

Kenshiro Oguri (Ken)

Colorado Center for Astrodynamics Research (CCAR),
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EDUCATION

Ph.D. student (2017-2020/2021 (expected))

Department of Aerospace Engineering Sciences, **University of Colorado Boulder**, CO, USA
Advisor: Prof. Jay McMahan

M.S. in Aeronautics and Astronautics (2017)

Department of Aeronautics and Astronautics, **the University of Tokyo**, Japan
Advisor: Prof. Shin-ichi Nakasuka and Prof. Ryu Funase
Thesis: "*Optimal Attitude and Trajectory Control for Spinning Solar Sails Steered by Reflectivity Control Devices Considering Arbitrary Membrane Deformation*"

B.S. in Aeronautics and Astronautics (2015)

Department of Aeronautics and Astronautics, **the University of Tokyo**, Japan
Advisor: Prof. Shin-ichi Nakasuka and Prof. Ryu Funase

PROFESSIONAL EXPERIENCE

NASA JPL visiting student researcher (2018), science orbit design for the Psyche mission. Group: outer planet mission analysis. Mentor: Dr. Gregory Lantoine & Dr. Jon Sims

CCAR graduate research assistant (2017-present), SRP-based orbit control around asteroids; NIAC 2017 project; risk-aware trajectory planning at asteroids. Colorado Center for Astrodynamics Research (CCAR), University of Colorado Boulder.

JSPS DC1 research fellow (2017), attitude control & trajectory design of solar sailing spacecraft. JSPS DC1 research fellowship: the most prestigious fellowship for Ph.D. students in Japan. JSPS: Japan Society for the Promotion of Science [\[URL\]](#).

JAXA ISAS assistant researcher (2015-2017), trajectory & system design for deep-space small-sat projects (PROCYON and EQUULEUS projects).

UTokyo graduate teaching assistant (2016), mentoring & grading for a junior-level class: *Exercise in Space Engineering*. Department of Aero&Astro, The University of Tokyo.

PROJECTS

Psyche project (Summer 2018) [\[URL\]](#), PI: Dr. L. Elkins-Tanton (ASU)

- NASA discovery mission program (*Psyche: Journey to a Metal World*)
- visiting student researcher*: science orbit design at (16) Psyche

NIAC 2017: Dismantling Rubble Pile Asteroids with AoES (2017-present) [\[URL\]](#), PI: Prof. J. McMahan (CU Boulder)

- funded by NASA Innovative Advanced Concepts (NIAC) program (Phase I & II)
- graduate research assistant*: trajectory design & mission analysis around small asteroids

EQUULEUS¹ (2016-present) [\[URL\]](#), PI: Prof. T. Hashimoto & Prof. R. Funase (JAXA/UTokyo)

- JAXA's CubeSat mission to explore cis-lunar space with low energy transfer, one of 13 CubeSat payloads on NASA's SLS-EM1
- project engineer lead*: high-level mission & system design
- mission analysis engineer*: trajectory design & mission analysis; quasi-halo orbit design & stationkeeping control in ephemeris

Guidance & Control of solar sailing spacecraft (2014-2017), PI: Prof. R. Funase (UTokyo)

- collaboration with ISAS/JAXA solar sail working group
- JSPS researcher*: guidance & control algorithm for attitude-orbit coupled dynamics, interplanetary trajectory design

PROCYON² (2014-2017) [\[URL\]](#), PI: Prof. R. Funase & Prof. Y. Kawakatsu (UTokyo/JAXA)

- JAXA's small-sat mission, the world-first 50kg-class deep-space explorer, successfully launched and operated
- attitude system engineer*: flight data analysis & flight software development

¹EQUULEUS: Equilibrium Lunar-Earth point 6U Spacecraft

²PROCYON: Proximate Object Close Flyby with Optical Navigation

AWARDS

Individual awards

The Bahls Endowed Funds – Travel Award (2019) [URL], from Colorado Center for Astrodynamics Research. Paper title: *Science Orbit Design with Frozen Beta angle: Theory and Application to Psyche mission*

John V. Breakwell student award (2018) [URL], from American Astronautical Society. Paper title: “*SRP-based Orbit Control with Application to Small Body Landing*”

Tuition fee half exemption for outstanding students (2017), from the University of Tokyo.

Outstanding Student Presentation Award (2016), from Japan Society for Aeronautical and Space Sciences. Paper title: *“Time-Optimal Attitude Control and its Application to Orbital Control of Spinning Solar Sail Driven by Reflectivity Control”*

Travel awards for international conferences (2016), from Tokyo electric power company holdings memorial foundation (~\$2,000); from Murata science foundation, Japan (~\$1,200); from Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan (~\$4,000)

Young Researcher Award (2015), from Japan Society for Aeronautical and Space Sciences, as the third author. Paper title: *“Preliminary Study of Angular Momentum Control by Solar Radiation Pressure for 50 kg-class Spacecraft PROCYON”*

Group awards

Japanese government MEXT³ Commendation for Science and Technology (2017), for PROCYON project.

The University of Tokyo President Award (2015), for PROCYON project.

Fellowships

Study abroad fellowship (2017-present), from Nakajima science foundation, Japan [URL; Japanese]. Total support up to ~\$50,000/year for 2 years (including tuition); selection ratio ~14%

Masason foundation fellowship (2017-2021), from Masason foundation, Japan [URL]. Customized support. Total support up to ~\$36,000/year w/ full tuition cover & research grant for 5 years; selection ratio ~8.7%.

Departmental fellowship (2017), from Department of Aerospace Engineering Sciences, University of Colorado Boulder. \$5,000.

JSPS DC1 research fellowship for young scientist (2017), from Japan Society for the Promotion of Science [URL] (declined when starting study abroad). **The most prestigious fellowship for Ph.D. students in Japan.** Total support up to ~\$24,000/year w/ research grant for three years; selection ratio ~20%

Japanese Government MEXT fellowship (2015-2017), from Ministry of Education, Culture, Sports, Science and Technology, Japan [URL]. Total support up to ~\$12,000/year for 2 years.

Research grants

Research grant for foundation members (FY2017, 2018), from Masayoshi-Son foundation, Japan. FY2017 ~\$3,000; FY2018 ~\$5,000 (up to ~\$50,000/year)

Grants-in-Aid for Scientific Research <KAKENHI> (FY2017), from Japan Society for the Promotion of Science. Total budget up to ~\$30,000/3year (declined when starting study abroad)

PEER-REVIEWED JOURNAL PUBLICATIONS

1. K. Oguri, R. Funase, Maneuverability-constrained Trajectory Design for Reflectivity-controlled Spinning Solar Sails using the Optimality Principle, to be submitted to *AIAA Journal of Guidance, Control, and Dynamics*. **in preparation.**
2. K. Oguri, K. Oshima, S. Campagnola, K. Kakihara, N. Ozaki, N. Baresi, Y. Kawakatsu, R. Funase, EQUULEUS Trajectory Design, *The Journal of the Astronautical Sciences*, **submitted.**
3. S. Ikari, T. Inamori, T. Ito, K. Ariu, K. Oguri, et.al, Attitude Determination and Control System for the Micro Spacecraft PROCYON, *Transactions of the Japan Society for Aeronautical and Space Sciences*.

³MEXT: Ministry of Education, Culture, Sports, Science and Technology

CONFERENCE PROCEEDINGS

First author

1. K. Oguri, G. Lantoine, B. Hart, and J. W. McMahon. Science Orbit Design with Frozen Beta angle: Theory and Application to Psyche mission. In *AAS/AIAA Space Flight Mechanics Meeting*, pages 1–15, Ka'anapali, HI, 2019, **Bahls Endowed Funds Travel Award**
2. K. Oguri and J. W. McMahon. SRP-based Orbit Control with Application to Orbit Stationkeeping at Small Bodies. In *AAS/AIAA Space Flight Mechanics Meeting*, pages 1–17, Ka'anapali, HI, 2019,
3. K. Oguri and J. W. McMahon. SRP-based Orbit Control with Application to Small Body Landing. In *AAS/AIAA Astrodynamics Specialist Conference*, pages 1–19, Snowbird, UT, 2018, **John V. Breakwell student award**
4. K. Oguri, K. Kakihara, S. Campagnola, N. Ozaki, K. Oshima, T. Yamaguchi, and R. Funase. EQUULEUS Mission Analysis: Design of the Science Orbit Phase. In *26th International Symposium on Space Flight Dynamics*, Ehime, Japan, 2017
5. K. Oguri, A. Ishikawa, S. Ikari, T. Kudo, and R. Funase. Precision Evaluation of Reduced Dynamics Model for Non-uniform Spinning Solar Sail Driven by Reflectivity Control. In *4th International Symposium on Solar Sailing, 17045*, Kyoto, Japan, 2017
6. K. Oguri, T. Kudo, and R. Funase. Design Criteria of Reflectivity Control System Under Uncertainty in Sail Property for Maneuverability Requirement of Spinning Solar Sail. In *AIAA/AAS Astrodynamics Specialist Conference, AIAA2016-5674*, Long beach, CA, 2016
7. K. Oguri and R. Funase. Time-optimal Attitude Control Law with a Strategy of Applying to Orbital Control for Spinning Solar Sail Driven by Reflectivity Control. *Advances in the Astronautical Sciences (also paper of 26th AAS/AIAA Space Flight Mechanics Meetings, AAS 16-329)*, 158:933–951, 2016
8. K. Oguri, T. Kudo, and R. Funase. Time-Optimal Attitude Control and its Application to Orbital Control of Spinning Solar Sail Driven by Reflectivity Control. In *60th Space Sciences and Technology Conference, 2016-P34*, Hokkaido, Japan, 2016, **Outstanding student presentation award**
9. K. Oguri, T. Furumoto, and R. Funase. Optimal Attitude Control of Spinning Solar Sail with Reflectivity Control. In *30th International Symposium on Space Technology and Science, 2015-d-26*, Kobe, Japan, 2015
10. K. Oguri, T. Furumoto, and R. Funase. Time-Optimal Attitude Control of Spinning Solar Sail by Reflectivity Control. In *25th Workshop on JAXA Astrodynamics and Flight Mechanics, 2015-C-11*, pages 1–6, Kanagawa, Japan, 2015
11. K. Oguri, T. Inamori, S. Ikari, R. Hamaguchi, S. Nakajima, K. Ariu, N. Ozaki, T. Asoma, T. Furumoto, Y. Yamagishi, K. Yoshino, Y. Kawasoe, K. Nagata, M. Fujimoto, S. Otsuka, T. Kudo, Y. Koshiro, and S. Nomura. On-Orbit Estimation of ADCS Parameters for micro-astrometry satellite "Nano-JASMINE". In *59th Space Sciences and Technology Conference, 2015-3J13*, Kagoshima, Japan, 2015

Co-author

1. S. Campagnola, J. Hernando-ayuso, N. Ozaki, N. Baresi, T. Hashimoto, Y. Kawakatsu, K. Kakihara, Y. Kawabata, T. Chikazawa, R. Funase, T. Ikenaga, K. Oguri, and K. Oshima. Mission analysis for the EM-1 CubeSats EQUULEUS and OMOTENASHI. In *International Astronautical Congress*, volume 1, pages 1–7, Bremen, 2018
2. S. Campagnola, N. Ozaki, J. Hernando-ayuso, K. Oshima, T. Yamaguchi, K. Oguri, Y. Ozawa, T. Ikenaga, K. Kakihara, S. Takahashi, R. Funase, Y. Kawakatsu, and T. Hashimoto. Mission Analysis for EQUULEUS and OMOTENASHI. In *31st International Symposium on Space Technology and Science*, pages 1–5, 2017
3. R. Funase, N. Ozaki, S. Nakajima, K. Oguri, K. Miyoshi, S. Campagnola, H. Koizumi, Y. Kobayashi, T. Ito, T. Kudo, Y. Koshiro, and S. Nomura. Mission to Earth to Moon Lagrange Point by a 6U CubeSat : EQUULEUS. In *31st International Symposium on Space Technology and Science*, pages 4–7, 2017
4. A. Ishikawa, K. Oguri, S. Ikari, R. Funase, and S. Nakasuka. Estimation of Shape and Optical Parameters of Spinning Solar Sail Equipped with Reflectivity Control Devices. In *26th International Symposium on Space Flight Dynamics*, pages 1–6, 2017
5. K. Oshima, S. Campagnola, C. H. Yam, Y. Kayama, Y. Kawakatsu, N. Ozaki, Q. Verspieren, K. Kakihara, K. Oguri, and R. Funase. EQUULEUS Mission Analysis: Design of the Transfer Phase. In *26th International Symposium on Space Flight Dynamics*, Ehime, Japan, 2017
6. S. Nomura, R. Takahashi, M. Ikura, K. Oguri, T. Obata, S. Ikari, and R. Funase. Initial Design of EQUULEUS Attitude Determination and Control System : How to Design an ADCS with High Reliability for a Deep Space CubeSat. In *31st International Symposium on Space Technology and Science*, pages 1–6, 2017
7. T. Kudo, K. Oguri, and R. Funase. Rapid Control of Attitude Angles for Spinning Solar Sail Utilizing Spin Rate Change with Reflectivity Control Devices. In *4th International Symposium on Solar Sailing, 17048*, pages 1–6, Kyoto, Japan, 2017
8. S. Campagnola, N. Ozaki, K. Oguri, Q. Verspieren, K. Kakihara, K. Yanagida, R. Funase, H. C. Yam, L. Ferella, T. Yamaguchi, Y. Kawakatsu, and G. D. Yarnoz. Mission Analysis for EQUULEUS , JAXA's Earth-Moon Libration Orbit Cubesat. In *67th International Astronautical Congress, IAC-16-B4.8.1*, pages 1–10, Guadalajara, Mexico, 2016
9. S. Ikari, T. Ito, K. Oguri, T. Inamori, S. Sakai, Y. Kawakatsu, A. Tomiki, and R. Funase. In orbit verification of a FDIR algorithm for

- the attitude control system of the micro interplanetary spacecraft PROCYON. In *60th Space Sciences and Technology Conference, 2016-2J08*, Hokkaido, Japan, 2016
10. T. Kudo, K. Oguri, and R. Funase. Rapid Control of Attitude Angles for Spinning Solar Sail Utilizing Spin Rate Change with Reflectivity Control Devices. In *60th Space Sciences and Technology Conference, 2016-P32*, Kyoto, Japan, 2016
 11. R. Funase, S. Ikari, N. Ozaki, S. Nakajima, K. Ariu, K. Oguri, T. Kudo, Y. Koshiro, K. Tokunaga, M. Tomooka, S. Nomura, A. Wachi, T. Arai, T. Iwata, M. Otsuki, and A. Tomiki. Close Flyby Observation of An Asteroid by A Small Probe PROCYON mini and Rendezvous Docking Experiment in Deep Space. In *60th Space Sciences and Technology Conference, 2016-2D08*, Hokkaido, Japan, 2016
 12. S. Nakajima, N. Sako, T. Inamori, S. Ikari, N. Ozaki, T. Furumoto, K. Ariu, K. Oguri, K. Nagata, M. Fujimoto, T. Kudo, Y. Koshiro, M. Tomooka, S. Nomura, A. Wachi, M. Ikura, A. Ishikawa, K. Kakihara, R. Takahashi, N. Funabiki, K. Yanagida, and S. Nakasuka. Bus System and Operation Plan of Nano-Astrometry Satellite Nano-JASMINE. In *60th Space Sciences and Technology Conference, 2016-3G08*, Hokkaido, Japan, 2016
 13. T. Kudo, K. Oguri, T. Furumoto, and R. Funase. Simultaneous Control of Attitude and Spin Rate of Spinning Solar Sail via Reflectivity Control. In *47th Annual Meeting of Japan Society for Aeronautical and Space Sciences, 2016-1C15*, Tokyo, Japan, 2016
 14. T. Ito, S. Ikari, K. Oguri, M. Fujimoto, K. Ariu, Y. Kawabata, T. Inamori, S. Sakai, Y. Kawakatsu, and R. Funase. Preliminary Study of Angular Momentum Control by Solar Radiation Pressure for 50 kg-class Spacecraft PROCYON. In *59th Space Sciences and Technology Conference, 2015-3J08*, pages 1–6, Kagoshima, Japan, 2015, **Young researcher award**
 15. M. Fujimoto, S. Ikari, K. Ariu, K. Oguri, T. Ito, and S. Sakai. Design and Operation Result of Attitude Determination and Control System of Micro Interplanetary Spacecraft PROCYON. In *59th Space Sciences and Technology Conference, 2015-1G10*, Kagoshima, Japan, 2015
 16. T. Ito, S. Ikari, T. Nakatani, M. Fujimoto, K. Ariu, K. Oguri, T. Inamori, S. Sakai, Y. Kawakatsu, and R. Funase. Reliable and Robust Implementation of Attitude Determination and Control Subsystem and Initial Flight Operation Results. In *25th International Symposium on Space Flight Dynamics ISSFD*, number 1, pages 1–12, Munich, Germany, 2015
 17. T. Ito, S. Ikari, K. Oguri, M. Fujimoto, K. Ariu, Y. Kawabata, T. Inamori, S. Sakai, Y. Kawakatsu, and R. Funase. Angular Momentum Control by Using Solar Radiation Pressure for 50 kg-class spacecraft PROCYON. In *25th Workshop on JAXA Astrodynamics and Flight Mechanics, 2015-B-21*, Kanagawa, Japan, 2015
 18. S. Ikari, T. Inamori, T. Ito, K. Ariu, K. Oguri, M. Fujimoto, S. Sakai, Y. Kawakatsu, and R. Funase. Development and On-orbit Verification of Attitude Control System for the Interplanetary Micro-spacecraft PROCYON. In *25th Workshop on JAXA Astrodynamics and Flight Mechanics, 2015-C-10*, Kanagawa, Japan, 2015

PRESENTATIONS

Oral

1. K. Oguri: "Science Orbit Design with Frozen Beta angle: Theory and Application to Psyche mission", at *2019 AAS/AIAA Space Flight Mechanics Meeting, AAS 19-269*, Ka'anapali, HI, 2019.
2. K. Oguri: "SRP-based Orbit Control with Application to Orbit Stationkeeping at Small Bodies", at *2019 AAS/AIAA Space Flight Mechanics Meeting, AAS 19-415*, Ka'anapali, HI, 2019.
3. K. Oguri: "SRP-based Orbit Control with Application to Small body Landing", at *2018 AAS/AIAA Astrodynamics Specialist Conference, AAS 18-375*, Snowbird, UT, 2018.
4. K. Oguri: "EQUULEUS Mission Analysis: Design of the Science Orbit Phase", at *26th International Symposium on Space Flight Dynamics, ISSFD-2017-072*, Ehime, Japan, 2017.
5. K. Oguri: "Precision Evaluation of Reduced Dynamics Model for Non-uniform Spinning Solar Sail Driven by Reflectivity Control", at *4th International Symposium on Solar Sailing, ISSS-17045*, Kyoto, Japan, 2017.
6. K. Oguri: "Attitude Maneuverability Estimation for Preliminary Mission Design of Spinning Solar Sail Driven by Reflectivity Control" at *the AIAA/AAS Astrodynamics Specialist Conference, AIAA2016-5674*, Long Beach, California, 2016.
7. K. Oguri: "Optimal Attitude and Orbital Control Strategy of Spinning Solar Sail Spacecraft via Reflectivity Control" at *26th AAS/AIAA Space Flight Mechanics Meeting, AAS 16-329*, Napa, California, 2016.
8. K. Oguri: "On-Orbit Estimation of ADCS Parameters for micro-astrometry satellite "Nano-JASMINE"" at *59th Space Sciences and Technology Conference, 2015-3J13*, Kagoshima, Japan, 2015.
9. K. Oguri: "Time-Optimal Attitude Control of Spinning Solar Sail by Reflectivity Control" at *25th Workshop on JAXA Astrodynamics and Flight Mechanics, 2015-C-11*, Kanagawa, Japan, 2015.
10. K. Oguri: "Optimal Attitude Control of Spinning Solar Sail with Reflectivity Control" at *30th International Symposium on Space Technology and Science, 2015-d-26*, Kobe, Japan, 2015.

Poster

1. K. Oguri: "Mission Concept and System Design of World-First Cis-Lunar Space Exploration CubeSat EQUULEUS", at *17th ISAS/JAXA Space Science Symposium, 2016-P-24*, Kanagawa, Japan, 2017.
2. K. Oguri: "Time-Optimal Attitude Control and its Application to Orbital Control of Spinning Solar Sail Driven by Reflectivity Control" at *60th Space Sciences and Technology Conference, 2016-P34*, Hokkaido, Japan, 2016. **Outstanding student presentation award**

MISCELLANEOUS

Languages: Japanese (native), English (fluent)

Professional memberships: AIAA, AAS, Japan Society for Aeronautical and Space Sciences (JSASS)

Programming: Matlab (proficient), Python (proficient), C (intermediate), C++ (intermediate)

Software, tools: SPICE (CSPICE, MICE), GMAT, jTOP (spacecraft trajectory optimization software developed by Dr. Stefano Campagnola), Microsoft Visual Studio, CAD software (SolidWorks, Autodesk inventor, PTC Creo), Subversion, GitHub

Last updated: January 20, 2019