Sergey P. Trofimov

Ph.D., Senior Researcher
Keldysh Institute of Applied Mathematics
Address: 4 Miusskaya Sq., 125047 Moscow, Russia
Phone: +7 499 220 79 77
Cell: +7 919 770 81 54
E-mail: trofimov@keldysh.ru, sertrofimov@yandex.ru
ResearchGate profile: https://www.researchgate.net/profile/Sergey-Trofimov

EDUCATION

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

PROFESSIONAL POSITIONS

2020-present	**Senior Researcher**	Space Systems Dynamics Department, Keldysh Institute of Applied Mathematics (KIAM)
2018-2020	**Researcher**	Space Systems Dynamics Department, Keldysh Institute of Applied Mathematics (KIAM)
2017-2018	**Researcher**	Mechanics and Motion Control Department, Keldysh Institute of Applied Mathematics (KIAM)
2014-2017	**Junior Researcher**	Mechanics and Motion Control Department, Keldysh Institute of Applied Mathematics (KIAM)
2010-2013	**Research Assistant**	Mechanics and Motion Control Department, Keldysh Institute of Applied Mathematics (KIAM)

TEACHING EXPERIENCE

2021-2022	**Deputy Chair**	Department of Mathematical Modeling and Applied Mathematics, MIPT
2019-2023	**Associate Professor**	Department of Mathematical Modeling and Applied Mathematics, MIPT
2012-2019	**Assistant Professor**	Department of Mathematical Modeling and Applied Mathematics, MIPT

Courses taught:

Systems and Methods of Earth and Space Navigation (Fall 2012 – Spring 2023)
Advanced Space Flight Mechanics (Fall 2014 – Fall 2020)

January 16, 2024

Advanced Analytical Mechanics (Spring 2016 – Spring 2023)
Dynamical Systems I (Spring 2018 – Fall 2022), Dynamical Systems II (Spring 2022 – Spring 2023)

AWARDS

1. Committee on Space Research (COSPAR) Outstanding Paper Award for Young Scientists (jointly with M. Shirobokov and M. Ovchinnikov) for the paper "On the Design of a Space Telescope Orbit Around the Sun-Venus L2 Point" published in the journal *Advances in Space Research*, 2022.

2. 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.

3. Best paper among graduate students, Session "Theoretical Mechanics," 54th MIPT Scientific Conference "Modern Issues of Fundamental and Applied Sciences," 2011.

4. Best paper among graduate students, Session "Spaceflight Dynamics and Control," 53rd MIPT Scientific Conference "Modern Issues of Fundamental and Applied Sciences," 2010.

5. 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, MIPT Scientific Conference, 2018-2023.

REVIEWING JOURNAL PAPERS

Acta Astronautica, Journal of Guidance, Control, and Dynamics, Celestial Mechanics and Dynamical Astronomy, Journal of Spacecraft and Rockets, Nonlinear Dynamics, Advances in Space Research, Physica D: Nonlinear Phenomena, Aerospace, Applied Sciences, Automation and Remote Control

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
   - Orbit design for near-Earth and near-Moon satellite constellations

- 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. **Sergey Trofimov**. CubeSat Handbook. From Mission Design to Operations. Contribution to Part II, Chapter 1: Applied Astrodynamics / ed. by C. Cappelletti, S. Battistini, and B. Malphrus. Academic Press, 2020. 420 p.
   ISBN 978-0-128178-84-3, doi: 10.1016/B978-0-12-817884-3.00001-1
   URL: https://www.elsevier.com/books/cubesat-handbook/cappelletti/978-0-12-817884-3

2. **Sergey Trofimov**. A Handbook for Post-Mission Disposal of Satellites Less Than 100 kg. Contribution to Chapter 6: Using Other Retarding Forces / ed. by D. McKnight and R. Kawashima. IAA, 2019. 105 p.

ISBN 978-2-917761-68-7
URL: https://iaaspace.org/wp-content/uploads/iaa/Scientific%20Activity/sg423finalreport.pdf

3. 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. Kirill Suslov, Maksim Shirobokov, **Sergey Trofimov**. Approximate Finite-Fourier Solution of the Periodically Perturbed Two-Body Problem // Journal of Guidance, Control, and Dynamics (under review).

2. **Sergey Trofimov**, Maksim Shirobokov, Mikhail Ovchinnikov. Lunar Satellite Constellations in Frozen Low Orbits // Advances in Space Research (submitted).

3. Kirill Korneev, **Sergey Trofimov**. Low-Thrust Trajectory Optimization in Kustaanheimo-Stiefel Variables // Cosmic Research, 2024, V. 62, No. 1 (accepted).

4. Maksim Shirobokov, **Sergey Trofimov**. KIAM Astrodynamics Toolbox Library for Spacecraft Orbital Motion Design // Programming and Computer Software, 2024, V. 50, No. 1 (accepted).

5. Anastasia Tselousova, **Sergey Trofimov**, Maksim Shirobokov, Mikhail Ovchinnikov. Geometric Analysis of Sun-Assisted Lunar Transfer Trajectories in the Planar Bicircular Four-Body Model // Applied Sciences, Special Issue “Advanced Schemes for Lunar Transfer, Descent and Landing,” 2023, V. 13, No. 8, 24 p. doi: 10.3390/app13084676
URL: https://www.mdpi.com/2076-3417/13/8/4676

6. Anastasia Tselousova, **Sergey Trofimov**, Maksim Shirobokov. Station-Keeping in High Near-Circular Polar Orbits Around the Moon // Acta Astronautica, 2021, V. 188, p. 185-192. doi: 10.1016/j.actaastro.2021.07.025
URL: https://www.sciencedirect.com/science/article/abs/pii/S0094576521003830

7. Maksim Shirobokov, **Sergey Trofimov**, Mikhail Ovchinnikov. Survey of Machine Learning Techniques in Spacecraft Control Design // Acta Astronautica, 2021, V. 186, p. 87-97. doi: 10.1016/j.actaastro.2021.05.018
URL: https://www.sciencedirect.com/science/article/pii/S0094576521002514

8. Maksim Shirobokov, **Sergey Trofimov**. Adaptive Neural Formation-Keeping Control of Satellites in a Low-Earth Orbit // Cosmic Research, 2021, V. 59, No. 6, p. 501-516. doi: 10.1134/S0010952521060113
URL: https://link.springer.com/article/10.1134/S0010952521060113

9. Maksim Shirobokov, **Sergey Trofimov**, Mikhail Ovchinnikov. On the Design of a Space Telescope Orbit Around the Sun-Venus L2 Point // Advances in Space Research, 2020, V. 65, No. 6, p. 1591-1606. doi: 10.1016/j.asr.2019.12.022
URL: https://www.sciencedirect.com/science/article/pii/S027311771930907X

10. Maksim Shirobokov, **Sergey Trofimov**. Low-Thrust Transfers to Lunar Orbits from Halo Orbits Around Lunar Libration Points L1 and L2 // Cosmic Research, 2020, V. 58, No. 3, p. 181-191. doi: 10.1134/S0010952520030065
URL: https://link.springer.com/article/10.1134/S0010952520030065

11. **Sergey Trofimov**, Maksim Shirobokov, Anastasia Tselousova, Mikhail Ovchinnikov. Transfers from Near-Rectilinear Halo Orbits to Low-Perilune Orbits and the Moon's Surface // Acta Astronautica, 2020, V. 167, p. 260-271. doi: 10.1016/j.actaastro.2019.10.049
URL: https://www.sciencedirect.com/science/article/pii/S0094576519313773

12. Danil Ivanov, Mikhail Ovchinnikov, Dmitry Roldugin, Stepan Tkachev, **Sergey Trofimov**, Sergey Shestakov, Maksim Shirobokov. Software Package for Simulating the Angular and Orbital Motion of a Satellite // Mathematical Models and Computer Simulations, 2020, V. 12, No. 4, p. 561-568. doi: 10.1134/S2070048220040109
URL: https://link.springer.com/article/10.1134/S2070048220040109

13. Maksim Shirobokov, **Sergey Trofimov**. Recovery of Quasi-Halo Orbit Missions in Case of Contingent Station-Keeping Maneuver Delay // Acta Astronautica, 2019, V. 165, p. 382-387. doi: 10.1016/j.actaastro.2019.09.022
URL: https://www.sciencedirect.com/science/article/pii/S0094576519312895

14. 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, V. 63, No. 12, p. 3953-3964. doi: 10.1016/j.asr.2019.03.007
URL: https://www.sciencedirect.com/science/article/pii/S0273117719301863

15. **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

16. 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

17. **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

18. **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
URL: https://arc.aiaa.org/doi/abs/10.2514/1.G002300

19. 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

20. 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

21. **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

22. 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

23. 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

24. 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

25. 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

26. 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/

27. 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)

28. 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/jaesa/editions/repository/v03/n01/7-OvchinnikovBaranovTrofimov.pdf

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

1. Kirill Suslov, Maksim Shirobokov, **Sergey Trofimov**, Mikhail Ovchinnikov. Approximate Closed-Form Solution of the Periodically Perturbed Two-Body Problem with Application to Low-Thrust Optimization // Proceedings of the 74th International Astronautical Congress, Baku, Azerbaijan, October 2-6, 2023, Paper IAC-23.C1.7.9, published by International Astronautical Federation & Curran Associates, 2024, IAF Astrodynamics Symposium 2023, V. ?, p. ????-????.
ISBN ?
URL: ?

2. Irina Glazunova, **Sergey Trofimov**, Anastasia Tselousova. Single-Launch Deployment of Lunar Constellations from a Sun-Assisted Lunar Transfer Trajectory // Proceedings of the 74th International Astronautical Congress, Baku, Azerbaijan, October 2-6, 2023, Paper IAC-23.C1.LBA.5, published by International Astronautical Federation & Curran Associates, 2024, IAF Astrodynamics Symposium 2023, V. ?, p. ????-????.
ISBN ?
URL: ?

3. Nuraddin Adigozalov, Maksim Shirobokov, Mikhail Ovchinnikov, **Sergey Trofimov**. Analytical Approximations of Spatial Distant Retrograde Orbits // Proceedings of the 74th International Astronautical Congress, Baku, Azerbaijan, October 2-6, 2023, Paper IAC-23.C1.8.2, published by International Astronautical Federation & Curran Associates, 2024, IAF Astrodynamics Symposium 2023, V. ?, p. ????-????.
   ISBN ?
   URL: ?

4. **Sergey Trofimov**, Maksim Shirobokov, Mikhail Ovchinnikov. Design and Study of Satellite Constellations in Frozen Low Lunar Orbits // Proceedings of the 73rd International Astronautical Congress, Paris, France, September 18-22, 2022, Paper IAC-22.LBA.C1.2, published by International Astronautical Federation & Curran Associates, 2023, IAF Astrodynamics Symposium 2022, V. 1, p. 1600-1610.
   ISBN 978-1-7138-7409-6
   URL: https://www.proceedings.com/69393.html

5. Anastasia Tselousova, **Sergey Trofimov**, Maksim Shirobokov. Multiple-Shooting Continuation of Sun-Assisted Lunar Transfers from the Planar Bicircular to the Ephemeris Model // Proceedings of the 73rd International Astronautical Congress, Paris, France, September 18-22, 2022, Paper IAC-22.C1.IPB.21, published by International Astronautical Federation & Curran Associates, 2023, IAF Astrodynamics Symposium 2022, V. 1, p. 1482-1492.
   ISBN 978-1-7138-7409-6
   URL: https://www.proceedings.com/69393.html

6. Maksim Shirobokov, **Sergey Trofimov**, Mikhail Ovchinnikov. Lunar Frozen Orbits for Small Satellite Communication/Navigation Constellations // Proceedings of the 72nd International Astronautical Congress, Dubai, UAE, October 25-29, 2021, Paper IAC-21-C1.4.6, published by International Astronautical Federation & Curran Associates, 2022, IAF Astrodynamics Symposium 2021, V. 1, p. 347-360.
   ISBN 978-1-7138-4307-8
   URL: https://www.proceedings.com/62593.html

7. Anastasia Tselousova, **Sergey Trofimov**, Maksim Shirobokov, and Denis Perepukhov. Geometric Approach to the Design of Lunar-Gravity-Assisted Low-Energy Earth-Moon Transfers // Advances in the Astronautical Sciences, 2022, V. 177, p. 1981-2000. Presented as Paper AAS 21-698, AAS/AIAA Astrodynamics Specialist Conference, ~~Big Sky, MT, USA~~ online, August 9-11, 2021.
   ISBN 978-0-87703-683-8
   URL: https://www.univelt.com/linkedfiles/v177%20Contents.pdf

8. Mikhail Ovchinnikov, Maksim Shirobokov, **Sergey Trofimov**, Stas Barabash, Per-Erik Atterwal. Low-Thrust Microspacecraft Delivery to a Lunar Orbit After the Launch to GTO or MEO // Proceedings of the 71st International Astronautical Congress, CyberSpace Edition, October 12-14, 2020, Paper IAC-20-C1.4.13, published by International Astronautical Federation & Curran Associates, 2021, IAF Astrodynamics Symposium 2020, V. 1, p. 323-330.
   ISBN 978-1-7138-3276-8
   URL: https://www.proceedings.com/59802.html

9. Anastasia Tselousova, Maksim Shirobokov, **Sergey Trofimov**. Geometrical Tools for the Systematic Design of Low-Energy Transfers in the Earth-Moon-Sun System // Advances in the Astronautical Sciences, 2021, V. 175, p. 5233-5250. Presented as Paper AAS 20-695, AAS/AIAA Astrodynamics Specialist Conference, ~~South Lake Tahoe, CA, USA~~ online, August 9-12, 2020.
   ISBN 978-0-87703-675-3
   URL: http://www.univelt.com/linkedfiles/v175%20Contents.pdf

10. Artemy Sorokin, Maksim Shirobokov, **Sergey Trofimov**. Artificial Neural Networks for Control and Propagation of Low-Thrust Trajectories // AIP Conference Proceedings, 2019, V. 2171, p.

200010-1-200010-7. Presented at XLIII Academic Readings on Astronautics, Moscow, January 29 – February 1, 2019. doi: 10.1063/1.5133368
ISBN 978-0-7354-1918-6
URL: https://aip.scitation.org/doi/abs/10.1063/1.5133368

11. Anastasia Tselousova, Maksim Shirobokov, **Sergey Trofimov**. Direct Two-Impulse Transfers from a Low-Earth Orbit to High Circular Polar Orbits Around the Moon // AIP Conference Proceedings, 2019, V. 2171, p. 130022-1-130022-6. Presented at XLIII Academic Readings on Astronautics, Moscow, January 29 – February 1, 2019. doi: 10.1063/1.5133289
ISBN 978-0-7354-1918-6
URL: https://aip.scitation.org/doi/abs/10.1063/1.5133289

12. Anastasia Tselousova, Maksim Shirobokov, **Sergey Trofimov**. High-Altitude Near-Circular Orbits for a Lunar Orbital Station // Advances in the Astronautical Sciences, 2019, V. 170, p. 41-52. Presented as Paper IAA-AAS-SciTech2018-062, IAA SciTech Forum 2018, IAA Conference on Space Flight Mechanics, Moscow, Russia, November 13-15, 2018.
ISBN 978-0-87703-664-7
URL: http://www.univelt.com/linkedfiles/v170%20Contents.pdf

13. **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. 11, p. 8309-8326.
ISBN 978-1-5108-8165-5
URL: http://www.proceedings.com/47918.html

14. 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

15. 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

16. 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

17. 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

18. **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

19. 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

20. 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

21. 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

22. 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. Denis Perepukhov, **Sergey Trofimov**, Maksim Shirobokov, Kirill Korneev. Dynamics, Navigation, and Control During the Flight to the Solar Gravitational Lens Focus // Abstracts of VI Russian Conference of Young Researchers in Mechanics, Sochi, September 4-14, 2023. (in Russian)

2. Irina Glazunova, **Sergey Trofimov**, Anastasia Tselousova. Single-Launch Deployment of Lunar Constellation Using Solar Gravity // Abstracts of VI Russian Conference of Young Researchers in Mechanics, Sochi, September 4-14, 2023. (in Russian)

3. Irina Glazunova, **Sergey Trofimov**, Anastasia Tselousova. Sensitivity Study of Low-Energy Lunar Transfer Trajectories // Proceedings of the 65th MIPT Scientific Conference, Moscow-Dolgoprudny-Zhukovsky, April 3-8, 2023. Applied Mathematics and Computer Science. (in Russian)

4. Kirill Korneev, **Sergey Trofimov**. Geometry Analysis of Boundary Value Problem Solutions for Earth-Mars Indirect Trajectory Optimization // Proceedings of the 65th MIPT Scientific Conference, Moscow-Dolgoprudny-Zhukovsky, April 3-8, 2023. Applied Mathematics and Computer Science. (in Russian)

5. Denis Perepukhov, **Sergey Trofimov**. Relative Motion of Spacecraft in Hyperbolic Trajectories // Proceedings of the 65th MIPT Scientific Conference, Moscow-Dolgoprudny-Zhukovsky, April 3-8, 2023. Applied Mathematics and Computer Science. (in Russian)

6. Kirill Suslov, Maksim Shirobokov, **Sergey Trofimov**. Closed-Form Solution of Averaged Orbital Motion Equations with Periodic Perturbation // Abstracts of XLVII Academic Space Conference, Moscow, January 24-27, 2023, V. 1, p. 284-285. (in Russian)
ISBN 978-5-7038-6053-3
URL: http://korolevspace.ru/sites/default/files/uploads/Chapter_1.pdf

7. Kirill Suslov, Maksim Shirobokov, **Sergey Trofimov**. Closed-Form Solution to Averaged Equations of Perturbed Orbital Motion in Optimal Control Problems // Russian Conference "Problems and Perspectives of Space Missions with Electric Propulsion Thrusters," Makhachkala, October 9-12, 2022.

8. Kirill Korneev, **Sergey Trofimov**. Kustaanheimo-Stiefel Transformation as a Canonical Transformation of the Optimal Low-Thrust Equations of Motion // Abstracts of XLVI Academic Space Conference, Moscow, January 25-28, 2022, V. 1, p. 353-356.
ISBN 978-5-7038-5890-5
URL: https://press.bmstu.ru/catalog/item/7554/reader/

9. Anastasia Tselousova, **Sergey Trofimov**, Maksim Shirobokov, Denis Perepukhov. Design of Low-Energy Lunar-Gravity-Assisted Trajectories to the Moon // Abstracts of XLVI Academic Space Conference, Moscow, January 25-28, 2022, V. 1, p. 405-409.
ISBN 978-5-7038-5890-5
URL: https://bmstu.press/catalog/item/7554/download/

10. Kirill Korneev, **Sergey Trofimov**. Change of State Variables as a Point Canonical Transformation in Optimal Orbital Transfer Problems // Proceedings of the 64th MIPT Scientific Conference, Moscow-Dolgoprudny-Zhukovsky, November 29 – December 3, 2021. Applied Mathematics and Computer Science. (in Russian)
ISBN 978-5-7417-0788-3

11. Denis Perepukhov, **Sergey Trofimov**. Analysis of Navigation Requirements for a Mission to Solar Gravity Lens Focus // Proceedings of the 64th MIPT Scientific Conference, Moscow-Dolgoprudny-Zhukovsky, November 29 – December 3, 2021. Applied Mathematics and Computer Science. (in Russian)
ISBN 978-5-7417-0788-3

12. Maksim Shirobokov, **Sergey Trofimov**. High-Level Programming Tools for Deep-Space Orbital Motion Simulation // Abstracts of XLV Academic Space Conference, Moscow, March 30 – April 2, 2021, V. 1, p. 417-418.
ISBN 978-5-7038-5635-2
URL: http://korolevspace.ru/sites/default/files/uploads/Part_1_2021.pdf

13. Anastasia Tselousova, **Sergey Trofimov**, Maksim Shirobokov. Geometrical Techniques for Lunar WSB Transfer Trajectory Design // Abstracts of XLV Academic Space Conference, Moscow, March 30 – April 2, 2021, V. 1, p. 393-395.
ISBN 978-5-7038-5635-2
URL: http://korolevspace.ru/sites/default/files/uploads/Part_1_2021.pdf

14. Denis Perepukhov, **Sergey Trofimov**. Correction Maneuvers Design for a Piggyback Launch to the Moon // Proceedings of the 63rd MIPT Scientific Conference, Moscow-Dolgoprudny-Zhukovsky, November 23-29, 2020. Applied Mathematics and Computer Science. (in Russian)
ISBN 978-5-7417-0757-9

15. Kirill Korneev, **Sergey Trofimov**. Optimal Trajectory Design Using Regularized Equations of Motion // Proceedings of the 63rd MIPT Scientific Conference, Moscow-Dolgoprudny-Zhukovsky, November 23-29, 2020. Applied Mathematics and Computer Science. (in Russian)
ISBN 978-5-7417-0757-9

16. Andrey Tarasov, **Sergey Trofimov**. Optimal Trajectory Design Using Space-Filling Curves // Proceedings of the 63rd MIPT Scientific Conference, Moscow-Dolgoprudny-Zhukovsky, November 23-29, 2020. Applied Mathematics and Computer Science. (in Russian)
ISBN 978-5-7417-0757-9

17. Egor Boborykin, **Sergey Trofimov**. On the Selection of Intermediate Orbit for Soft Landing of Lunar Ascent-Descent Module // Proceedings of the 63rd MIPT Scientific Conference, Moscow-Dolgoprudny-Zhukovsky, November 23-29, 2020. Applied Mathematics and Computer Science. (in Russian)
ISBN 978-5-7417-0757-9

18. Anastasia Tselousova, **Sergey Trofimov**, Maksim Shirobokov. Station-Keeping of High Circular Polar Orbits Around the Moon // Proceedings of XLIV Academic Readings on Astronautics, Session 5, Paper 20, Moscow, January 28-31, 2020. (in Russian)
ISBN 978-5-7038-5343-6

19. Anastasia Tselousova, **Sergey Trofimov**. Role of Jacobi Integral in Bicircular Four-Body Problem // Proceedings of the 62nd MIPT Scientific Conference, Moscow-Dolgoprudny-Zhukovsky, November 18-23, 2019. Applied Mathematics and Computer Science. (in Russian)
ISBN 978-5-7417-0726-5

20. Egor Boborykin, **Sergey Trofimov**. Analytical Guidance Techniques for Spacecraft Descent and Landing on Airless Bodies // Proceedings of the 62nd MIPT Scientific Conference, Moscow-Dolgoprudny-Zhukovsky, November 18-23, 2019. Applied Mathematics and Computer Science. (in Russian)
ISBN 978-5-7417-0726-5

21. Maksim Shirobokov, **Sergey Trofimov**, Artemy Sorokin. Neurocontrol of Spacecraft Formations in a Low-Earth Orbit // Proceedings of the 62nd MIPT Scientific Conference, Moscow-Dolgoprudny-Zhukovsky, November 18-23, 2019. Applied Mathematics and Computer Science. (in Russian)
ISBN 978-5-7417-0726-5

22. Maksim Shirobokov, **Sergey Trofimov**, Artemy Sorokin. Online Learning Techniques for Neurocontrol of a Spacecraft with a Low-Thrust Engine // Proceedings of the 62nd MIPT Scientific Conference, Moscow-Dolgoprudny-Zhukovsky, November 18-23, 2019. Applied Mathematics and Computer Science. (in Russian)
ISBN 978-5-7417-0726-5

23. Mikhail Ovchinnikov, Maksim Shirobokov, **Sergey Trofimov**. Mathematical Methods of Modern Astrodynamics // Proceedings of the XII Russian Congress on Fundamental Problems of Theoretical and Applied Mechanics, Ufa, August 19-24, 2019. Editing and Publishing Center of Bashkir State University, 2019. V. 1, p. 49-51. (in Russian)
ISBN 978-5-7477-4951-1

24. Sergey Shestakov, **Sergey Trofimov**, Maksim Shirobokov. Optimal Design of Spacecraft Formations in Lissajous Orbits // 10th International Workshop on Satellite Constellations and Formation Flying (IWSCFF), Glasgow, UK, July 16-19, 2019, 16 p.

URL:
https://www.researchgate.net/publication/334825131_Optimal_Design_of_Spacecraft_Formations_in_Lissajous_Orbits

25. Maksim Shirobokov, **Sergey Trofimov**. Homotopy Methods for Spacecraft Trajectory Design // Abstracts of International Scientific Conference "Contemporary Problems of Mathematics and Mechanics," dedicated to the 80th anniversary of academician V.A. Sadovnichiy, MSU, Moscow, May 13-15, 2019, p. 823-824. (in Russian)

26. **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)

27. Maksim Shirobokov, **Sergey Trofimov**, Anastasia Tselousova, Michael Koptev. Parallel Computing in Astrodynamics // Parallel Computing Technologies 2019, Kaliningrad, April 2-4, 2019. (in Russian)

28. 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

29. 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

30. 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

31. Anastasia Tselousova, Maksim Shirobokov, **Sergey Trofimov**. High-Altitude Circular Orbits Around the Moon for Placing an Orbital Station // Proceedings of the 61st MIPT Scientific Conference, Moscow-Dolgoprudny-Zhukovsky, November 19-25, 2018. Applied Mathematics and Computer Science. (in Russian)
ISBN 978-5-7417-0689-3

32. Artemy Sorokin, Maksim Shirobokov, **Sergey Trofimov**, Yusuf Khudaiberdiev. Prediction and Control of Low-Thrust Spacecraft Trajectories Using Artificial Neural Networks // Proceedings of the 61st MIPT Scientific Conference, Moscow-Dolgoprudny-Zhukovsky, November 19-25, 2018. Applied Mathematics and Computer Science. (in Russian)
ISBN 978-5-7417-0689-3

33. **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

34. 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)

35. 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

36. 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)

37. **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)

38. 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

39. 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

40. **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

41. **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.jsforum.or.jp/ISSS2017/papers/paper/17031_Paper_Dr.%20Sergey%20Trofimov.pdf

42. 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

43. 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

44. 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)

45. 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)

46. 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.

47. 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)

48. 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)

49. **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)

50. **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)

51. **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)

52. 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)

53. 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)

54. 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)

55. **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)

56. 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)

57. 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.

58. **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://glcw2013.cosmos.ru/sites/glcw2013.cosmos.ru/files/presentations/glcw_7_04_trofimov.pptx

59. 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)

60. 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)

61. Danil S. Ivanov, Michael Yu. Ovchinnikov, **Sergey P. Trofimov**. Formation of Flying Mock-Up Autonomous Navigation and Control Algorithms Using On-Board Pictures in Laboratory // Proceedings of III Joint Symposium of Taiwan-Russia Research Cooperation on Advanced Problems in Intelligent Mechatronics, Mechanics and Control, Moscow, November 7-12, 2012, p.100-112.
URL: http://www.imec.msu.ru/content/school/Proceedings.pdf

62. M. Ovchinnikov, **S. Trofimov**, M. Shirobokov. Method of Virtual Trajectories for the Design of Gravity Assisted Missions // Proceedings of XXXVI Academic Readings on Astronautics, Session 5, Paper 8, Moscow, January 24-27, 2012. (in Russian)

63. D. Ivanov, M. Ovchinnikov, S. Tkachev, D. Roldugin, **S. Trofimov**, S. Karpenko. Investigation and Laboratory Verification of Microsatellite Attitude Control Algorithms and Formation Flying Relative Motion Control Algorithms // Proceedings of the 5th International Conference "Earth from Space—the Most Effective Solutions," Moscow, November 29 – December 1, 2011, BINOM Publishers, p. 102-103. (in Russian)

64. **S. Trofimov**, M. Shirobokov. Method of Virtual Trajectories for the Design of Gravity Assisted Missions // Proceedings of the 54th MIPT Scientific Conference "Modern Issues of Fundamental and Applied Sciences," Dolgoprudny, November 10-30, 2011. Applied Mathematics and Control. V. 2, p. 36-37. (in Russian)

65. **S. Trofimov**, G. Smirnov. Periodic Relative Motion of Two Near-Circular Orbit Satellites with Single-Input Control // Proceedings of the 54th MIPT Scientific Conference "Modern Issues of Fundamental and Applied Sciences," Dolgoprudny, November 10-30, 2011. Aerophysics and Space Research, p. 166-67. (in Russian)

66. Irina E. Zaramenskikh, Michael Yu. Ovchinnikov, **Sergey P. Trofimov**. Single-Input Control in Formation of Small Satellites Aligned with Geomagnetic Field Induction Vector // Digest of the 8th International Symposium of the International Academy of Astronautics "Small Satellites for Earth Observation," Berlin, April 4-8, 2011, p. 139-142.

67. Michael Ovchinnikov, Georgui Smirnov, **Sergey P. Trofimov**. Near-Circular Orbit Correction and Formation Maintenance Using Single-Input Control // 6th International Workshop and Advanced School "Spaceflight Dynamics and Control," Covilha, Portugal, March 28-30, 2011.
URL: http://www.aerospace.ubi.pt/workshop2011/APRESENTACOES/Trofimov.pdf

68. D. Ivanov, M. Ovchinnikov, **S. Trofimov**, D. Nuzhdin. Laboratory Facility for Verification of Position and Attitude Determination Algorithms Based on Starry-Sky Image Processing // Proceedings of the 2nd Russian Scientific and Technological Conference "Modern Issues of Spacecraft Attitude Determination and Navigation," Moscow, Institute of Space Research, 2011, p. 215-225. (in Russian)

69. **S. Trofimov**. Review of Star Identification Algorithms // Proceedings of the 53rd MIPT Scientific Conference "Modern Issues of Fundamental and Applied Sciences," Dolgoprudny, November 24-29, 2010. Volume VII. Applied Mathematics and Control. No. 3, p. 66-67. (in Russian)

70. D. Ivanov, **S. Trofimov**, D. Nuzhdin. Mock-up Position and Attitude Determination System Based on Block of Inertial Sensors and Star Tracker // Proceedings of the 53rd MIPT Scientific Conference "Modern Issues of Fundamental and Applied Sciences," Dolgoprudny, November 24-29, 2010. Volume VII. Applied Mathematics and Control. No. 3, p. 57-58. (in Russian)

71. D. Ivanov, M. Ovchinnikov, **S. Trofimov**, D. Nuzhdin. Laboratory Facility for Verification of Position and Attitude Determination Algorithms Based on Starry-Sky Image Processing // Abstracts of the 2nd Russian Scientific and Technological Conference "Modern Issues of Spacecraft Attitude Determination and Navigation," Tarusa, Kaluga Region, September 13-16, 2010, p. 34-35. (in Russian)

72. **S. Trofimov**, D. Ivanov, D. Bindel. Position and Attitude Determination Algorithm on the Test Stand at ZARM (Center of Applied Space Technology and Microgravity, Bremen, Germany) // Proceedings of XXXIV Academic Readings on Astronautics, Session 5, Paper 22, Moscow, 2010. (in Russian)

73. **S. Trofimov**, D. Ivanov. Algorithm of Relative Satellite Navigation in a Formation Using Video Images // Proceedings of the 52nd MIPT Scientific Conference "Modern Issues of Fundamental and Applied Sciences," Dolgoprudny, November 27-30, 2009. Volume III. Aerophysics and Space Research. No. 1, p. 188-192. (in Russian)

PREPRINTS

1. **S. Trofimov**, K. Korneev, E. Pyriaev, I. Zagrebin, E. Fattakhov, N. Morgunov, Yu. Khurtina, D. Lunin, D. Yakusheva, K. Vasyurin, A. Tselousova. AMADEOS student school on the design and optimization of interplanetary space missions // Keldysh Institute Preprints, 2022, No. 41, 40 p. (in Russian)
   URL: https://library.keldysh.ru/preprint.asp?id=2022-41

2. K. Korneev, **S. Trofimov**. Regular variables in the problem of low-thrust trajectory optimization // Keldysh Institute Preprints, 2022, No. 32, 36 p. (in Russian)
   URL: https://library.keldysh.ru/preprint.asp?id=2022-32

3. M. Shirobokov, **S. Trofimov**. Formation control in low-Earth orbits by means of machine learning methods // Keldysh Institute Preprints, 2020, No. 19, 32 p. (in Russian)
   URL: http://library.keldysh.ru/preprint.asp?id=2020-19

4. A. Tselousova, M. Shirobokov, **S. Trofimov**. Comparison of two direct interplanetary trajectory optimization techniques // Keldysh Institute Preprints, 2018, No. 98, 24 p. (in Russian)
   URL: http://library.keldysh.ru/preprint.asp?id=2018-98

5. M. Koptev, **S. Trofimov**. Design, deployment and keeping of nanosatellite-based tetrahedral highly elliptical orbit formation // Keldysh Institute Preprints, 2018, No. 97, 28 p. (in Russian)
   URL: http://library.keldysh.ru/preprint.asp?id=2018-97

6. M. Shirobokov, **S. Trofimov**. Design of Interplanetary Trajectories with Swing-Bys and Deep Space Maneuvers // Preprint of the Russian Academy of Sciences, 2017, 29 p. (in Russian) ISBN 978-5-906906-68-7
URL: http://www.ras.ru/FStorage/Download.aspx?id=4d6e692b-e3ac-4f04-857b-78c905d467a8

7. **S. Trofimov**. Deorbiting of Low-Earth Orbit Spacecraft Using a Sail for Solar Radiation Pressure Force Augmentation // Keldysh Institute Preprints, 2015, No. 32, 32 p. (in Russian)
URL: http://library.keldysh.ru/preprint.asp?id=2015-32

8. **S. Trofimov**. Dynamically Invariant Scaling of Square Solar Sail Systems // Keldysh Institute Preprints, 2015, No. 31, 16 p. (in Russian)
URL: http://library.keldysh.ru/preprint.asp?id=2015-31

9. M. Ovchinnikov, **S. Trofimov**, M. Shirobokov. Design of Interplanetary Transfers with Unpowered Gravity Assists Using the Method of Virtual Trajectories // Keldysh Institute Preprints, 2013, No. 22, 26 p. (in Russian)
URL: http://library.keldysh.ru/preprint.asp?id=2013-22

10. M. Ovchinnikov, **S. Trofimov**, M. Shirobokov. Method of Virtual Trajectories for the Design of Gravity Assisted Missions // Keldysh Institute Preprints, 2012, No. 9, 26 p. (in Russian)
URL: http://library.keldysh.ru/preprint.asp?id=2012-9

11. D. Bindel, D. Ivanov, D. Nuzhdin, M. Ovchinnikov, **S. Trofimov**. Mock-up Position and Orientation Determination System Based on Block of Inertial Sensors and Star Tracker // Keldysh Institute Preprints, 2011, No. 24, 30 p.
URL: http://library.keldysh.ru/preprint.asp?id=2011-24&lg=e

12. M. Ovchinnikov, **S. Trofimov**. Creation of Formation for Ionosphere Sensing Based on Two Satellites Equipped with a Passive Magnetic Attitude Control System // Keldysh Institute Preprints, 2010, No. 33, 23 p. (in Russian)
URL: http://library.keldysh.ru/preprint.asp?id=2010-33

13. D. Ivanov, M. Ovchinnikov, **S. Trofimov**. The Photogrammetric Method for Autonomous Relative Position and Attitude Determination in the Mock-up Formation // Keldysh Institute Preprints, 2010, No. 5, 19 p. (in Russian)
URL: http://library.keldysh.ru/preprint.asp?id=2010-5

PARTICIPATION IN SEMINARS

1. **Sergey Trofimov**. Past and Future of Orbital Dynamics Research in KIAM Space Systems Dynamics Department. Seminar of Space Systems Dynamics Department, Keldysh Institute of Applied Mathematics, online, July 7, 2023.

2. **Sergey Trofimov**. Small Spacecraft in Deep Space: On the Verge of a New Era. Meeting of Young Researchers Councils of Keldysh Institute of Applied Mathematics and Keldysh Research Center, Keldysh Research Center, Moscow, May 19, 2021.

3. **Sergey Trofimov**. Organization of Advanced Mission Analysis, Design and Optimization School (AMADEOS). Seminar of Space Systems Dynamics Department, Keldysh Institute of Applied Mathematics, Moscow, March 23, 2021.

4. **Sergey Trofimov**. Curriculum for 2021–2022 Academic Year. Seminar of Department of Mathematical Modeling and Applied Mathematics (specialty “Control of Dynamical Systems”), Moscow, March 9, 2021.

5. **Sergey Trofimov**. Bifrost Mission Design: Phase 0 – Feasibility Study. Seminar of Space Systems Dynamics Department, Keldysh Institute of Applied Mathematics, Moscow, April 14, 2020.

6. **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.

7. 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.

8. 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.

9. **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.

10. **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.

11. 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.

12. **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.

13. **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.

14. **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.

15. **Sergey Trofimov**. Interplanetary Small Spacecraft: Missions and Technology. Attitude Dynamics and Control Seminar, Spaceflight Mechanics and Control Department, Keldysh Institute of Applied Mathematics, Moscow, July 3, 2014.

16. **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.

17. 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.

18. Maksim Shirobokov, **Sergey Trofimov**. Method of Virtual Trajectories for the Design of Interplanetary Gravity-Assist Missions. Vsevolod A. Egorov Seminar on Spaceflight Mechanics (chairs: Prof. V.V. Sazonov and Assoc. Prof. M.P. Zapletin), Moscow State University, Moscow, February 20, 2013.

19. **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.

20. **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. (2023-2026) Contributor to the Report of International Academy of Astronautics (IAA) Study Group 4.27 "Low Cost Highly Autonomous (AI) Small Satellite Constellation for Deep Space Exploration," **co-chairs Yuichiro Nogawa, Ph.D. and Prof. Chantal Cappelletti, Ph.D.**

2. (2020-2022) Moscow Center for Fundamental and Applied Mathematics (MCFAM), Project No. 20-01-01 "Study of Dynamics and Motion Control for Small Satellite Formations," **principal investigator Prof. M.Yu. Ovchinnikov, D.Sc.**

3. (2019-2023) Russian Science Foundation (RSF), Grant No. 19-11-00256 "Spacecraft Dynamics and Navigation in Complex Gravity Fields," **principal investigator Prof. M.Yu. Ovchinnikov, D.Sc.**

4. (2019-2020) Contract with PAO RSC "Energia" "Selection and Rationale of a Baseline Orbit for the Lunar Habitable Platform," **principal investigator Prof. M.Yu. Ovchinnikov, D.Sc.**

5. (2018-2020) Russian Foundation for Basic Research (RFBR), Grant No. 18-31-20014-mol_a_ved "Study of Satellite Controlled Motion During Rendezvous and Capture of the Noncooperative Target," **principal investigator D.S. Ivanov, Ph.D.**

6. (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.**

7. (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.**

8. (2017-2019) Russian Science Foundation (RSF), Grant No. 17-71-10242 "Spacecraft Trajectory Design and Optimization Using Multi-Core Computing Systems," **principal investigator S.P. Trofimov, Ph.D.**

9. (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.**

10. (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.**

11. (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.**

12. (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.**

13. (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.**

14. (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.**

15. (2014-2018) Russian Science 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.**

16. (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.**

17. (2014) Contract “Development and Performance Assessment of Impact Point Calculation Algorithms,” **principal investigator Prof. M.Yu. Ovchinnikov, D.Sc.**

18. (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.**

19. (2013) Contract with Sputnix LLC “Development of attitude control system for microsatellite “Tabletsat”,” **principal investigator Prof. M.Yu. Ovchinnikov, D.Sc.**

20. (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.**

21. (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.**

22. (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.**

23. (2011-2013) Contract 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.**

24. (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”.

25. (2010-2012) Contract 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.**

26. (2010-2011) Program for the support of leading Russian scientific schools НШ-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.**

27. (2009-2011) Russian Foundation for Basic Research (RFBR), Grant No. 09-01-00431-а “Dynamics and control of multi-element mobile formation under limitation for measuring and control,” **principal investigator Prof. M.Yu. Ovchinnikov, D.Sc.**

28. (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.**