Yu. Ovchinnikov, D.Sc.**

25. (2008-2012) Project "Helicon Plasma Hydrazine.combined micro" (HPH.com) of the Seventh Framework Program (FP7) of the European Union on the issue "Space," subprogram "Space transportation," Grant No. 218862, coordinator Daniele Pavarin, Ph.D., **principal investigator Prof. M.Yu. Ovchinnikov, D.Sc.**