

Jay W. McMahan

CONTACT INFORMATION Smead Aerospace Engineering Sciences
University of Colorado Boulder
3775 Discovery Drive
429 UCB
Boulder, CO 80303-0429
Voice: 303-492-3944
Fax: 303-492-7881
jay.mcmahan@colorado.edu
www.colorado.edu/faculty/mcmahan/

CITIZENSHIP United States of America

CURRENT POSITION University of Colorado Boulder **August 2021 to present**
Associate Professor, H.J. and Ann Smead Aerospace Engineering Sciences

EDUCATION **University of Colorado Boulder August 2008 to August 2011**
Ph.D., Aerospace Engineering Sciences (August 2011 conferral)

- Dissertation: An Analytical Theory for the Perturbative Effect of Solar Radiation Pressure on Natural and Artificial Satellites
- Advisor: Daniel J. Scheeres

University of Southern California January 2005 to May 2006
M.S.E., Astronautical Engineering, May 2006
University of Michigan August 2000 to May 2004
B.S.E., *Cum Laude*, Aerospace Engineering, May 2004

RESEARCH INTERESTS Astrodynamics; celestial mechanics; Binary asteroid dynamical evolution; spacecraft guidance, navigation and control; autonomy; Asteroid proximity operations mission design and navigation; optical navigation; flash/scanning LIDAR for navigation; High-fidelity solar radiation pressure modeling; space robotics; space resources, asteroid mining, and In-situ Resource Utilization (ISRU); orbit determination; gravity estimation

POSITIONS HELD **University of Colorado Boulder**
H.J. and Ann Smead Aerospace Engineering Sciences
Associate Professor **August 2021 to present**
Assistant Professor **August 2016 to August 2021**
Assistant Research Professor **March 2013 to August 2016**

- Visiting Erskine Fellow, University of Canterbury, 2023
- Participating Scientist, NASA DART Mission
- Deputy PI, NASA Janus Mission
- Science Team Co-I, Deputy Radio Science Lead, NASA OSIRIS-REx Mission
- Science Team Co-I, Astrodynamics Team, JAXA Hayabusa 2 Mission

University of Colorado Boulder
H.J. and Ann Smead Aerospace Engineering Sciences
Research Associate **September 2011 to March 2013**

- Radio Science team member, OSIRIS-REx mission under Co-I Dr. Daniel Scheeres.
 - Responsible for estimating properties of the target asteroid, Bennu, including its mass, mass distribution, and gravity field.

- Collaborated with the Flight Dynamics and Navigation teams concerning orbit design near the asteroid and implications of the asteroid properties for the sampling maneuver.

University of Colorado Boulder

Graduate Research Assistant

August 2008 to August 2011

- PhD research focused on the orbital effects of solar radiation pressure (SRP).
- Developed an analytical SRP model based on a Fourier series representation.
- Analyzed the orbital perturbations and determined the secular effects of SRP through the use of averaging theory.
- Applied this theory to binary asteroids systems and to Earth orbiting spacecraft.

The Aerospace Corporation

Member of the Technical Staff

June 2004 to June 2008

- Guidance Performance Section, Guidance Analysis Department
- Analyzed launch vehicle guidance in support of Air Force satellite launches.
- Supported the entire mission from open-loop trajectory analysis to day-of-launch support to post-launch performance analysis.
- Used high-fidelity 6 degree-of-freedom simulations to verify guidance performance.
- Used 3 degree-of-freedom simulations that were used for Monte Carlo analysis to make statistical predictions of injection accuracy and fuel reserve levels in the presence of unknown vehicle parameters.
- Supported 4 Delta II, 5 Delta IV, and 4 Atlas V missions pre-flight through day-of-launch.
- Developed an independent tool to build Delta IV guidance and control mission constants from open-loop nominal trajectories.
- Conducted various research studies on guidance systems for Titan IV, Inertial Upper Stage, and ARES I-X.
- Internal funded research on unmanned vehicle guidance and control.

TEACHING & SERVICE

University of Colorado Boulder

Instructor/Professor

January 2011 to present

- Dynamics and Systems, ASEN 2003 (Springs 2018, 2020)
- Orbital Mechanics, ASEN 3200 (Spring 2021, 2022)
- Attitude Dynamics and Control, ASEN 3200 (Fall 2022)
- Statistical Orbit Determination 2, ASEN 6080 (Springs 2012, 2014, 2016, 2017, 2018)
- Space Vehicle Guidance, ASEN 6015/6519 (Springs 2011, 2013, 2015, Falls 2018, 2020, 2022)
- Senior Projects, ASEN 4018/4028 (Fall 2016, Spring 2017)
- Planetary Sciences Seminar, ASTR/ATOC/GEOL 5835 (Spring 2020)
- Statistical Estimation of Dynamical Systems, ASEN 5044 (Fall 2019, 2021)

AES Department Service

- Associate Chair for Graduate Studies - 2021-2023
- Undergraduate Committee - 2017-20
- Strategic Vision Committee - 2017-18
- Graduate Committee - ASN focus area lead - 2016-17
- Outreach Committee - 2016-18

Teaching Assistant

January to May 2009, January to May 2010

- Intro. to Dynamical Systems, ASEN 2003 (Spring 2010 with Dr. Daniel Scheeres and Dr. Penina Axelrad)
- Intro. to Orbital Dynamics, ASEN 3200 (Spring 2009 with Dr. George Born)

ASN Seminar Coordinator **August to December 2010**
• Recruited speakers for, advertised for, and hosted weekly seminar on topics in astrodynamics and satellite navigation.

Aerospace Graduate Student Organization (AGSO) **2008 to 2010**
• Founding member of graduate student organization that serves the Aerospace engineering graduate student population by facilitating communication between the department and the students and organizing social events. Served as a Focus Area and Faculty Interaction chair.

External

Editorial Positions

- Associate Editor, AIAA Journal of Guidance, Control and Dynamics **2020 to Present**
- Associate Editor, AIAA Journal of Spacecraft and Rockets **2018 to 2022**
- Guest Editor, Acta Astronautica, IWSCFF Special Issue **2017-2018**
- Edited conference proceedings, AAS Spaceflight Mechanics 2017, Advances in the Astronautical Sciences, Vol. 160, American Astronautical Society

AAS Space Flight Mechanics Committee **2014 to 2018**
• Elected to serve 4-year term
• Technical Chair for Winter 2017 meeting in San Antonio.

AAS RMS Board of Directors **2019 to 2020**
• Elected to serve 2-year term

AIAA Astrodynamics Technical Committee **2020 to 2025**
• Elected to serve 4-year term (extended)

Conferences/Workshops Organized

- AAS Spaceflight Mechanics Conference, San Antonio, TX, Technical Chair 2017
- IAF IWSCFF, Boulder, CO, Co-Chair 2017
- Bridging the Gap in Space Robotics Workshop, RSS, Boston, MA, Organizer 2017
- Autonomous Space Robotics Workshop, RSS, Pittsburgh, PA, Organizer 2018
- Advanced Navigation Applications and Technologies Session, AAS GNC, Breckenridge, CO, National Chair 2019
- AAS Division of Dynamical Astronomy Meeting, Boulder, CO, Chair 2019
- IAF IWSCFF, Glasgow, Scotland, UK, SOC 2019
- Binaries in the Solar System 5, Fort Collins, CO, SOC 2019
- Asteroid and Small Body Exploration and Sample Return Session, AAS GNC, Breckenridge, CO, National Chair 2020
- Small Body Exploration Session, AAS GNC, Breckenridge, CO, National Chair 2022
- Small Body Exploration Session, AAS GNC, Breckenridge, CO, National Chair 2023

Referee for Peer-Reviewed Journals, including:

- *Icarus*
- *Celestial Mechanics and Dynamical Astronomy*
- *AIAA Journal of Guidance, Control, and Dynamics*
- *AIAA Journal of Spacecraft and Rockets*
- *Advances in Space Research*
- *AAS Journal of the Astronautical Sciences*
- *Journal of Nonlinear Mechanics*
- *Journal of Computational and Nonlinear Dynamics*

- *Journal of Aerospace Engineering*
- *Acta Astronautica*
- *Earth, Moon, and Planets*
- *International Journal of Dynamics and Control*
- *Planetary and Space Science*
- *AIAA Journal of Aerospace Information Sciences*
- *IEEE Transactions on Aerospace and Electronic Systems*
- *IEEE Geoscience and Remote Sensing Letters*
- *Nature: Scientific Reports*
- *Aerospace Science and Technology*
- *Science*
- *AAS Planetary Science Journal*

Review Panel Member

- NASA Science Mission Directorate
- NASA Planetary Data System (PDS)
- NASA Physical Sciences Informatics (PSI)

MENTORING

University of Colorado Boulder

- PhDs Awarded:
 - Dr. Ann Dietrich [**NSF12**] (defended Summer 2017)
 - Dr. Jeroen Geeraert (defended Fall 2017)
 - Dr. Benjamin Bercovici (defended Spring 2019)
 - Dr. Daniel Brack (defended Fall 2019)
 - Dr. Andrew French (defended Summer 2020)
 - Dr. Kenshiro Oguri (defended Spring 2021)
 - Dr. Don Kuettel (defended Summer 2021)
 - Dr. Evan Roelke [**Draper Fellowship 18**] (defended Summer 2021)
 - Dr. Luke Bury [**NSTRF18**] (defended Fall 2021)
 - Dr. Sean Napier (defended Fall 2021)
 - Dr. Hermann Kaptui Sipowa [**GEM20**] (defended Spring 2022)
 - Dr. Mark Moretto [**NSTRF18**] (defended Summer 2022)
 - Dr. Spencer Boone (defended Fall 2022)
 - Dr. Matthew Givens (defended Summer 2023)
 - Dr. Taralicin Deka (defended Summer 2023)
 - Dr. Jacopo Villa (defended Fall 2023)
- Postdoctoral Scholars:
 - Dr. Mattia Pugliatti (January 2024 - Present)
 - Dr. Alexandre Cortiella (April - December 2023)
 - Prof. Davide Amato, Imperial College London (May 2019 - Dec 2020)
- PhD Students:
 - Dahlia Baker [**NSF18**] (exp. graduation 2024)
 - Rylie Bull (exp. graduation 2024)
 - Chloe Long (exp. graduation 2024)
 - Anivid Pedros Faura [**La Caixa20**] (exp. graduation 2024)
 - Ken Kuppa [**Draper Fellowship 20**] (exp. graduation 2024)
 - Jens Rataczak [**NSTGRO22**] (exp. graduation 2025)
 - Rachel Cueva [**NSF 22**] (exp. graduation 2026)
 - Kian Shakerin [**NDSEG23, Draper23**] (exp. graduation 2026)
 - Dezell Turner [**GEM22, NSF23**] (exp. graduation 2027)
 - Zach Donovan (exp. graduation 2026)
 - Kristen Ahner [**Draper23**] (exp. graduation 2028)
 - Chun-Wei Kong (exp. graduation 2026)
 - Grace Calkins [**NSTGRO23**] (exp. graduation 2026)

- Giovanni Fereoli (exp. graduation 2027)
- MS Students:
 - Jonathan Nikkel (graduated Fall 2018)
 - Lubna Zubair (graduated Spring 2019)
 - Hunter Mellema (graduated Spring 2020)
 - Jonathan Manni [**Draper Fellowship 18**] (graduated Summer 2020)
 - Jesse Tambornini (graduated Summer 2020)
 - Rachel Mamich (graduated Fall 2020)
 - Michael Caudill (graduated Summer 2021)
 - Shayna Hume [**NSF18**] (graduated 2021)
 - Melis Grace (graduated 2022)
 - Disip Chaturvedi (graduated 2023)
 - Paul Imler (graduated 2024)
- Visiting Scholars:
 - Andrea De Vittori, Politecnico di Milano, Spring-Summer 2023
 - Dong-Uk Lee, KAIST, Fall 2022 - Spring 2023
 - Paolo Panicucci, ISAE-Supaero, Spring-Summer 2019
 - Anivid Pedros Faura, Universitat Politècnica De Catalunya, Spring-Summer 2019
 - Marc Trullas, TU Delft, Spring 2017 (MS Defended Spring 2018)
 - Alessandro Vanzella, TU Delft, Spring 2016
 - Michael Van den Broeck, TU Delft, Fall 2015
- Advised 2 Discovery Learning Apprentices, 2014–2015
- Advised SPUR student, summer 2018
- Advised UROP student, AY19–20
- PhD Thesis Committee Membership, 30 students
- MS Thesis Committee Membership, 13 students

AWARDS

AIAA

- Elected AIAA Associate Fellow 2017
- AIAA-Rocky Mountain Section Young Engineer of the Year 2017

NASA

- NASA STMD Early Career Faculty fellow 2018-2022
- NIAC Fellow 2017-2020
- Group Achievement Award - OSIRIS-REx Mission Team 2017
- Group Achievement Award - ARRM Team 2015
- Center Group Award - ARRM “Option B” Team 2015
- Director’s Group Award - ARRM Alternate Concept Study Team 2014
- Earth and Space Sciences Graduate Fellowship 2010–2011

DARPA

- DARPA YFA Fellow 2020–2022

Student Awards

- 1st Place Graduate Student Poster Competition (Taralycin Deka) AAS 2021
- Breakwell Student Travel Award, AAS (Hermann Kaptui Sipowa) ASC 2021
- Aviation Week 20 Twenties (Rachel Cueva) 2021
- Breakwell Student Travel Award, AAS (Spencer Boone) SFM 2020
- 2nd Place, Student Paper Competition, AAS (Kenshiro Oguri) GNC 2020
- 1st Place, Student Paper Competition, 2nd Space Imaging Workshop (Jonathan Manni) RPI 2019
- 3rd Place, Student Paper Competition, 2nd Space Imaging Workshop (Dahlia Baker) RPI 2019
- Aviation Week 20 Twenties (Mark Moretto) 2019

- Bahls Student Travel Award, CCAR (Kenshiro Oguri) SFM 2019
- Aviation Week 20 Twenties (Luke Bury) 2018
- Breakwell Student Travel Award, AAS (Daniel Brack) ASC 2018
- Breakwell Student Travel Award, AAS (Kenshiro Oguri) ASC 2018
- 2nd Place, Student Paper Competition, AAS (Ben Bercovici) GNC 2018
- 2nd Place, Student Paper Competition, AAS (Ann Dietrich) GNC 2016
- Breakwell Student Travel Award, AAS (Ann Dietrich) ASC 2015

University of Colorado Boulder

- CU College of Engineering and Applied Sciences Outstanding Faculty Advisor Award 2020
- Smead Aerospace Engineering Sciences Outstanding Junior Faculty Award 2020
- Smead Aerospace Engineering Sciences Outstanding Junior Faculty Award 2017
- Aerospace Engineering Sciences Departmental Fellowship 2008

The Aerospace Corporation

- Independent Research and Development Award 2008
- Graduate Studies Fellowship 2005–2006

ORGANIZATIONS

- American Astronomical Society (AAS)
 - Division for Planetary Sciences
 - Division on Dynamical Astronomy
- American Astronautical Society (AAS)
- American Institute of Aeronautics and Astronautics (AIAA)
- IEEE

INVITED TALKS

- IRAP / Obs. Midi-pyrnes Seminar **April 4, 2024**
The Past, Present, and Future of Asteroid Exploration
- COMET-ORB Seminar **March 19, 2024**
Asteroid Exploration and Advances in Autonomy for Small Body Missions
- Observatoire de la Cote D’Azur **March 7, 2024**
Long-Term Dynamical Implications of DART
- ISAE-Supaero DCAS Seminar **February 27, 2024**
GNC Research for Autonomous Spacecraft
- University of Auckland Invited Seminar **November 1, 2023**
Autonomy for Solar System Exploration
- University of Canterbury Erskine Visiting Fellow Seminar **September 15, 2023**
The Past, Present, and Future of Asteroid Exploration
- University of New Mexico Invited Seminar **April 6, 2023**
Autonomy for Solar System Exploration
- MIT Space Systems Laboratory Seminar **February 26, 2020**
Autonomy for Small Body Exploration

NASA NIAC Symposium <i>Dismantling Rubble Pile Asteroids with Area-of-Effect Soft-bots</i>	September 25, 2019
Stanford University <i>Autonomy for Small Body Exploration</i>	May 22, 2019
NASA NIAC Symposium <i>Dismantling Rubble Pile Asteroids with Area-of-Effect Soft-bots</i>	September 26, 2018
International Space Development Conference <i>Dismantling Rubble Pile Asteroids with Area-of-Effect Soft-bots</i>	May 27, 2018
Museum of Science and Industry Chicago <i>Robotic Asteroid Exploration & Mining with AoES</i>	April 7, 2018
University of Arizona <i>A New Approach to Mining Near-Earth Asteroids</i>	March 27, 2018
Georgia Institute of Technology <i>A New Approach to Mining Near-Earth Asteroids</i>	November 6, 2017
NASA NIAC Symposium <i>Dismantling Rubble Pile Asteroids with Area-of-Effect Soft-bots</i>	September 25, 2017
University of Illinois at Urbana-Champaign <i>A New Approach to Mining Near-Earth Asteroids</i>	September 18, 2017
JPL Planetary Science Colloquium <i>Is YORP "Stochastic"?</i>	August 7, 2017
University of Colorado Boulder <i>Enabling a Sustainable Space Economy</i>	April 20, 2016
The University of Texas at Austin <i>Enabling a Sustainable Space Economy</i>	March 31, 2016
Purdue University <i>Fusing Planetary Science and Aerospace Engineering to Expedite the Exploration and Exploitation of Space</i>	April 18, 2013

87. T. Deka* and **J. W. McMahon**, “Efficient astrodynamics-informed kinodynamic motion planning for relative spacecraft motion,” *Advances in Space Research* (accepted)
86. K. Kuppa*, **J. W. McMahon** and A. Dietrich*, “Initial Pole Axis and Spin Direction Estimation of Asteroids using Infrared Imagery,” *Journal of Guidance, Control, and Dynamics*, Published online March 13, 2024. <https://doi.org/10.2514/1.G007736>
85. R. Cueva*, **J. W. McMahon**, A. Meyer, D. Scheeres, M. Hirabayashi, S. Raducan, S. Jacobson, and C. Merrill, “The Secular Dynamical Evolution of Binary Asteroid System (65803) Didymos Post-DART,” *The Planetary Science Journal* (accepted)
84. J. Rataczack*, R. Chaudhry, **J. W. McMahon**, and I. Boyd, “Investigation of Surface-Catalycity Effects on Hypersonic Glide Vehicle Trajectory Optimization,” *Journal of Spacecraft and Rockets*, published online March 8, 2024. <https://doi.org/10.2514/1.A357>
83. N. Chabot and others including **J. W. McMahon**, “Achievement of the Planetary Defense Investigations of the Double Asteroid Redirection Test (DART) Mission,” *The Planetary Science Journal*, Vol. 5, No. 2, February 2024. <https://doi.org/10.3847/PSJ/a>
82. A. Pedros-Faura* and **J. W. McMahon**, “Mixed Fidelity Shape Models for Efficient Small Body Gravity Modeling,” *Journal of Guidance, Control, and Dynamics*, Vol 47, No. 2, February 2024. <https://doi.org/10.2514/1.G007617>
81. T. Deka* and **J. W. McMahon**, “Astrodynamics-Informed Kinodynamic Sampling-Based Motion Planning for Relative Spacecraft Motion,” *Journal of Guidance, Control, and Dynamics*, Vol 46, No 12, December 2023. <https://doi.org/10.2514/1.G007702>
80. K. Oguri*, G. Lantoine, A. E. Petropoulos, **J. W. McMahon**, “Solar Sailing Q-Law for Planetocentric, Many-Revolution Sail Orbit Transfers,” *Journal of Guidance, Control, and Dynamics*, Vol 46, No 10, October 2023. <https://doi.org/10.2514/1.G007103>
79. E. Roelke*, **J. W. McMahon**, R. D. Braun, P. D. Hattis, “Atmospheric Density Estimation Techniques for Aerocapture,” *Journal of Spacecraft and Rockets*, Vol. 60, No. 3, May 2023. <https://doi.org/10.2514/1.A35197>
78. L. Bury*, **J. W. McMahon**, M. Lo, “Low-Energy Boundaries on Vertical Motion Near the Secondary Body in the CR3BP,” *Journal of the Astronautical Sciences*, Vol. 70, pp 1493-1513, Published Online April 11, 2023. <https://doi.org/10.1007/s40295-023-00375-x>
77. M. Moretto* and **J. W. McMahon**, “Orbit averaging applied to inverse-square perturbations; Application to coma drag, thermal radiation pressure, and heliocentric solar sailing,” *Celestial Mechanics and Dynamical Astronomy*, Vol. 135, January 2023. <https://doi.org/10.1007/s10569-022-10114-3>
76. S. Boone* and **J. W. McMahon**, “Directional State Transition Tensors for Capturing Dominant Nonlinear Effects in Orbital Dynamics,” *Journal of Guidance, Control, and Dynamics*, Vol. 43, No. 6, March 2023. <https://doi.org/10.2514/1.G006910>

75. A.J. Meyer, D.J. Scheeres, H.F. Agrusa, G. Noiset, **J. W. McMahon**, A. Karatekin, M. Hirabayashi, R. Nakano, “Energy dissipation in synchronous binary asteroids,” *Icarus*, Vol. 391, Feb 2023. <https://doi.org/10.1016/j.icarus.2022.115323>
74. L. Bury*, **J. W. McMahon**, M. Lo, “Perturbed Periodic Orbits as Landing Solutions with an Abort Option at Europa,” *Journal of the Astronautical Sciences*, Vol. 69, pp 1493-1513, Published Online December 08, 2022. <https://doi.org/10.1007/s40295-022-00359-3>
73. S. Napier*, **J. W. McMahon**, J. Englander, “Multi-Agent Multi-Objective Optimization of a Very-Long-Baseline Interferometry Mission,” *Journal of Guidance, Control, and Dynamics*, Vol. 45, No. 12, pp. 2275-2288, October 2022. <https://doi.org/10.2514/1.G006486>
72. M.W. Givens* and **J. W. McMahon**, “Square-Root Extended Information Filter for Visual-Inertial Odometry for Planetary Landing,” *Journal of Guidance, Control, and Dynamics*, Vol. 46, No. 2, February 2023. <https://doi.org/10.2514/1.G006849>
71. S Bonasera, N Bosanac, CJ Sullivan, I Elliott, N Ahmed, **J. W. McMahon**, “Designing Sun-Earth L2 Halo Orbit Stationkeeping Maneuvers via Reinforcement Learning,” *Journal of Guidance, Control, and Dynamics*, Vol. 46, No. 2, February 2023. <https://doi.org/10.2514/1.G006783>
70. H. Kaptui Sipowa* and **J. W. McMahon**, “Fuel-Optimal Geometric Path Planning Algorithm for Spacecraft Formation Flying,” *Journal of Guidance, Control, and Dynamics*, Vol. 45, No. 10, October 2022. <https://doi.org/10.2514/1.G006378>
69. M. Holzinger, **J. W. McMahon**, K. Rivera and J. Yuricich, “Decentralized Formation and Constellation Stability Design Requirements Using Differential Mean Orbit Elements,” *Journal of Spacecraft and Rockets*, Published Online July 2022. <https://doi.org/10.2514/1.A35188>
68. D. C. Richardson, H. F. Agrusa, B. Barbee, W. F. Bottke, ... , **J. W. McMahon**, ..., “Predictions for the Dynamical States of the Didymos System before and after the Planned DART Impact,” *The Planetary Science Journal*, Vol. 3, No. 7, published July 2022. <https://doi.org/10.3847/PSJ/ac76c9>
67. L. Bury*, M. Lo, **J. W. McMahon**, “A Study of Periodic Orbits near Europa,” *Celestial Mechanics and Dynamical Astronomy*, Vol. 134, published May 2022. <https://doi.org/10.1007/s10569-022-10076-6>
66. H. Kaptui Sipowa* and **J. W. McMahon**, “Distributed Estimator For Spacecraft Cooperative Localization,” *Journal of Guidance, Control, and Dynamics*, Vol. 45, No. 6, June 2022. <https://doi.org/10.2514/1.G006249>
65. O. S. Barnouin, M. G. Daly, J. A. Seabrook, Y. Zhang, F. Thuillet, P. Michel, J. H. Roberts, R. T. Daly, M. E. Perry, H. C. M. Susorney, E. R. Jawin, R.-L. Ballouz, K. J. Walsh, M. M. Sevalia, M. M. Al Asad, C. L. Johnson, E. B. Bierhaus, R. W. Gaskell, E. E. Palmer, J. Weirich, B. Rizk, C. Y. Drouet D’Aubigny, M. C. Nolan, D. N. DellaGiustina, D. J. Scheeres, **J. W. McMahon**, H. C. Connolly Jr, D. C. Richardson, C. W. V. Wolner, D. S. Lauretta, “The Formation of Terraces on Asteroid (101955) Bennu.” *Journal of Geophysical Research - Planets*, Vol. 127, No. 4, April 2022. <https://doi.org/10.1029/2021JE006927>
64. C. M. Lisse, M. R. Combi, T. L. Farnham, N. Dello Russo, S. Sandford, A. F. Cheng, U. Fink, W. M. Harris, **J. W. McMahon**, D. J. Scheeres, H. A. Weaver, J. Leary, “Operating spacecraft around comets: Evaluation of the near-nucleus

- environment,” *Acta Astronautica*, Vol. 195, June 2022.
<https://doi.org/10.1016/j.actaastro.2021.11.030>.
63. D. Kuettel* and **J. W. McMahan**, “Autonomous Maneuver Targeting Around Small Bodies using Continuous-Thrust Propulsion,” *Journal of Guidance, Control, and Dynamics*, Vol. 45, No. 3, March 2022, Published Online November 30, 2021.
<https://doi.org/10.2514/1.G006213>
62. Tricarico, P., D. J. Scheeres, A. S. French*, **J. W. McMahan**, D. N. Brack*, J. M. Leonard, P. Antreasian et al. “Internal rubble properties of asteroid (101955) Bennu.” *Icarus*, Vol. 370 (2021): 114665.
<https://doi.org/10.1016/j.icarus.2021.114665>
61. K. Oguri*, G. Lantoine and **J. W. McMahan**, “Solar Sailing Primer Vector Theory: Indirect Trajectory Optimization with Practical Mission Considerations,” *Journal of Guidance, Control, and Dynamics*, Vol. 45, No. 1, January 2022. published online September 2021. <https://doi.org/10.2514/1.G006210>
60. K. Oguri* and **J. W. McMahan**, “Stochastic Primer Vector for Robust Low-thrust Trajectory Design under Uncertainty,” *Journal of Guidance, Control, and Dynamics*, Vol. 45, No. 1, January 2022. published online September 2021.
<https://doi.org/10.2514/1.G005970>
59. D. Amato* and **J. W. McMahan**, “Deep learning method for Martian atmosphere reconstruction,” *Journal of Aerospace Information Sciences*, Vol. 18, No. 10, October 2021. <https://doi.org/10.2514/1.I010922>
58. S. Boone* and **J. W. McMahan**, “Variable Time-Of-Flight Spacecraft Maneuver Targeting Using State Transition Tensors,” *Journal of Guidance, Control, and Dynamics*, Vol. 44, No. 11, November 2021. published online August, 2021.
<https://doi.org/10.2514/1.G005890>
57. R. Bull*, R. Mitch, J. Atchison, **J. W. McMahan**, A. Rivkin, E. Mazarico “Optical Gravimetry Performance for Small Body Flyby Missions,” *Planetary and Space Science*, Vol. 205, October 2021. <https://doi.org/10.1016/j.pss.2021.105289>
56. E. Roelke*, **J. W. McMahan**, R. Braun and P. Hattis, “Multi-Event Jettison Guidance Approaches for Drag-Modulation Aerocapture,” *Journal of Spacecraft and Rockets*, Vol 59, No 1, January 2022. Published Online July 5, 2021.
<https://doi.org/10.2514/1.A35059>
55. J.H. Roberts, O.S. Barnouin, M.G. Daly, K.J. Walsh, M.C. Nolan, R.T. Daly, P. Michel, Y. Zhang, M.E. Perry, G.A. Neumann, J.A. Seabrook, R.W. Gaskell, E.E. Palmer, J.R. Weirich, S. Watanabe, N. Hirata, Na Hirata, S. Sugita, D.J. Scheeres, **J.W. McMahan**, D.S. Laretta, “Rotational states and shapes of Ryugu and Bennu: Implications for interior structure and strength,” *Planetary and Space Science*, Vol 204, published online May 27, 2021.
<https://doi.org/10.1016/j.pss.2021.105268>
54. D. Kuettel* and **J. W. McMahan**, “Low-Thrust Maneuverability Using Bilinear Tangent Guidance Near Small Bodies,” *Journal of Guidance, Control, and Dynamics*, Vol 44, No. 8, August 2021. published online June 2021.
<https://doi.org/10.2514/1.G005395>
53. P. Scheirich, P. Pravec, P. Kusnirak, K. Hornoch, **J. W. McMahan**, et al., “A satellite orbit drift in binary near-Earth asteroids (66391) 1999 KW4 and (88710) 2001 SL9 – Indication of the BYORP effect,” *Icarus*, Vol 360, 2021.
<https://doi.org/10.1016/j.icarus.2021.114321>

52. K. Oguri* and **J. W. McMahan**, “Robust Spacecraft Guidance around Small Bodies under Uncertainty: Stochastic Optimal Control Approach,” *Journal of Guidance, Control, and Dynamics*, Vol 44, No 7, July 2021. <https://doi.org/10.2514/1.G005426>
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