



2023 AAS/AIAA Astrodynamics Specialist Conference

Big Sky, MT, Aug 13-17, 2023



Dynamical Systems & Cislunar Astrodynamics I Gallatin, Monday, August 14, 8:00 AM : 12:00 PM Session Chair: Matthew Bolliger (Advanced Space)

8:00 AM

AAS-190 : Targeting Hamiltonian Integral Invariant Behaviour With Control To Manipulate Spacecraft Phase Space Distributions

Oliver Boodram (University of Colorado Boulder), Daniel Scheeres (University of Colorado Boulder)

8:20 AM

AAS-232 : Approximate Analytical Solutions for the Circular Restricted Three-Body Problem Including Non-Hamiltonian Solar Radiation Pressure

Hailee Hettrick (Massachusetts Institute of Technology), David Miller (Massachusetts Institute of Technology), Begum Cannataro (Draper)

8:40 AM

AAS-288 : Bi-Impulsive Transfers linking Ballistic Captures to Periodic Orbits in the Earth-Moon system
Lorenzo Anò (University of Auckland - Auckland Space Institute), **Thomas Caleb** (ISAE-SUPAERO), Roberto Armellin (The University of Auckland), Alicia Martínez-Cacho (Universidad Politécnica de Madrid), Claudio Bombardelli (Technical University of Madrid (UPM)), Stéphanie Lizy-Destrez (ISAE-SUPAERO)

9:00 AM

AAS-120 : Symplectic methods in space mission design

Agustin Moreno (IAS), Urs Frauenfelder (Universität Augsburg), Dayung Koh (JPL), Cengiz Aydin (University of Neuchatel)

9:20 AM

AAS-300 : Stability Maps of Periodic Orbits in the Bi-Circular Restricted Four-Body Problem

Juan Ojeda Romero (Johns Hopkins University Applied Physics Laboratory), Wayne Schlei (JHUAPL)

9:40 AM

AAS-176 : Optimization of Earth-Moon Low-Thrust-Enhanced Low-Energy Transfer

Yuji Takubo (Georgia Institute of Technology / Stanford University), Yuri Shimane (Georgia Institute of Technology), Koki Ho (Georgia Institute of Technology)

10:00 AM

Morning Break

10:20 AM

AAS-443 : Low Delta-V Transfer between Lunar Gateway and Deep Space Port at Sun-Earth Libration Point utilizing Sun-Earth-Moon Four Body Dynamics
Kawsihen Elankumaran (The Australian National University), Junichiro Kawaguchi (School of Engineering, College of Engineering and Computer Cybernetics, Australian National University), **Kohei Takeda** (Tohoku University)

10:40 AM

AAS-231 : A Comparison of Phase-Augmented X-Axis Crossing Control and Floquet Mode Control for Station-Keeping in Halo Orbits
Dale Williams (Purdue University), Kathleen C. Howell (Purdue University), Diane Davis (NASA Johnson Space Center)

11:20 AM

AAS-368 : Cislunar CR3BP Periodic Orbit Identification in Virtual Reality
Dhathri Harsha Somavarapu (Auburn University), **Eirik Mulder** (Auburn University), Davide Guzzetti (Auburn University)

11:20 AM

AAS-200 : Rephasing and Loitering Strategies in the Gateway Near Rectilinear Halo Orbit
Brian McCarthy (a.i. solutions, Inc), Stephen Scheuerle (Purdue University), Emily Zimovan-Spreen (NASA Johnson Space Center), Dale Williams (Purdue University), Diane Davis (NASA Johnson Space Center), Kathleen C. Howell (Purdue University)

11:40 AM

AAS-225 : Optimisation of two-impulse transfers within periodic families of the Earth-Moon system using high-order Taylor polynomials
Thomas Caleb (ISAE-SUPAERO), Alberto Fossà (Institut Supérieur de l'Aéronautique et de l'Espace (ISAE-SUPAERO)), Roberto Armellin (The University of Auckland), Stéphanie Lizy-Destrez (ISAE-SUPAERO)



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Relative Motion I

Room: Amphitheater, Monday, August 14, 8:00 AM : 12:00 PM
Session Chair: David Vallado (Commercial Space Operations Center)

8:00 AM

AAS-206 : Analytical State Transition Matrix Approach for Low-Thrust Reachability Computation
Adam Evans (University of Auckland), Claudio Bombardelli (Technical University of Madrid (UPM)), Roberto Armellin (The University of Auckland), Laura Pirovano (University of Auckland)

8:20 AM

AAS-226 : A Back-propagated Effort Metric for Maneuvering Space Objects Correlation
Riccardo Cipollone (Politecnico di Milano), Pierluigi Di Lizia (Politecnico di Milano)

8:40 AM

AAS-177 : An A*-Search Approach to Optimal Telescope Tasking for Space Domain Awareness
Lorenzo Federici (The University of Arizona), Andrea D'Ambrosio (The University of Arizona), Roberto Furfaro (The University of Arizona), Vishnu Reddy (University of Arizona)

9:00 AM

AAS-412 : Simulation and Control of an Extra-Vehicular Space Robot for Debris Capture and Removal in LEO
HARUN KHAN (University of Texas at Arlington), Ameya Godbole (The MathWorks Inc.), Kamesh Subbarao (University of Texas at Arlington)

9:20 AM

AAS-400 : Reconfiguration of Satellite Constellation for Hurricane Waypoint Tracking
Atri Dutta (Wichita State University), Pardha Sai Chadalavada (Wichita State University)

9:40 AM

AAS-457 : Model Predictive Path Integral Control for Spacecraft Rendezvous and Proximity Operations on Elliptic Orbits
Tomohiro Sasaki (Georgia Institute of Technology), Koki Ho (Georgia Institute of Technology), E. Glenn Lightsey (Georgia Institute of Technology)

10:00 AM

Morning Break

10:20 AM

AAS-453 : Visual Point-Cloud SLAM for Spacecraft Rendezvous and Proximity Operations

Jacopo Villa (University of Colorado Boulder), Jay McMahon (CCAR (Colorado Center for Astrodynamics Research)), Issa Nesnas (Jet Propulsion Laboratory, California Institute of Technology), **Matthew Givens** (University of Colorado Boulder)

10:40 AM

AAS-462 : Lunar Crater Identification using Triangle Reprojection

Ava Thrasher (Georgia Institute of Technology), John Christian (Georgia Institute of Technology), Giovanni Molina (Intuitive Machines), Mike Hansen (Intuitive Machines), John Pelgrift (KinetX, Inc.), Derek Nelson (KinetX, Inc.)

11:00 AM

AAS-484 : Weak GNSS enabled Cis-Lunar PNT using high gain inflatable antennas

Aman Chandra (University of Arizona)

11:20 AM

AAS-488 : NAVIGATION RESULTS AND ANALYSIS FOR THE LICIAUCUBE MISSION

Daniel Lubey (Jet Propulsion Laboratory, California Institute of Technology), Matthew Smith (NASA Jet Propulsion Laboratory), Declan Mages (NASA / Caltech JPL), Courtney Hollenberg (Maxar Technologies), Shyam Bhaskaran (Jet Propulsion Laboratory)



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Space Domain Awareness I

Room: Madison, Monday, August 14, 8:00 AM : 12:00 PM

Session Chair: Ryne Beeson (Princeton University) and Maria Anna Laino (University of Strathclyde)

8:00 AM

AAS-127 : Modeling Spacecraft Earth Radiation Pressure to Improve Spacecraft Trajectory Estimation and Design

Charles Reynerson (Jet Propulsion Laboratory), Maria Hakuba (Jet Propulsion Laboratory, California Institute of Technology 4800 Oak Grove Dr), Marco Quadrelli (JPL/Caltech), David Wiese (Jet Propulsion Laboratory), Christopher McCullough (Jet Propulsion Laboratory)

8:20 AM

AAS-316 : Satellite coverage assessment considering cloud cover

Ciara McGrath (University of Manchester), Astrid Werkmeister (University of Strathclyde), Joshua Gribben (University of Strathclyde), Christopher Lowe (University of Strathclyde), Malcolm Macdonald (University of Strathclyde)

8:40 AM

AAS-100 : TWO-BODY EQUATIONS OF MOTION

James Miller (Consultant)

9:00 AM

AAS-135 : On the integration of radial intermediaries in AST

Antonio Elipe (Universidad de Zaragoza.), Eva Tresaco (Universidad de Zaragoza), Maria Livia da Costa (National Institute For Space Research), Luca Piccotti (Universidade de Santiago de Compostela), **David Arnas Martinez** (Purdue University)

9:20 AM

AAS-258 : The Perturbed Hodograph

Paul Lane (KBR)

9:40 AM

AAS-273 : Osculating second order frozen orbits in the zonal harmonics problem

David Arnas Martinez (Purdue University)

10:00 AM

Morning Break

10:40 AM

AAS-220 : Optimal orbits for a recycling station supporting in-orbit recycling

Maria Anna Laino (University of Strathclyde), Massimiliano Vasile (University of Strathclyde, Department of Mechanical & Aerospace Engineering)

11:00 AM

AAS-158 : Narrow Field-of-View Sensor Tasking for Search of Gaussian-Mixture Probability Density Functions

Andrew J. Sinclair (Air Force Research Laboratory), Edwin Peters (UNSW Canberra), Melrose Brown (UNSW Canberra)

11:20 AM

AAS-264 : Acquisition of Objects in Cislunar Space with a Small Spaceborne Telescope

William Priedhorsky (Los Alamos National Laboratory)

11:40 AM

AAS-338 : Ground-Based Cislunar Space Surveillance Demonstrations at Los Alamos National Laboratory

Yancey Sechrest (Los Alamos National Laboratory), Marion Vance (Los Alamos National Laboratory), Christian Ward (Los Alamos National Laboratory), William Priedhorsky (Los Alamos National Laboratory), Przemek Wozniak (Los Alamos National Laboratory)



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Trajectory, Mission, and Maneuver Design and Optimization I

Room: Jefferson, Monday, August 14, 8:00 AM : 12:00 PM

Session Chair: Ossama Abdelkhalik (Iowa State University) and Roberto Armellin (The University of Auckland)

8:00 AM

AAS-137 : Preliminary Statistical Maneuver Analysis for a Low-Thrust NRHO to DRO Transfer

Chandrankanth Venigalla (NASA Jet Propulsion Laboratory), Dayung Koh (JPL), Daniel Grebow (NASA / Caltech JPL), Brian Rush (NASA / Caltech JPL), Scott Karn (NASA Glenn Research Center), Steven McCarty (NASA Glenn Research Center), Melissa McGuire (NASA GRC), Jon Sims (Jet Propulsion Laboratory)

8:20 AM

AAS-171 : END-TO-END OPTIMIZATION OF THE DRAGONFLY INTERPLANETARY CRUISE WITH EDL TARGETING

Jacob Englander (Johns Hopkins Applied Physics Laboratory), Donald Ellison (Johns Hopkins University Applied Physics Lab), Maria McQuaide (JHU Applied Physics Laboratory), Zachary Putnam (Johns Hopkins Applied Physics Laboratory)

8:40 AM

AAS-173 : DESIGN OF THE FIREFLY HELIOPHYSICS CONSTELLATION VIA DIRECT OPTIMIZATION WITH COOPERATIVE MINIMAX AND MAXIMIN OBJECTIVES

Jacob Englander (Johns Hopkins Applied Physics Laboratory), Jackson Shannon (Johns Hopkins Applied Physics Laboratory), Nour E. Raouafi (The Johns Hopkins University Applied Physics Laboratory)

9:00 AM

AAS-210 : UNSCENTED TRAJECTORY OPTIMIZATION

Isaac Ross (Naval Postgraduate School), Ronald J. Proulx (Naval Postgraduate School), **Mark Karpenko** (Naval Postgraduate School)

9:20 AM

AAS-266 : Nonlinear Reachable Set Computation And Model Predictive Control For Safe Hypersonic Re-Entry Of Atmospheric Vehicles

Jinaykumar Patel (The University of Texas at Arlington), Kamesh Subbarao (University of Texas at Arlington)

9:40 AM

AAS-223 : Dragonfly Preliminary Launch Targeting

Donald Ellison (Johns Hopkins University Applied Physics Lab), Jacob Englander (Johns Hopkins Applied Physics Laboratory), Maria McQuaide (JHU Applied Physics Laboratory)

10:00 AM

Morning Break

10:20 AM

AAS-243 : A New Eclipse Algorithm for use in Spacecraft Trajectory Optimization

Jacob Williams (NASA Johnson Space Center), Sarah Smallwood (NASA JSC), David Lee (NASA/JSC), Maxon Widner (Jacobs Technology)

10:40 AM

AAS-265 : Trajectory & Maneuver Design of the NEA Scout Solar Sail Mission

Gregory Lantoine (NASA / Caltech JPL), Andrew Cox (Jet Propulsion Lab), Theodore H. (Ted) Sweetser (Jet Propulsion Laboratory), Daniel Grebow (NASA / Caltech JPL), Gregory Whiffen (NASA / Caltech JPL), David Garza (Jet Propulsion Laboratory), Anastassios Petropoulos (NASA / Caltech JPL), Kenshiro Oguri (Purdue University), Julie Kangas (JPL), Gerhard Kruizinga (NASA / Caltech JPL), Julie Castillo-Rogez (Jet Propulsion Laboratory, California Institute of Technology)

11:00 AM

AAS-280 : A Fast Matrix-Free Method for Low-Thrust Trajectory Optimization

Aurya Javeed (Sandia National Laboratories), Denis Ridzal (Sandia National Laboratories), Drew Kouri (Sandia National Laboratories), Isaac Ross (Naval Postgraduate School)

11:40 AM

AAS-157 : A Survey of Saturn Interplanetary Cruise Options in the 2032-2034 Timeframe

Matthew Shaw (Lockheed Martin Corporation), Logan Johnson (Lockheed Martin Space), Brian Sutter (Lockheed-Martin)



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Asteroid, Earth and Planetary Missions I

Amphitheater: Amphitheater, Monday, August 14, 1:30 PM : 3:10 PM

Session Chair: Damon Landau (Jet Propulsion Laboratory)

1:30 PM

AAS-170 : Dragonfly Phase B Mission Design

Maria McQuaide (JHU Applied Physics Laboratory), Donald Ellison (Johns Hopkins University Applied Physics Lab), Jacob Englander (Johns Hopkins Applied Physics Laboratory), Mark Jesick (Jet Propulsion Laboratory), Martin Ozimek (The Johns Hopkins University Applied Physics Laboratory), Duane Roth (Jet Propulsion Laboratory)

1:50 PM

AAS-489 : Development of a Solar Radiation Pressure Model for the Dragonfly Mission

Daniel Lubey (Jet Propulsion Laboratory, California Institute of Technology), Brian Kennedy (NASA / Caltech JPL), Duane Roth (Jet Propulsion Laboratory), Mark Jesick (Jet Propulsion Laboratory), Dianna Velez (NASA / Caltech JPL), Mau C. Wong (JPL)

2:10 PM

AAS-460 : Trajectory Options for a Uranus Orbiter and Probe

Damon Landau (Jet Propulsion Laboratory), Alex Davis (Jet Propulsion Laboratory), Reza Karimi (NASA-JPL)

2:30 PM

AAS-374 : The Orbit Design for Enceloscope to Sample Plumes on Enceladus

Jeff Parker (Advanced Space, LLC), Erik Buehler (ASTROBi Foundation), Ethan Kayser (Advanced Space, LLC), Alec Forsman (Advanced Space, LLC), Michael Caudill (Advanced Space, LLC), Andrew Koehler (Advanced Space)

2:50 PM

AAS-237 : Preliminary projectile impact and safety analyses for the Hayabusa2 extended mission

Mirko Trisolini (Politecnico di Milano), **Anivid Pedros-Faura** (University of Colorado Boulder), Yuichi Tsuda (Japan Aerospace Exploration Agency), Shota Kikuchi (National Astronomical Observatory of Japan)



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Attitude Dynamics, Determination and Control I Room: Madison, Monday, August 14, 1:30 PM : 3:10 PM Session Chair: Brian McCarthy (a.i. solutions, Inc)

1:30 PM

AAS-106 : CONTROL OF UNDERACTUATED SPACECRAFT BY DYNAMIC IMPLEMENTATION OF A SEQUENCE OF FEASIBLE ROTATIONS

Giulio Avanzini (Università del Salento), Fabrizio Giulietti (Università di Bologna), Novara Carlo (Politecnico di Torino), Michele Pagone (Politecnico di Torino)

2:10 PM

AAS-182 : DUAL LIE ALGEBRA REPRESENTATIONS OF RIGID BODY DISPLACEMENT AND MOTION WITH DUAL CAYLEY MAPS. AN OVERVIEW (II)

Daniel Condurache (Technical University of Iasi)

2:30 PM

AAS-205 : Covariance Analysis of Attitude and Angular Rate Estimation using Accelerometers

Koya Yamamoto (Texas A&M University)

2:50 PM

AAS-147 : Challenges in ICESat-2 Precision Laser Pointing Determination

Sungkoo Bae (The University of Texas at Austin)



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Guidance, Navigation and Control I

Room: Gallatin, Monday, August 14, 1:30 PM : 3:10 PM

Session Chair: Rebecca Foust (JHU-APL)

1:30 PM

AAS-307 : Autonomous Constrained Control for Arbitrary Configurations of Gimbaling Thrusters in SE(3)

Matthew Wittal (National Aeronautics and Space Administration), Morad Nazari (Embry-Riddle Aeronautical University)

1:50 PM

AAS-113 : Run Time Assurance for Autonomous Spacecraft Inspection

Kyle Dunlap (Parallax Advanced Research), David van Wijk (Texas A&M University), Kerianne Hobbs (Air Force Research Laboratory)

2:10 PM

AAS-423 : In-Flight Autonomous Optical Navigation Demonstration Onboard the LunaH-Map Spacecraft

John Pelgrift (KinetX, Inc.), Derek Nelson (KinetX, Inc.), Bobby G. Williams (KinetX, Inc.), Patrick Hailey (Qwaltec, Inc.), Tyler O'Brien (Qwaltec, Inc.), Kaylee Poetsch (Qwaltec, Inc.), Craig Hardgrove (Arizona State University)

2:30 PM

AAS-153 : Guidance, Navigation, and Control System for Precise Autonomous Satellite Rendezvous and Docking Using Vision Based Navigation

Mohammad Abdelrahman (MDA)

2:50 PM

AAS-349 : A Modal Decomposition Approach for Relative Navigation in Cislunar Space

Michael Mercurio (Ten One Aerospace), Christopher Roscoe (Ten One Aerospace), Jason Westphal (TEN ONE AEROSPACE LLC)



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Machine Learning and Autonomy in Astrodynamics I Room: Jefferson, Monday, August 14, 1:30 PM : 3:10 PM Session Chair: Atri Dutta (Wichita State University)

1:30 PM

AAS-108 : Optimal Target Sequencing in the Agile Earth-Observing Satellite Scheduling Problem Using Learned Dynamics

Mark Stephenson (University of Colorado, Boulder), Hanspeter Schaub (CCAR (Colorado Center for Astrodynamics Research))

1:50 PM

AAS-122 : Forecasting Multiple Solar Radio Fluxes with Long Short-Term Memory Neural Networks

Charles Fry (The University of Kansas), **Craig McLaughlin** (University of Kansas Aerospace Engineering)

2:10 PM

AAS-240 : Machine Learning-aided Satellite Navigation through Extended Kalman Filter using Magnetometer Measurements

Gilberto Goracci (Tor Vergata and Sapienza Universities of Rome), **Andrea D'Ambrosio** (The University of Arizona), Fabio Curti (School of Aerospace Engineering, Sapienza University of Rome)

2:30 PM

AAS-372 : Applications of Regression Vision Transformers for Autonomous Spacecraft Optical Navigation in Simulated Orbital Environments

Kanak Parmar (Auburn University), Jeff Parker (Advanced Space, LLC), Davide Guzzetti (Auburn University)



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Technical Panel: Attitude Estimation, Sensing and Applications

Room: Madison, Monday, August 14, 3:30 PM : 4:00 PM

Session Chair: David van Wijk (Texas A&M)

Panelists:

Attitude Estimation with Intermittent Measurements for On-Orbit Assembly

Andrew Miller, The University of Texas at Austin

A Pose Estimation Approach to Resolve the Temporal Alignment Problem of Multiple Sensor Measurements

Ali Hasnain Khawaja, Texas A&M University

Technical Panel: Reinforcement Learning in Astrodynamics

Room: Madison, Monday, August 14, 4:00 PM : 4:30 PM

Session Chair: David van Wijk (Texas A&M)

Panelists:

Deep Reinforcement Learning for Autonomous Spacecraft Inspection using Illumination

David van Wijk, Texas A&M University

Invalid Action Masking for Deep Reinforcement Learning Applied to Space Situational Awareness

Dylan Penn, Virginia Tech

Vision-based Autonomous Docking via Meta-Reinforcement Learning

Andrea Scorsoglio, The University of Arizona

Technical Panel: Reinforcement Learning in Astrodynamics

Room: Madison, Monday, August 14, 4:30 PM : 5:00 PM

Session Chair: David van Wijk (Texas A&M)

Panelists:

Satellite Collision Avoidance Using Repeated Games

Sydney Dolan, Massachusetts Institute of Technology,

Continuous Center Of Mass Estimation For A Gimbaled Ion Thruster Equipped Spacecraft

Riccardo Calaon, University of Colorado Boulder

Technical Panel: Special Topics in Astrodynamics Modeling

Room: Madison, Monday, August 14, 5:00 PM : 5:30 PM

Session Chair: David van Wijk (Texas A&M)

Panelists:

Physics-Informed Neural Networks for Orbit Propagation in Astrodynamics Problems

Hunter Quebedeaux, University of Central Florida

Validation of the SRP tool: HiFi-SoRaP

Leandro Zardain, University of Barcelona



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Technical Panel: Newer Techniques in Spacecraft GNC I

Room: Amphitheater, Monday, August 14, 3:30 PM : 4:00 PM

Session Chair: Manoranjan Majji (Texas A&M)

Panelists:

A Novel Approach to Autonomous Lunar Localization and Timing

Fabio D'Onofrio, The University of Texas at Austin

Successive Convex Programming for High-order Guidance and Navigation of Satellites

Roberto Armellin, The University of Auckland

Applying Event-based Sensors to Relative Spacecraft State Estimation

Sofia Gianina Catalan, The University of Texas at Austin

Technical Panel: Newer Techniques in Spacecraft GNC II

Room: Amphitheater, Monday, August 14, 4:00 PM : 4:30 PM

Session Chair: Manoranjan Majji (Texas A&M)

Panelists:

Cislunar and Lunar RSO Observability Potential for Candidate Lunar Surface Sites

Clint Spesard, Air Force Institute of Technology

Time-Varying Mass Property Estimation Utilizing A Joint Unscented Kalman Filter on TSE(3)

Brennan McCann, Embry-Riddle Aeronautical University

SEMI-ANALYTICAL LONG-TERM ATTITUDE PROPAGATION

Irene Cavallari, University of Strathclyde

Technical Panel: Newer Techniques in Spacecraft GNC III

Room: Amphitheater, Monday, August 14, 4:30 PM : 5:00 PM

Session Chair: Manoranjan Majji (Texas A&M)

Panelists:

Analytical Methods in Crater Rim Fitting and Pattern Recognition

Michael Krause, Georgia Institute of Technology

Tracking Error Recoverability Analysis for Drag-Modulated LEO Spacecraft Using Successive Convexification

Alex Hayes, University of Minnesota

Fast Target-Relative Navigation and Pole Estimation Using Silhouettes In Imagery

Jacopo Villa, University of Colorado Boulder

Technical Panel: Estimation Methods in Entry, Descent and Landing

Room: Amphitheater, Monday, August 14, 5:00 PM : 5:30 PM

Session Chair: Manoranjan Majji (Texas A&M)

Panelists:

Learning Reachability for Hazard Detection and Avoidance in Planetary Landing

Kento Tomita, Georgia Institute of Technology

Development of Toolbox for Ascent Trajectory Optimization of Spacecraft from Launch to Lower Earth Orbit

DIVYESHWARI VANSADIA, Embry Riddle Aeronautical University

MHN-SLAM For Planetary Landing

Corey Marcus, The University of Texas at Austin



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Technical Panel: Planetary Entry, Descent and Landing

Room: Gallatin, Monday, August 14, 3:30 PM : 4:00 PM

Session Chair: Patrick Kelly (Texas A&M)

Panelists:

Planetary Entry, Descent and Landing

Rapid Calculation of Re-Entry Landing Site Uncertainty Using a Reference Table

Brendan Mindiak, Georgia Institute of Technology

Information-based Guidance and Control for Planetary Entry Systems

Kevin Bonnet, University of Colorado at Boulder

Technical Panel: Generalizations of CR3BP

Room: Gallatin, Monday, August 14, 4:00 PM : 4:30 PM

Session Chair: Patrick Kelly (Texas A&M)

Panelists:

Periodic Orbits in the Hill Restricted 4-Body Problem Applied to the Sun-Earth-Moon System

Gavin Brown, University of Colorado Boulder

Generating Low-Energy Transfers in the Inclined Bi-Elliptical Restricted Four-Body Problem

Riley Fitzgerald, Virginia Tech

Resonant Quasi-Periodic Orbits in the Bi-Elliptic Restricted Four-Body Problem

Patrick Kelly, Texas A&M University

Technical Panel: Low Thrust Trajectory Design in CR3BP

Room: Gallatin, Monday, August 14, 4:30 PM : 5:00 PM

Session Chair: Patrick Kelly (Texas A&M)

Panelists:

A Semi-Analytic Approach For Low-Thrust Cislunar Trajectories Design

Madhusudan Vijayakumar, Iowa State University

Characterizing Low-Thrust Transfers from Near-Rectilinear Halo Orbits to Low Lunar Orbits with Q-Law

Yuri Shimane, Georgia Institute of Technology

Analysis of Robust Low Thrust Trajectories for The Lunar Gateway

Amlan Sinha, Princeton University

Technical Panel: Planetary Entry, Descent and Landing

Room: Gallatin, Monday, August 14, 5:00 PM : 5:30 PM

Session Chair: Patrick Kelly (Texas A&M)

Panelists:

Navigation in Cislunar Space

Directional Reachability for Cislunar Optical Tracking and Custody Maintenance

Casey Heidrich, University of Colorado Boulder

Initial Orbit determination in Circular Restricted Three-Body Problem

Xin Liu, Nanjing University



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Technical Panel: Emerging Trends in Spacecraft Control and Estimation I

Room: Jefferson, Monday, August 14, 4:00 PM : 4:30 PM

Session Chair: James McElreath (Texas A&M)

Panelists:

On-Board Guidance Implementation Analysis for Robust Asteroid Rendezvous

Tomohiro Ishizuka, ISAE-SUPAERO

Disturbance Modeling in Linear Covariance Analysis for Crewed Artemis Missions

Jack Joshi, University of Illinois at Urbana-Champaign

Technical Panel: Emerging Trends in Spacecraft Control and Estimation II

Room: Jefferson, Monday, August 14, 4:30 PM : 5:00 PM

Session Chair: James McElreath (Texas A&M)

Panelists:

Comparison of Optimal Control for Orbital Maneuvers using Basilisk

Joao Leonardo Silva Cotta, Florida Institute of Technology

Automatic Control Sequence Detection and Separation In The Low-Thrust Fuel-Optimal Guidance Problem

Adam Evans, University of Auckland

Mass and Inertia Property Estimation on TSE(3) in the Presence of a Sloshing Liquid

Marco Fagetti, Embry-Riddle Aeronautical University

Technical Panel: Station Keeping in Multibody Regimes

Room: Jefferson, Monday, August 14, 5:00 PM : 5:30 PM

Session Chair: James McElreath (Texas A&M)

Panelists:

Robust NRHO Station-keeping Planning with Maneuver Location Optimization under Operational Uncertainties

Naoya Kumagai, Purdue University

Chance-Constrained Output-Feedback Control without History Feedback: Application to NRHO Stationkeeping

Divija Aleti, Purdue University

Stationkeeping of Earth-Moon L2 Libration Point Orbits via Optimal Covariance Control

Alessandro Zavoli, Sapienza - University of Rome



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Dynamical Systems & Cislunar Astrodynamics II

Gallatin, Tuesday, August 15, 8:00 AM : 12:00 PM

Session Chair: Maaninee Gupta (Purdue University) and Brian McCarthy (a.i. solutions, Inc)

8:00 AM

AAS-159 : Gauss Equations for Local Action-Angle Orbital Elements in Cislunar Space

Luke Peterson (University of Colorado Boulder), Daniel Scheeres (University of Colorado Boulder)

8:20 AM

AAS-293 : Performance of an Vehicle Active Stabilization System during Touchdown in the Presence of Propellant Slosh Dynamics

Jing Pei (NASA Langley Research Center)

8:40 AM

AAS-466 : Loitering Strategies Leveraging Higher-Order Gravity Expansions for Lunar Surface Access

Mackenzie Mangette (The Pennsylvania State University), Roshan Thomas Eapen (The Pennsylvania State University)

9:00 AM

AAS-376 : Cislunar Eclipse Mitigation Strategies for Resonant Periodic Orbits

Maaninee Gupta (Purdue University), Kathleen C. Howell (Purdue University)

9:20 AM

AAS-268 : Baseline Orbit Generation for Near Rectilinear Halo Orbits

Emily Zimovan-Spreen (NASA Johnson Space Center), Stephen Scheuerle (Purdue University), Brian McCarthy (a.i. solutions, Inc), Diane Davis (NASA Johnson Space Center), Kathleen C. Howell (Purdue University)

9:40 AM

AAS-464 : A Generalized Condition for Symplectic Dynamics and the State Transition Matrix

Joseph Peterson (Texas A&M University), Manoranjan Majji (Texas A&M University, College Station), John L. Junkins (Texas A&M University)

10:00 AM

Morning Break

10:20 AM

AAS-116 : Construction and Analysis of "L1/L2 Cyclers" Orbits in the Earth-Moon System

Ricardo Gomez (Purdue University), Juan-Pablo Almanza-Soto (Purdue University), Kathleen C. Howell (Purdue University), Jonathan Aziz (The Aerospace Corporation)

10:40 AM

AAS-416 : Three-Burn Libration Point Capture for Smallsats Leveraging Moon-Bound Rideshare Opportunities

Chelsea Welch (Space Exploration Engineering), Mike Loucks (Space Exploration Engineering (SEE)), John Carrico (Space Exploration Engineering, LLC), Stephen West (Space Exploration Engineering)

11:00 AM

AAS-315 : Local Stability of Equilibria in the Circular-Restricted Full Three Body Problem

Brennan McCann (Embry-Riddle Aeronautical University), Annika Anderson (Embry-Riddle Aeronautical University), Morad Nazari (Embry-Riddle Aeronautical University), David Canales Garcia (Embry-Riddle Aeronautical University)

11:20 AM

AAS-238 : An Observational Approach To Low Lunar Frozen Orbit Design

Michael Mesarch (NASA Goddard Space Flight Center)

11:40 AM

AAS-242 : Orbital control strategy for a CubeSat satellite equipped with a solar sail for Earth-Mars communications during solar conjunctions

Leonor Cui Domingo Centeno (Complutense University of Madrid), Ariadna Farres (University of Maryland Baltimore County)



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Relative Motion II

Room: Amphitheater, Tuesday, August 15, 8:00 AM : 12:00 PM
Session Chair: Angela Bowes (NASA LaRC) and Eric Butcher (University of Arizona)

8:00 AM

AAS-123 : HelioSwarm: Swarm Establishment and Reconfiguration in Perturbed Eccentric Orbit
Paul Levinson-Muth (NASA), Laura Plice (Metis Technology Solutions)

8:20 AM

AAS-160 : Slightly Elliptic Quadratic Relative Motion with J2 Effects in Spherical Coordinates: Model and Time-Explicit Solution
Eric Butcher (University of Arizona)

8:40 AM

AAS-161 : Validation of the Guidance, Navigation, and Control (GN&C) Architecture for RPO Missions using Basilisk-cFS Architecture
Axel Garcia (Astroscale), Ryan Kramlich (Astroscale U.S.), Jack Huun (Astroscale), Arielle Cohen (Astroscale), Tyler Gaston (Astroscale)

9:00 AM

AAS-179 : Nonlinear Coupled Orbital-Attitude Dynamics of Spacecraft Formation Flying Under the Effect of Gravity Gradient Torque
Ayansola Ogundele (Kratos Defense and Security Solutions Inc.)

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AAS-188 : Sliding Mode Control for Orbital Rendezvous with a Tumbling Client
Bryan Hoskins (U.S. Naval Research Laboratory)

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AAS-180 : Dynamics of Tethered Spacecraft Formation Flying Under the Effects of J2 Perturbation for Space Based Solar Power System
Ayansola Ogundele (Kratos Defense and Security Solutions Inc.)

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Morning Break

10:20 AM

AAS-328 : Space-based Observer Image RPO Maneuver Detection using Deep Learning

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Samuel McConnell (Intuitive Machines)

11:00 AM

AAS-105 : Regular Satellite Constellations for Continuous Global Coverage

Thomas Lang (The Aerospace Corp)

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AAS-114 : Actionability and Persistence of Conjunction Data

David Vallado (Commercial Space Operations Center), Salvatore Alfano (COMSPOC), Peter Zimmer (J.T. McGraw and Associates, LLC), Daniel Oltrogge (COMSPOC Corporation)

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AAS-310 : Remarks on the Gauss von Mises Distribution, Distributional Statistics, and Uncertainty
Realism in Space Situational Awareness

Ryne Beeson (Princeton University)

10:40 AM

AAS-162 : Stochastic consider parameters for covariance realism in orbit determination

Alejandro Cano Sanchez (GMV), Alejandro Pastor (GMV), Diego Escobar (GMV), Joaquín Míguez
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AAS-204 : Initial Orbit Determination Algorithms for Rapid Optical and Radar Data Processing

Gim Der (DerAstrodynamics)

11:20 AM

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AAS-289 : Optimal Short-term Scheduling For Space Telescope Operation In Low-Earth Orbit

Euihyeon Choi (Korea Advanced Institute of Science and Technology), Jaemyung Ahn (Korea Advanced Institute of Science and Technology)

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AAS-305 : Trajectory Design and Early Mission Operations for Lunar IceCube

Dave Folta (NASA Goddard Space Flight Center), Sun Hur-Diaz (NASA GSFC), Robert Pritchett (NASA Goddard Space Flight Center), Kyle Hughes (NASA Goddard Space Flight Center), Steven Slojkowski (Omitron, Inc)

8:40 AM

AAS-360 : Optimal Orbits for Imaging Supermassive Black Holes Using Space VLBI

Sonia Hernandez (Continuum Space Systems), **Emily Doughty** (Continuum Space Systems), Todd Ely (Jet Propulsion Laboratory), Marin Anderson (Jet Propulsion Laboratory), Joseph Lazio (Jet Propulsion Laboratory), Eric Burt (Jet Propulsion Laboratory), Geoffrey Bower (Academia Sinica Institute of Astronomy and Astrophysics)

9:00 AM

AAS-367 : EZIE CONSTELLATION CONTROL UTILIZING ATMOSPHERIC DIFFERENTIAL DRAG MANEUVERS

Kevin Bokelmann (The Johns Hopkins University Applied Physics Laboratory)

9:40 AM

AAS-433 : AUTONOMOUS LANDING SITE SELECTION OF A LUNAR LANDER

Michael Zepeda (Naval Postgraduate School), Mark Karpenko (Naval Postgraduate School)

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Morning Break

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AAS-121 : NEO Surveyor Trajectory Design and Launch Period Analysis

Thomas Pavlak (NASA / Caltech JPL), Mar Vaquero (Jet Propulsion Laboratory), Andrew Cox (Jet Propulsion Lab), Zubin Olikara (NASA Jet Propulsion Laboratory), David Garza (Jet Propulsion Laboratory)

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Matthew Gualdoni (NASA Johnson Space Center), Kari Ward (Missouri University of Science and Technology), Donald Kelly (Odyssey Space Research LLC), Greg Holt (NASA Johnson Space Center)

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AAS-233 : Applications of Signed Distance Fields to Spacecraft Trajectory Design

Jared Sikes (The University of Alabama), Rohan Sood (The University of Alabama)



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Asteroid, Earth and Planetary Missions II

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Session Chair: Matthew Shaw (Lockheed Martin Corporation)

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AAS-253 : Solar System Exploration using Articulating Sails

Darrel Conway (Thinking Systems, Inc.), Darren Garber (NXTRAC)

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AAS-257 : Orbiting Below the Brillouin Sphere using Translated Spherical Harmonics

David Cunningham (Space Trajectory Computation Lab, University of Texas), Ryan Russell (The University of Texas at Austin)

2:30 PM

AAS-320 : Assessment of Propellant Requirements for Proposed Fast Earth-Mars Round-Trip Trajectories

Jeremy Petersen (a.i. solutions), Kyle Hughes (NASA Goddard Space Flight Center), Dave Folta (NASA Goddard Space Flight Center), Matthew Vavrina (a.i. solutions), Azita Valinia (NASA Engineering & Safety Center)

2:50 PM

AAS-397 : 4th Body-Induced Secondary Resonance Overlapping Inside Unstable Resonant Orbit Families: a Jupiter-Ganymede 4:3 + Europa Case Study

Bhanu Kumar (Jet Propulsion Laboratory, California Institute of Technology), Rodney L. Anderson (Jet Propulsion Laboratory/Caltech), Rafael de la Llave (Georgia Institute of Technology)



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AAS-230 : Multi-Body Prescribed Spacecraft Dynamics Subject to Actuator Inputs

Leah Kiner (University of Colorado Boulder), Cody Allard (Laboratory for Atmospheric and Space Physics - CU Boulder), Hanspeter Schaub (CCAR (Colorado Center for Astrodynamics Research))

1:50 PM

AAS-261 : Representing the space environment in a star simulator testbed for CubeSat star trackers

Mikel Samson (arcsec NV), **Laila Kazemi** (arcsec space)

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AAS-391 : Multi-Agent Spacecraft Attitude Formation and Tracking Control Using Reshaping

Eric Butcher (University of Arizona), S. Mathavaraj (Indian Space Research Organization)

2:30 PM

AAS-192 : Effector Dynamics for Sequentially Rotating Rigid Body Spacecraft Components

João Vaz Carneiro (University of Colorado Boulder), Cody Allard (Laboratory for Atmospheric and Space Physics - CU Boulder), Hanspeter Schaub (CCAR (Colorado Center for Astrodynamics Research))

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AAS-357 : Inertial Reference Unit Performance Investigation: Insights Via Meta-Analyses Of Data-Mined Correlations

Martin Hasha (Lockheed Martin Space Company)



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AAS-144 : Experimental Demonstration of Output-Tube Model Predictive Control for Spacecraft Circumnavigation

Thomas Frekhaug (Universidad de Carlos III), Jennifer Hudson (Naval Postgraduate School), Manuel Sanjurjo-Rivo (Universidad Carlos III), MANUEL SOLER ARNEDO (UNIVERSITY CARLOS III MADRID), Marcello Romano (Naval Postgraduate School & Politecnico di Torino)

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AAS-149 : Autonomous Guidance Navigation and Control of the VISORS Formation-Flying Mission

Tommaso Guffanti (Stanford University), Toby Bell (Stanford University), Samuel Low (Stanford University), Mason Murray-Cooper (Stanford University), Simone D'Amico (Stanford University)

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AAS-301 : Passive Stabilization of Rotating Spacecraft Using Dynamic Fluid-Pressure Equilibrium

Matthew Wittal (National Aeronautics and Space Administration), Sara Tavárez-Garcia (Interamerican University of Puerto Rico)

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AAS-254 : The Evolution of Deep Space Navigation: 2018–2020

Lincoln Wood (Jet Propulsion Laboratory, Caltech)



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Machine Learning and Autonomy in Astrodynamics II Room: Jefferson, Tuesday, August 15, 1:30 PM : 3:10 PM Session Chair: Donald Ellison (JHU-APL)

1:30 PM

AAS-267 : Approximate Estimates of Orbit Transfer Cost for Efficient Mission Analysis and Design

Giulio Avanzini (Università del Salento), Francesco Marchetti (Strathclyde University), Edmondo Minisci, Danilo Zona (Università del Salento)

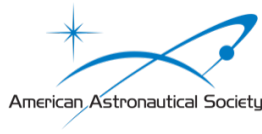
2:10 PM

AAS-463 : Crater Detection for Cislunar Autonomous Navigation through Convolutional Neural Networks

Tim Kilduff (UCSD), Pablo Machuca (MIT), Aaron Rosengren (UC San Diego)

2:30 PM

AAS-401 : Deep Reinforcement Learning for Station Keeping on Near Rectilinear Halo Orbits
Suda Takumi (Mitsubishi Electric Corporation), **Yuri Shimane** (Georgia Institute of Technology),
Purnanand Elango (University of Washington), Avishai Weiss (MERL)



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Dynamical Systems & Cislunar Astrodynamics II

Gallatin, Tuesday, August 15, 8:00 AM : 12:00 PM

Session Chair: Maaninee Gupta (Purdue University) and Brian McCarthy (a.i. solutions, Inc)

8:00 AM

AAS-159 : Gauss Equations for Local Action-Angle Orbital Elements in Cislunar Space

Luke Peterson (University of Colorado Boulder), Daniel Scheeres (University of Colorado Boulder)

8:20 AM

AAS-293 : Performance of an Vehicle Active Stabilization System during Touchdown in the Presence of Propellant Slosh Dynamics

Jing Pei (NASA Langley Research Center)

8:40 AM

AAS-466 : Loitering Strategies Leveraging Higher-Order Gravity Expansions for Lunar Surface Access

Mackenzie Mangette (The Pennsylvania State University), Roshan Thomas Eapen (The Pennsylvania State University)

9:00 AM

AAS-376 : Cislunar Eclipse Mitigation Strategies for Resonant Periodic Orbits

Maaninee Gupta (Purdue University), Kathleen C. Howell (Purdue University)

9:20 AM

AAS-268 : Baseline Orbit Generation for Near Rectilinear Halo Orbits

Emily Zimovan-Spreen (NASA Johnson Space Center), Stephen Scheuerle (Purdue University), Brian McCarthy (a.i. solutions, Inc), Diane Davis (NASA Johnson Space Center), Kathleen C. Howell (Purdue University)

9:40 AM

AAS-464 : A Generalized Condition for Symplectic Dynamics and the State Transition Matrix

Joseph Peterson (Texas A&M University), Manoranjan Majji (Texas A&M University, College Station), John L. Junkins (Texas A&M University)

10:00 AM

Morning Break

10:20 AM

AAS-116 : Construction and Analysis of "L1/L2 Cyclers" Orbits in the Earth-Moon System

Ricardo Gomez (Purdue University), Juan-Pablo Almanza-Soto (Purdue University), Kathleen C. Howell (Purdue University), Jonathan Aziz (The Aerospace Corporation)

10:40 AM

AAS-416 : Three-Burn Libration Point Capture for Smallsats Leveraging Moon-Bound Rideshare Opportunities

Chelsea Welch (Space Exploration Engineering), Mike Loucks (Space Exploration Engineering (SEE)), John Carrico (Space Exploration Engineering, LLC), Stephen West (Space Exploration Engineering)

11:00 AM

AAS-315 : Local Stability of Equilibria in the Circular-Restricted Full Three Body Problem

Brennan McCann (Embry-Riddle Aeronautical University), Annika Anderson (Embry-Riddle Aeronautical University), Morad Nazari (Embry-Riddle Aeronautical University), David Canales Garcia (Embry-Riddle Aeronautical University)

11:20 AM

AAS-238 : An Observational Approach To Low Lunar Frozen Orbit Design

Michael Mesarch (NASA Goddard Space Flight Center)

11:40 AM

AAS-242 : Orbital control strategy for a CubeSat satellite equipped with a solar sail for Earth-Mars communications during solar conjunctions

Leonor Cui Domingo Centeno (Complutense University of Madrid), Ariadna Farres (University of Maryland Baltimore County)



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Relative Motion II

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Eric Butcher (University of Arizona)

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AAS-161 : Validation of the Guidance, Navigation, and Control (GN&C) Architecture for RPO
Missions using Basilisk-cFS Architecture
Axel Garcia (Astroscale), Ryan Kramlich (Astroscale U.S.), Jack Huun (Astroscale), Arielle Cohen
(Astroscale), Tyler Gaston (Astroscale)

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AAS-179 : Nonlinear Coupled Orbital-Attitude Dynamics of Spacecraft Formation Flying Under the
Effect of Gravity Gradient Torque
Ayansola Ogundele (Kratos Defense and Security Solutions Inc.)

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Bryan Hoskins (U.S. Naval Research Laboratory)

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AAS-328 : Space-based Observer Image RPO Maneuver Detection using Deep Learning

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Samuel McConnell (Intuitive Machines)

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Thomas Lang (The Aerospace Corp)

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AAS-398 : A Multistep Probability of Collision Computational Algorithm

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Ryne Beeson (Princeton University)

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Gim Der (DerAstrodynamics)

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AAS-360 : Optimal Orbits for Imaging Supermassive Black Holes Using Space VLBI
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AAS-367 : EZIE CONSTELLATION CONTROL UTILIZING ATMOSPHERIC DIFFERENTIAL DRAG MANEUVERS
Kevin Bokelmann (The Johns Hopkins University Applied Physics Laboratory)

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AAS-433 : AUTONOMOUS LANDING SITE SELECTION OF A LUNAR LANDER
Michael Zepeda (Naval Postgraduate School), Mark Karpenko (Naval Postgraduate School)

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10:40 AM

AAS-112 : NEO Surveyor Mission Overview

Mar Vaquero (Jet Propulsion Laboratory), Andrew Cox (Jet Propulsion Lab), David Garza (Jet Propulsion Laboratory), Erica Jenson (NASA Jet Propulsion Laboratory), Tim McElrath (JPL/Caltech), Zubin Olikara (NASA Jet Propulsion Laboratory), Thomas Pavlak (NASA / Caltech JPL), Christopher Lawler (NASA Jet Propulsion Laboratory), Margaret Rybak (Jet Propulsion Laboratory)

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AAS-121 : NEO Surveyor Trajectory Design and Launch Period Analysis

Thomas Pavlak (NASA / Caltech JPL), Mar Vaquero (Jet Propulsion Laboratory), Andrew Cox (Jet Propulsion Lab), Zubin Olikara (NASA Jet Propulsion Laboratory), David Garza (Jet Propulsion Laboratory)

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AAS-330 : ORION ARTEMIS I (A-1) BEST ESTIMATED TRAJECTORY DEVELOPMENT

Matthew Gualdoni (NASA Johnson Space Center), Kari Ward (Missouri University of Science and Technology), Donald Kelly (Odyssey Space Research LLC), Greg Holt (NASA Johnson Space Center)

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AAS-233 : Applications of Signed Distance Fields to Spacecraft Trajectory Design

Jared Sikes (The University of Alabama), Rohan Sood (The University of Alabama)



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Darrel Conway (Thinking Systems, Inc.), Darren Garber (NXTRAC)

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AAS-257 : Orbiting Below the Brillouin Sphere using Translated Spherical Harmonics

David Cunningham (Space Trajectory Computation Lab, University of Texas), Ryan Russell (The University of Texas at Austin)

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AAS-320 : Assessment of Propellant Requirements for Proposed Fast Earth-Mars Round-Trip Trajectories

Jeremy Petersen (a.i. solutions), Kyle Hughes (NASA Goddard Space Flight Center), Dave Folta (NASA Goddard Space Flight Center), Matthew Vavrina (a.i. solutions), Azita Valinia (NASA Engineering & Safety Center)

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AAS-397 : 4th Body-Induced Secondary Resonance Overlapping Inside Unstable Resonant Orbit Families: a Jupiter-Ganymede 4:3 + Europa Case Study

Bhanu Kumar (Jet Propulsion Laboratory, California Institute of Technology), Rodney L. Anderson (Jet Propulsion Laboratory/Caltech), Rafael de la Llave (Georgia Institute of Technology)



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AAS-230 : Multi-Body Prescribed Spacecraft Dynamics Subject to Actuator Inputs

Leah Kiner (University of Colorado Boulder), Cody Allard (Laboratory for Atmospheric and Space Physics - CU Boulder), Hanspeter Schaub (CCAR (Colorado Center for Astrodynamics Research))

1:50 PM

AAS-261 : Representing the space environment in a star simulator testbed for CubeSat star trackers

Mikel Samson (arcsec NV), **Laila Kazemi** (arcsec space)

2:10 PM

AAS-391 : Multi-Agent Spacecraft Attitude Formation and Tracking Control Using Reshaping

Eric Butcher (University of Arizona), S. Mathavaraj (Indian Space Research Organization)

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AAS-192 : Effector Dynamics for Sequentially Rotating Rigid Body Spacecraft Components

João Vaz Carneiro (University of Colorado Boulder), Cody Allard (Laboratory for Atmospheric and Space Physics - CU Boulder), Hanspeter Schaub (CCAR (Colorado Center for Astrodynamics Research))

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AAS-357 : Inertial Reference Unit Performance Investigation: Insights Via Meta-Analyses Of Data-Mined Correlations

Martin Hasha (Lockheed Martin Space Company)



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Session Chair: Sandeep Singh (RPI)

1:30 PM

AAS-144 : Experimental Demonstration of Output-Tube Model Predictive Control for Spacecraft Circumnavigation

Thomas Frekhaug (Universidad de Carlos III), Jennifer Hudson (Naval Postgraduate School), Manuel Sanjurjo-Rivo (Universidad Carlos III), MANUEL SOLER ARNEDO (UNIVERSITY CARLOS III MADRID), Marcello Romano (Naval Postgraduate School & Politecnico di Torino)

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AAS-149 : Autonomous Guidance Navigation and Control of the VISORS Formation-Flying Mission

Tommaso Guffanti (Stanford University), Toby Bell (Stanford University), Samuel Low (Stanford University), Mason Murray-Cooper (Stanford University), Simone D'Amico (Stanford University)

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AAS-301 : Passive Stabilization of Rotating Spacecraft Using Dynamic Fluid-Pressure Equilibrium

Matthew Wittal (National Aeronautics and Space Administration), Sara Tavárez-Garcia (Interamerican University of Puerto Rico)

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AAS-254 : The Evolution of Deep Space Navigation: 2018–2020

Lincoln Wood (Jet Propulsion Laboratory, Caltech)



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AAS-267 : Approximate Estimates of Orbit Transfer Cost for Efficient Mission Analysis and Design

Giulio Avanzini (Università del Salento), Francesco Marchetti (Strathclyde University), Edmondo Minisci, Danilo Zona (Università del Salento)

2:10 PM

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Tim Kilduff (UCSD), Pablo Machuca (MIT), Aaron Rosengren (UC San Diego)

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AAS-401 : Deep Reinforcement Learning for Station Keeping on Near Rectilinear Halo Orbits
Suda Takumi (Mitsubishi Electric Corporation), **Yuri Shimane** (Georgia Institute of Technology),
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1:30 PM

AAS-144 : Experimental Demonstration of Output-Tube Model Predictive Control for Spacecraft Circumnavigation

Thomas Frekhaug (Universidad de Carlos III), Jennifer Hudson (Naval Postgraduate School), Manuel Sanjurjo-Rivo (Universidad Carlos III), MANUEL SOLER ARNEDO (UNIVERSITY CARLOS III MADRID), Marcello Romano (Naval Postgraduate School & Politecnico di Torino)

2:10 PM

AAS-149 : Autonomous Guidance Navigation and Control of the VISORS Formation-Flying Mission

Tommaso Guffanti (Stanford University), Toby Bell (Stanford University), Samuel Low (Stanford University), Mason Murray-Cooper (Stanford University), Simone D'Amico (Stanford University)

2:30 PM

AAS-301 : Passive Stabilization of Rotating Spacecraft Using Dynamic Fluid-Pressure Equilibrium

Matthew Wittal (National Aeronautics and Space Administration), Sara Tavárez-Garcia (Interamerican University of Puerto Rico)

2:50 PM

AAS-254 : The Evolution of Deep Space Navigation: 2018–2020

Lincoln Wood (Jet Propulsion Laboratory, Caltech)



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Technical Panel: Advances in Spacecraft GNC - 1

Room: Jefferson, Tue, August 15, 3:30 PM : 4:00 PM

Session Chair: Deep Parikh (Texas A&M)

Panelists:

A Control Framework for CubeSat Rendezvous and Proximity Operations using Electric Propulsion

Chun-Wei Kong University of Michigan

Rest-to-Rest Reachable Set Computation

Robyn Natherson University of Colorado, Boulder

Technical Panel: Advances in Spacecraft GNC - 2

Room: Jefferson, Tue, August 15, 4:00 PM : 4:30 PM

Session Chair: Deep Parikh (Texas A&M)

Panelists:

Estimation of inertial properties of a rigid structure maneuvered by satellite modules

Deep Parikh, Texas A&M University

Fault-Tolerant Feedback Control for Spacecraft Rendezvous using Semi-Markov Jump Model

Shaurya Shrivastava, Purdue University

Analytical Approach to Energy-Optimal Spacecraft Rendezvous with Thrust Saturation in the Presence of System Uncertainties

Seur Gi Jo Embry-Riddle Aeronautical University

Technical Panel: Advances in Trajectory Optimization - 1

Room: Jefferson, Tue, August 15, 4:30 PM : 5:00 PM

Session Chair: Deep Parikh (Texas A&M)

Panelists:

Costates Feedback Control for Mass-Optimal Low-Thrust Transfers

Yuri Shimane, Georgia Institute of Technology

Q-Law Control With Sun-Angle Constraint for Solar Electric Propulsion

Grant Hecht, University at Buffalo

Homogeneity-Leveraging for desensitization of trajectory optimization problems

Praveen Jawaharlal Ayyanathan, Auburn University

Technical Panel: Advances in Trajectory Optimization - 2

Room: Jefferson, Tue, August 15, 5:00 PM : 5:30 PM

Session Chair: Deep Parikh (Texas A&M)

Panelists:

Preliminary Sequencing Strategy for Synergetic Gravity-Assist Missions

Ghanghoun Paik, Pennsylvania State University

Lissajous Orbit Selection Strategies as a Secondary Payload; the Space Weather Follow On-1 Mission

Ariadna Farres, University of Maryland Baltimore County



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Technical Panel: Space environment: Impact and Estimation

Room: Gallatin, Tue, August 15, 3:30 PM : 4:00 PM

Session Chair: Kwonhee Lee (Georgia Institute of Technology)

Panelists:

Global Thermospheric Density Prediction Model Based on Deep Evidential Framework

Wang Yiran, Rutgers University

A Further Look at Density and Accommodation Coefficient Estimation Using a Paddlewheel Cubesat

Craig McLaughlin University of Kansas

Space Weather Influences on Decision-Making for Satellite Collision Avoidance

William Parker, Massachusetts Institute of Technology

Technical Panel: Advances in SDA-1

Room: Gallatin, Tue, August 15, 4:00 PM : 4:30 PM

Session Chair: Kwonhee Lee (Georgia Institute of Technology)

Panelists:

Admissible Region Splitting for Multi-Fidelity Orbit Propagation

Brandon Jones, The University of Texas at Austin

MCMC EnGMF for Sparse Data Orbit Determination

Dalton Durant, The University of Texas at Austin

Technical Panel: Advances in IOD

Room: Gallatin, Tue, August 15, 4:30 PM : 5:00 PM

Session Chair: Kwonhee Lee (Georgia Institute of Technology)

Panelists:

State estimation with angle-only observations in cislunar space via physics-informed neural network

Andrea D'Ambrosio, The University of Arizona

Initial Orbit Determination Using Relative Position Measurements

Sebastien Henry, Georgia Institute of Technology

The Three-Vector Solution to Lambert's Problem

Luke Schaeckenbach, Iowa State University

Technical Panel: Advances in SDA-2

Room: Gallatin, Tue, August 15, 5:00 PM : 5:30 PM

Session Chair: Kwonhee Lee (Georgia Institute of Technology)

Panelists:

Partitioned Extent Tracking of Clusters Following an Orbital Breakup Event

Melissa Adams, UMD College Park

Using Clock Frequency Comparison for Complementing the Deep Space Network for Deep Space Navigation

Kwonhee Lee, Georgia Institute of Technology

Autonomous Cislunar Navigation using a Visual Direction of Motion Measurement and a Gaussian Mixture Model Filter Matthew Givens, CU Boulder



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Technical Panel: Trends in Dynamic Optimization - 1

Room: Madison, Tue, August 15, 3:30 PM : 4:00 PM

Session Chair: David Arnas Martinez (Purdue University)

Panelists:

Estimating Stochastic Processes in an Imperfect, Incomplete Orbital Pursuer-Evader Game

Stephanie Halsey, AFIT

Comparison of Direct and Indirect Methods for Low-Thrust Trajectory Optimization with Multi-Mode Propulsion Systems

Keziban Saloglu, Auburn University

Amortized Global Search for Efficient Preliminary Trajectory Design with Deep Generative Models

Anjian Li, Princeton University

Technical Panel: Trends in Dynamic Optimization - 2

Room: Madison, Tue, August 15, 4:00 PM : 4:30 PM

Session Chair: David Arnas Martinez (Purdue University)

Panelists:

A Higher-Order Differential Correction Scheme for the Two-Point Boundary Value Problem

Sharad Sharan, Pennsylvania State University

Investigation of Interplanetary Trajectories to Sedna

Sam Brickley, University of Tennessee, Knoxville

Technical Panel: Advances in Trajectory Optimization - 3

Room: Madison, Tue, August 15, 4:30 PM : 5:00 PM

Session Chair: David Arnas Martinez (Purdue University)

Panelists:

A Bayesian Optimization-based Framework for Feature Detection of an Unknown, Non-cooperative and Dynamic Space Object

Rabiul Hasan Kabir, Rutgers University

Improvements to MIT's Source-Sink Evolutionary Model: Validating Model Predictions with ESA's DELTA

Celina Pasiecznik, Massachusetts Institute of Technology

Cislunar Periodic Disposal Orbits: Preliminary Operational Analysis

Ryan Sargent, AFIT

Technical Panel: Advances in Trajectory Optimization - 4

Room: Madison, Tue, August 15, 5:00 PM : 5:30 PM

Session Chair: David Arnas Martinez (Purdue University)

Panelists:

Particle Swarm Optimization applied to trajectory design for Earth to Mars Missions using refueling ISRU candidate Asteroids

Davide Conte, Embry-Riddle Aeronautical University

Aerothermodynamic Heating Analysis of Aerogravity Assist Maneuvers at Venus

Divinaa Burder, University of Colorado-Boulder

On the infinite number of symmetric paths connecting satellite constellations

David Arnas Martinez, Purdue University



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Invited Special Session: 50 Years of Halo Orbits

Room: Amphitheatre, Tuesday, August 15, 3:30 PM : 5:30 PM

Session Chair: Diane Davis (NASA-JSC) and David Dunham (KinetX)

3:30 PM

AAS-347 : Fiftieth Anniversary of the Halo Orbits Founding Publication

David Dunham (KinetX), Kathleen C. Howell (Purdue), Ali Kamel (Kamel Engg), David Richardson (University of Cincinnati)

4:00 PM

AAS-244 : Evolution of Astrodynamics for Multibody Environments, Numerical Precision and Dynamical Understanding

David Folta (NASA GSFC), Kathleen C. Howell (Purdue)

4:30 PM

AAS-148 : Quasi-Periodic Near-Rectilinear Halo Orbits for Enceladus Jet Targeting

Jared Blanchard (Stanford), Sara Tavárez-Garcia (Interamerican University of Puerto Rico)

4:50 PM

AAS-311 : Jettison and Disposal from Near Rectilinear Halo Orbits Part 1: Theory

Stephen Scheuerle (Purdue), Diane Davis (NASA-JSC), Emily Zimovan-Spreen (NASA-JSC), Brian McCarthy (a.i. solutions), Kathleen C. Howell (Purdue)

5:10 PM

AAS-306 : Jettison and Disposal from Near Rectilinear Halo Orbits Part 2: Applications

Diane Davis (Purdue), Stephen Scheuerle (Purdue), Steven McCarty (NASA-Glenn), Emily Zimovan-Spreen (NASA-JSC), Melissa McGuire (NASA-GRC), Kathleen C. Howell (Purdue)



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Dynamical Systems & Cislunar Astrodynamics III

Gallatin, Wednesday, August 16, 8:00 AM : 12:00 PM

Session Chair: Jennifer Hudson (NPS) and Rolfe Power (Purdue University)

8:00 AM

AAS-234 : Long-Term Orbit Operations For The Lunar Reconnaissance Orbiter

Michael Mesarch (NASA Goddard Space Flight Center)

8:20 AM

AAS-392 : Segmented Fitting Representations of Cislunar Navigation Satellite Constellation

Hao Peng (Embry-Riddle Aeronautical University), Xiaoli Bai (Rutgers)

8:40 AM

AAS-119 : There and Back Again: Reliable, Repeatable Cislunar Transits Using 2:1-Resonant Spatial Orbits

Andrew Binder (Purdue University), David Arnas Martinez (Purdue University)

9:00 AM

AAS-142 : Clustering Approach To Identifying Low Lunar Frozen Orbits In A High-Fidelity Model

Giuliana Elena Miceli (University of Colorado Boulder), Natasha Bosanac (University of Colorado, Boulder), Michael Mesarch (NASA Goddard Space Flight Center), Dave Folta (NASA Goddard Space Flight Center), Rebecca Mesarch (NASA Goddard Space Flight Center)

9:20 AM

AAS-107 : Data-Driven Summary of Natural Spacecraft Trajectories in the Earth-Moon System

Natasha Bosanac (University of Colorado, Boulder)

9:40 AM

AAS-413 : Navigation Strategy, Preparations, and Results for the LunaH-Map Lunar CubeSat Mission

Derek Nelson (KinetX, Inc.), John Pelgrift (KinetX, Inc.), Carly VeNard (KinetX, Inc.), Jeremy Knittel (KinetX Aerospace, Inc.), Andrew Levine (KinetX, Inc.), Daniel Wibben (KinetX, Inc.), Peter Antreasian (KinetX Aerospace), Jason Leonard (KinetX), Jeroen Geeraert (KinetX), Michael Salinas (KinetX Aerospace), David Dunham (KinetX, Inc.), Michael Corvin (KinetX, Inc.), Dale Stanbridge (KinetX Aerospace), Eric Carranza (Johns Hopkins University Applied Physics Laboratory), Winston Price (KinetX, Inc.), Peter Wolff (KinetX Aerospace, Inc.), Kenneth Williams (KinetX Aerospace (KinetX, Inc.)), Bobby G. Williams (KinetX, Inc.), Craig Hardgrove (Arizona State University)

10:00 AM

Morning Break

10:20 AM

AAS-276 : Dynamical Analysis of a Target Marker in a Microgravity Environment

Tetsuya Kusumoto (Graduate School of Engineering, The University of Tokyo), Shun Yasuda (Aoyama Gakuin University), Yoshiki Sugawara (Aoyama Gakuin University), Osamu Mori (Japan Aerospace Exploration Agency)

10:40 AM

AAS-428 : Attitude Prediction in a Near-Rectilinear Halo Orbit Within the Geometric Mechanics Framework

Annika Anderson (Embry-Riddle Aeronautical University), Brennan McCann (Embry-Riddle Aeronautical University), David Canales Garcia (Embry-Riddle Aeronautical University), Morad Nazari (Embry-Riddle Aeronautical University)

11:00 AM

AAS-468 : A Survey of Earth-Moon and Sun-Earth Three-Body Orbit Family Visibility Metrics Using Ground-Based Tracking Networks

Matthew Bolliger (Advanced Space), Michael Thompson (The Aerospace Corporation)

11:20 AM

AAS-214 : Meta-Reinforcement Learning for Adaptive Station-Keeping in Cislunar Periodic Orbits

Carlo La Pegna (Sapienza University of Rome), **Lorenzo Federici** (The University of Arizona), Alessandro Zavoli (Sapienza - University of Rome), Roberto Furfaro (The University of Arizona)

11:40 AM

AAS-490 : Data-Driven Modeling for Navigation in Cislunar Space

Matthew Brownell (The Pennsylvania State University), Roshan Thomas Eapen (The Pennsylvania State University), Puneet Singla (The Pennsylvania State University), Mackenzie Mangette (The Pennsylvania State University)



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Relative Motion III

Room: Amphitheater, Tuesday, August 15, 8:00 AM : 12:00 PM

Session Chair: Kevin Bokelmann (JHU-APL) and Jason Leonard (KinetX)

8:00 AM

AAS-455 : The Impact of Satellite Constellations on Solar System Science from ground-based astronomical surveys

Sanjana Srivastava (UIUC), Samuel Cornwall (UIUC), Michelle Zosky (UIUC), David Garcia (UIUC), Michael Lembeck (UIUC), Siegfried Eggl (UIUC)

8:20 AM

AAS-469 : Source Sink Evolutionary Model of MEO

Julia Pasiecznik (Massachusetts Institute of Technology), Celina Pasiecznik (Massachusetts Institute of Technology), Richard Linares (Massachusetts Institute of Technology)

8:40 AM

AAS-281 : Convex Optimization-Based Model Predictive Control for the Guidance of Active Debris Removal Transfers

Minduli Charithma Wijayatunga (University of Auckland), Roberto Armellin (The University of Auckland), Harry Holt (University of Auckland), Laura Pirovano (University of Auckland), Claudio Bombardelli (Technical University of Madrid (UPM))

9:00 AM

AAS-124 : A Multi-Layer Temporal Network Model of the Space Environment

Yirui Wang (University of Strathclyde), Massimiliano Vasile (University of Strathclyde, Department of Mechanical & Aerospace Engineering)

9:20 AM

AAS-215 : Numerically Efficient Low-thrust Fuel-Optimal Collision Avoidance Maneuvres With Tangential Firing

Andrea De Vittori (Politecnico di Milano), Matteo Omodei (Politecnico di Milano), Pierluigi Di Lizia (Politecnico di Milano), Roberto Armellin (The University of Auckland)

9:40 AM

AAS-473 : CHANGING PERIAPSIS OF FORMATION FLYING SPACECRAFT USING ATMOSPHERIC DRAG AND SOLAR RADIATION

Disip Chaturvedi (University of Colorado Boulder), Jay McMahon (CCAR (Colorado Center for Astrodynamics Research))

10:00 AM

Morning Break

10:20 AM

AAS-212 : Operationally-Constrained Low-Thrust Trajectory Design For Variable-Isp Variable-Thrust Engines

Nicholas Nurre (Auburn University), Ehsan Taheri (Auburn University)

10:40 AM

AAS-140 : Searcher: An economical spacecraft to locate asteroids trapped in the Earth Orbital Arc

Andrew Turner (Maxar)

11:00 AM

AAS-213 : Reduced Mutual Potential for Spacecraft Dynamic Analysis near Small Bodies

Jinah Lee (Yonsei university), Chandeok Park (Yonsei University)



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Space Domain Awareness III

Room: Madison, Wednesday, August 16, 8:00 AM : 12:00 PM

Session Chair: Brian Gunter (Georgia Tech.)

8:00 AM

AAS-247 : LUCY ORBIT DETERMINATION PERFORMANCE FROM LAUNCH THROUGH EGA-1

Jeroen Geeraert (KinetX), Joel Fischetti (KinetX Aerospace), Dale Stanbridge (KinetX Aerospace), Coralie Adam (KinetX, Inc.), Kevin Berry (NASA Goddard Space Flight Center)

8:20 AM

AAS-294 : Metric Tracking Data Analysis – Diagnosing Anomalies In Tracking Data For Improved Orbit Determination & Ground Station Performance: Case Studies from Three Lunar Missions

David Shteinman (Industrial Sciences Group)

8:40 AM

AAS-303 : Multifidelity orbit uncertainty propagation in the presence of process noise

Alberto Fossà (Institut Supérieur de l'Aéronautique et de l'Espace (ISAE-SUPAERO)), Roberto Armellini (The University of Auckland), Emmanuel Delande (Centre National d'Études Spatiales), Francesco SANFEDINO (ISAE SUPAERO)

9:00 AM

AAS-312 : James Webb Space Telescope Navigation Optimization Challenges

James Logan (Omitron Inc.)

9:40 AM

AAS-344 : Validation of GTDS and DSST Standalone Versions against Precise Orbit Ephemerides

Paul J. Cefola (University at Buffalo (SUNY)), Rosario López (University of La Rioja), Juan Félix San-Juan (University of La Rioja), Bryan Cazabonne (Airbus Defence and Space), Srinivas Setty (GMV GmbH), David Vallado (Commercial Space Operations Center)

10:00 AM

Morning Break

10:20 AM

AAS-379 : Precise Near-Earth Asteroid Orbits from Occultation Observations for Flyby Missions

David Dunham (KinetX, Inc.), Fumi Yoshida (Univ. of Occupational and Environmental Health), Tsutomu Hayamizu (Saga Hoshizora Astronomy Center), Joan Dunham (retired), Roger Venable (International Occultation Timing Association), Steve Chesley, Davide Farnocchia, Dave Herald (Trans-Tasman Occultation Alliance), Steve Preston (International Occultation Timing Association)

10:40 AM

AAS-384 : CAPSTONE Off-Nominal Spin-Stabilized Orbit Determination

Michael Thompson (The Aerospace Corporation), **Connor Ott** (Advanced Space), Jeff Parker (Advanced Space, LLC)



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Trajectory, Mission, and Maneuver Design and Optimization III

Room: Jefferson, Wednesday, August 16, 8:00 AM : 12:00 PM

Session Chair: James Thorne (Jet Propulsion Laboratory)

8:00 AM

AAS-128 : Copernicus-LinCov (CopCov) Software Integration in Support of Robust Trajectory Optimization

Joshua Geiser (NASA Johnson Space Center), David Woffinden (NASA Johnson Space Center), Matthew Horstman (Barrios Technology)

8:20 AM

AAS-129 : Artemis I Off-Nominal Trajectory Design

Robert Harpold (Jacobs Technology Engineering Research and Consulting), **Colin Brown** (Barrios Technology), Brian Killeen (NASA/Johnson Space Center), Randy Eckman (NASA Johnson Space Center), Tim Dawn (NASA), Badejo Adebajo (Jacobs (ESSSA)/NASA), Jacob Williams (NASA Johnson Space Center)

8:40 AM

AAS-133 : Hessian-Accelerated, Regularized Direct Method for Impulsive Trajectory Optimization

Kenta Oshima (Hiroshima Institute of Technology)

9:00 AM

AAS-217 : Low-Thrust Automated Asteroid Tour Trajectory Design via Dynamic Programming

Jose Carlos Garcia Mateas (ISAE-SUPAERO), Joan-Pau Sanchez (ISAE-Supaero)

9:20 AM

AAS-221 : Bind: A Robust Framework for Indirect Optimization of Many-Revolution Low-Thrust Transfers

Ian Elliott (Blue Origin), David Gardiner (Blue Origin), Martin Ozimek (The Johns Hopkins University Applied Physics Laboratory)

9:40 AM

AAS-222 : Low-Thrust Many-Revolution Trajectory Design Under Operational Uncertainties for DESTINY+ Mission

Naoya Ozaki (ISAS, JAXA), Yuki Akiyama (Japan Aerospace Exploration Agency), Akira Hatakeyama (Waseda University), Shota Ito (Tokyo Metropolitan University), Takuya Chikazawa (University of Tokyo), Takayuki Yamamoto (Japan Aerospace Exploration Agency)

10:00 AM

Morning Break

10:20 AM

AAS-239 : Europa Clipper Tour Trajectory Navigation Analysis - Mitigating the Effects of Unintended ΔV Due to Safe Mode

Andrew French (Jet Propulsion Laboratory), **Dylan Boone** (Jet Propulsion Laboratory / California Institute of Technology), Brian Young (Jet Propulsion Laboratory, California Institute of Technology.), Stefano Campagnola (Jet Propulsion Laboratory)

10:40 AM

AAS-241 : A History of Orion Mission Design, Copernicus Software Development, and the Artemis I Trajectory

Jacob Williams (NASA Johnson Space Center), Tim Dawn (NASA), Amelia Batcha (NASA Johnson Space Center)

11:00 AM

AAS-250 : A Tale of Two Indirect Multi-Stage Algorithms

Prashant Patel (Institute for Defense Analyses), Daniel Scheeres (University of Colorado Boulder)

11:20 AM

AAS-252 : A NEW ARCHITECTURE FOR PARALLELIZATION OF COMPLEX SPACECRAFT TRAJECTORY OPTIMIZATION SCANS

Quentin Moore (Odyssey Space Research), Jacob Williams (NASA Johnson Space Center), Brian Killeen (NASA/Johnson Space Center)

11:40 AM

AAS-263 : A SINGULAR PERTURBATION APPROACH TO THE LOW THRUST LAMBERT'S PROBLEM

Giulio Avanzini (Università del Salento), Danilo Zona (Università del Salento), Joan-Pau Sanchez (ISAE-Supaero), Jose Carlos Garcia Mateas (ISAE-SUPAERO)



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Asteroid, Earth and Planetary Missions III

Room: Amphitheater, Wednesday, August 16, 1:30 PM : 3:10 PM

Session Chair: Jennifer Hudson (NPS)

1:30 PM

AAS-211 : Rapid Response Missions to Interstellar Objects using Lyapunov Wait-in-Orbit Constellations

Anabel Soria Carro (The University of Texas Austin), Sonia Hernandez (Continuum Space Systems), Maruthi R. Akella (The University of Texas at Austin)

1:50 PM

AAS-235 : Independent Verification and Validation Orbit Determination for the Artemis I Mission

Sarah Elizabeth McCandless (Jet Propulsion Laboratory), Sumita Nandi (NASA / Caltech JPL), Tomas Martin-Mur (NASA / Caltech JPL)

2:10 PM

AAS-395 : LOW-THRUST TRAJECTORY OPTIMIZATION FOR ENCELADUS EXPLORATION USING INDIRECT FORWARD-BACKWARD SHOOTING

Yanis Sidhoum (Purdue University), Kenshiro Oguri (Purdue University)

2:30 PM

AAS-485 : Europa Clipper Interplanetary Trajectory Navigation Analysis : General Results and Planetary Protection Strategy

Troy Goodson (NASA / Caltech / JPL), Dylan Boone (Jet Propulsion Laboratory / California Institute of Technology), Yungsun Hahn (Jet Propulsion Laboratory), Mau C. Wong (JPL)

2:50 PM

AAS-245 : Europa Clipper Tour Trajectory Navigation Analysis - Baseline Strategy and Selected Sensitivity Results

Dylan Boone (Jet Propulsion Laboratory / California Institute of Technology), Stefano Campagnola (Jet Propulsion Laboratory), Andrew French (Jet Propulsion Laboratory), Sarah Elizabeth McCandless (Jet Propulsion Laboratory), Troy Goodson (NASA / Caltech / JPL), Brian Young (Jet Propulsion Laboratory, California Institute of Technology.)



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Attitude Dynamics, Determination and Control III Room: Madison, Wednesday, August 16, 1:30 PM : 3:10 PM Session Chair: Gregory Lantoine (JPL)

1:30 PM

AAS-434 : Achieving Solar Pressure Equilibrium Attitude using Solar Array Feathering

Benjamin Asher (Aegis Aerospace), Matthew Wittal (National Aeronautics and Space Administration)

1:50 PM

AAS-435 : A METHOD TO SPEED UP CONVERGENCE OF ITERATIVE LEARNING CONTROL FOR HIGH PRECISION REPETITIVE MOTIONS

Richard Longman (Columbia University), **Shuo Liu** (Boston University), Tarek Elsharhawy (Cal Poly Pomona)

2:30 PM

AAS-421 : Lunar Reflectance Modeling for Terrain Relative Navigation

Carl De Vries (Georgia Institute of Technology), **John Christian** (Georgia Institute of Technology)

2:50 PM

AAS-339 : Generalized Sloshing Equations of Motion for Any Equivalent Mechanical Model on TSE(3)

Marco Fagetti (Embry-Riddle Aeronautical University), Brennan McCann (Embry-Riddle Aeronautical University), Morad Nazari (Embry-Riddle Aeronautical University), Matthew Wittal (National Aeronautics and Space Administration), Michael Elmore (a.i. solutions), Jeffrey Smith (Gateway Logistics Element, NASA Kennedy Space Center)



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Guidance, Navigation and Control III

Room: Gallatin, Tuesday, August 15, 1:30 PM : 3:10 PM

Session Chair: Mar Vaquero (JPL)

1:30 PM

AAS-332 : From Freefall to Controlled Descent: Dragonfly's Transition to Powered Flight

Connor Boss (Johns Hopkins University Applied Physics Lab), Lev Rodovskiy (JHU/APL)

1:50 PM

AAS-196 : Overview and Control Performance of the Dragonfly Flight Test Platform

Rebecca Foust (Johns Hopkins University Applied Physics Laboratory), Jinho Kim (Johns Hopkins Applied Physics Laboratory), Lev Rodovskiy (JHU/APL), John Samscock (JHU/APL), Jason Stipes (JHU/APL), Connor Boss (Johns Hopkins University Applied Physics Lab), David Edell (JHU/APL), Ben Schilling (Johns Hopkins Applied Physics Laboratory), Erin Sutton (Johns Hopkins University Applied Physics Laboratory), Glenn Creamer (JHU/APL), Timothy McGee (Point Mass Technologies LLC), Stephen Jenkins (Johns Hopkins University Applied Physics Lab), Benjamin Villac (Johns Hopkins University Applied Physics Laboratory)

2:10 PM

AAS-139 : Initial Flight Test Performance of the Dragonfly Navigation Filter

Ben Schilling (Johns Hopkins Applied Physics Laboratory), Rebecca Foust (Johns Hopkins University Applied Physics Laboratory), Jinho Kim (Johns Hopkins Applied Physics Laboratory), Timothy McGee (Point Mass Technologies LLC), Connor Boss (Johns Hopkins University Applied Physics Lab)

2:30 PM

AAS-175 : Sequential Filtering in the Presence of Uniform Measurement Errors

James McCabe (NASA Johnson Space Center)

2:50 PM

AAS-260 : A Delicate Balance of Torque and Thrust: How Lunar FLashlight Used Rotating Maneuvers to Make One Thruster do the Work of Four

Tim McElrath (JPL/Caltech), Steven Collins (NASA Jet Propulsion Laboratory), Kevin Lo (NASA Jet Propulsion Laboratory), Celeste Smith (JPL/Caltech), Nathan Cheek (JPL/Caltech), Michael Hauge (JPL/Caltech)



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Machine Learning and Autonomy in Astrodynamics III

Room: Jefferson, Wednesday, August 16, 1:30 PM : 3:10 PM

Session Chair: Kanak Parmar (Auburn University)

1:30 PM

AAS-284 : A Bayesian Optimization-based Approach for Feature Detection of an Unknown, Non-cooperative, and Static Space Object

Rabiul Hasan Kabir (Rutgers University), Xiaoli Bai (Rutgers)

2:10 PM

AAS-394 : Satellite Reorientation using Reinforcement Learning without Attitude Awareness: Internal Control Torques Case

Hao Peng (Embry-Riddle Aeronautical University), Xiaoli Bai (Rutgers)

2:30 PM

AAS-405 : Leveraging Camera Attitude Priors for Structure from Motion of Small, Noncooperative Targets

Kaitlin Dennison (Stanford University Space Rendezvous Laboratory), Simone D'Amico (Stanford University)

2:50 PM

AAS-422 : AI-based LiDAR / camera data fusion to enable high-resolution 3D surface reconstruction for autonomous asteroid exploration mission

Alexander Liesch (Technische Universität Dresden), Patrick Suwinski (Institute of Automation, Technische Universität Dresden, Germany), Bangshang Liu (Institute of Automation, Technische Universität Dresden, Germany), Valerij Chernykh (Institute of Automation, Technische Universität Dresden, Germany), Klaus Janschek (Institute of Automation, Technische Universität Dresden, Germany)



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Technical Panel: Advances in Cislunar SDA

Room: Gallatin, Wednesday, August 16, 3:30 PM : 4:00 PM

Session Chair: David Schwab (Penn State)

Panelists:

Optimization Framework for Space-based Multi-Sensor Systems in Cislunar Space Domain Awareness

Henry Claerson, West Virginia University

Cislunar Satellite Constellation Design Via Integer Linear Programming

Malav Patel, Georgia Institute of Technology

Technical Panel: Advances in SDA-3

Room: Gallatin, Wednesday, August 16, 4:00 PM : 4:30 PM

Session Chair: David Schwab (Penn State)

Data-Driven Categorization of Spacecraft Motion with Uncertainty in the Earth-Moon System

Renee Spear, University of Colorado - Boulder

Validation of a Simulation Environment for Future Space Traffic Management

Alaric Gregoire, Georgia Institute of Technology

Technical Panel: In-space Operations

Room: Gallatin, Wednesday, August 16, 4:30 PM : 5:00 PM

Session Chair: David Schwab (Penn State)

A Computationally Efficient Approach to Reachability Analysis of Multibody Systems

Nate Osikowicz, Pennsylvania State University

Development of a 12 Degrees-of-Freedom Robotic Testbed for Experimental Analysis of In-Space Missions

Anirudh Chhabra, University of Cincinnati

Propagation of periodic and quasiperiodic orbits using the harmonic balance method

Nicolas LECLERE, Uliege

Technical Panel: Advances in SDA-4

Room: Gallatin, Wednesday, August 16, 5:00 PM : 5:30 PM

Session Chair: David Schwab (Penn State)

Application of Radial Basis Function approximation for orbital uncertainty propagation in Astrodynamics

Pugazhenth Sivasankar, University of Central Florida

Advantages of using sigma point orbit estimation filtering via multiple space-based observers

James Hippelheuser, University of Central Florida

Cislunar Semi-Analytical Uncertainty Propagation for Conjunction Analysis

Yashica Khatri, University of Colorado Boulder



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Technical Panel: Elements of Formation Flying -1

Room: Madison, Wednesday, August 16, 3:30 PM : 4:00 PM

Session Chair: Roshan Eapen (Penn State)

Comparing the Effectiveness of Agility and Reconfigurability in Earth Observation Satellite Systems for Disaster Response

Brycen Pearl, West Virginia University

A Table-Top Game to Simulate Competition Between P-LEO Satellite Internet Constellations

Rehman Qureshi, Auburn University

Optimization of Early-Phase Cislunar Navigation Constellations for Users Near the Lunar South Pole

Mark Hartigan, Georgia Institute of Technology

Technical Panel: Elements of Formation Flying - 2

Room: Madison, Wednesday, August 16, 4:00 PM : 4:30 PM

Session Chair: Roshan Eapen (Penn State)

An Analysis of Orbital Separation Distances to Support Space Traffic Management

Giovanni Lavezzi, Massachusetts Institute of Technology

WITHDRAWN Fault-Tolerant Control of Spacecraft Formation Flying using Nonlinear Model Predictive Control

Edison Yang, Santa Clara University

Technical Panel: Advances in Spacecraft GNC - 3

Room: Madison, Wednesday, August 16, 4:30 PM : 5:00 PM

Session Chair: Roshan Eapen (Penn State)

Energy-optimal Trajectory Planning for Close-range Concurrent Rendezvous and Synchronization

Jun Yang Li, University of Toronto

Closed-Form Optimal Propulsive-Differential Drag Control for Large Reconfigurations of Spacecraft Swarms

Matthew Hunter, Stanford University

Technical Panel: Advances in Spacecraft GNC - 4

Room: Madison, Wednesday, August 16, 5:00 PM : 5:30 PM

Session Chair: Roshan Eapen (Penn State)

A Relative Motion Model for Periodic Thrust

Philip Hittepole, Western Michigan University

Post-Docking Complex Spacecraft Dynamics Using Baumgarte Stabilization

Andrew Morell, University of Colorado Boulder

A Case Study on Gravitational Orbit-Attitude Coupling of Spacecraft near Small Bodies

David Hadley, Syracuse University



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Technical Panel: Advances in Spacecraft GNC-5

Room: Jefferson, Wednesday, August 16, 3:30 PM : 4:00 PM

Session Chair: Kenshiro Oguri (Purdue)

Feedback Control Methods on Short-Period Orbits of the Earth-Moon Equilateral Libration Points

Luis Mendoza Zambrano, Embry-Riddle Aeronautical University

Utilizing Optimal Bi-Impulse Orbit Transfers to Realize Continuous Thrust Maneuvers

James McElreath, Texas A&M University

Technical Panel: Advanced Trajectory Optimization Tools and Methods - 1

Room: Jefferson, Wednesday, August 16, 4:00 PM : 4:30 PM

Session Chair: Kenshiro Oguri (Purdue)

Design of a Flexible Optimal Trajectory Definition Tool for a Multi-Payload Multi-Orbit Injection Mission

Iñigo Alforja Ruiz, Politecnico di Milano

Enhancements to the Astrodynamics Software and Science Enabling Toolkit (ASSET)

James Pezent, The University of Alabama

Technical Panel: Advanced Trajectory Optimization Tools and Methods - 2

Room: Jefferson, Wednesday, August 16, 4:30 PM : 5:00 PM

Session Chair: Kenshiro Oguri (Purdue)

Rapid Trajectory Design in Multi-Body Systems Using Sampling-Based Kinodynamic Planning

Kristen Bruchko, University of Colorado, Boulder

Methods for Dual-Objective High-Energy Tour Design

Yuri Shimane, Georgia Institute of Technology

Adaptive-Mesh Sequential Convex Programming for Space Trajectory Optimization

Naoya Kumagai, Purdue University

Technical Panel: Advances in Trajectory Optimization-5

Room: Jefferson, Wednesday, August 16, 5:00 PM : 5:30 PM

Session Chair: Kenshiro Oguri (Purdue)

Hidden Genes Genetic Algorithm and Resonance Operator in Moon Tour Design Optimization

Jacob Englander, Johns Hopkins Applied Physics Laboratory

On Robust Low Thrust Trajectories and Invariant Manifolds

Amlan Sinha, Princeton University



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Technical Panel: Aero-Assisted Mechanics and Control

Room: Amphitheatre, Wednesday, August 16, 3:30 PM : 4:00 PM

Session Chair: Ian Down (Texas A&M)

Panelist:

Advanced Guidance Design via Successive Convex Optimization for the 6-DoF Atmospheric Re-entry of Reusable Launchers

Alice De Oliveira, Politecnico di Milano

Technical Panel: Advances in Dynamical Systems - 1

Room: Amphitheatre, Wednesday, August 16, 4:00 PM : 4:30 PM

Session Chair: Ian Down (Texas A&M)

Panelists:

Leveraging the Elliptic Restricted Three-Body Problem for Characterization of Multi-Year Earth-Moon L2 Halos in an Ephemeris Model

Beom Park, Purdue

On-Manifold Pose Optimization on SE(3) for Spacecraft Coverage Maximization

Brennan McCann, Embry-Riddle Aeronautical University

Translunar Logistics With Low-Energy Transfers

Nicholas Gollins, Georgia Institute of Technology

Technical Panel: Advances in Trajectory Optimization - 6

Room: Amphitheatre, Wednesday, August 16, 4:30 PM : 5:00 PM

Session Chair: Ian Down (Texas A&M)

Panelists:

Solution of the Perturbed Lambert's Problem Using the Theory of Functional Connections

Franco Criscola, Embry-Riddle Aeronautical University

Vector thrust Control of an Upper-stage rocket with partially filled fuel tanks via Takagi- Sugeno Fuzzy model

Aaron Inks, University of Alaska Anchorage

Leveraging the ground-track resonance capture and escape for precise and efficient orbital transfers

Wail Boumchita, University of Strathclyde



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Dynamical Systems & Cislunar Astrodynamics IV

Gallatin, Thursday, August 17, 8:00 AM : 12:00 PM

Session Chair: Davide Guzzetti (Auburn) and Juan Ojeda Romero (JHU-APL)

8:00 AM

AAS-131 : Orbit Maintenance via Homeomorphic, Periodic Orbit Revs in the Elliptic Restricted Three Body Problem

Kevin Alvarado (Rensselaer Polytechnic Institute), Sandeep Singh (Rensselaer Polytechnic Institute)

8:20 AM

AAS-271 : Sensitivity Analysis of Separation Time along Weak Stability Boundary Transfers

Isabel Nolton (Georgia Institute of Technology), Kento Tomita (Georgia Institute of Technology), Yuri Shimane (Georgia Institute of Technology), Koki Ho (Georgia Institute of Technology)

8:40 AM

AAS-424 : Quasi-Periodic Orbits near Earth-Moon L1 and L2 in the Hill Restricted Four-Body Problem

Damennick Henry (University of Colorado at Boulder), Daniel Scheeres (University of Colorado Boulder), Gavin Brown (University of Colorado Boulder), Jose Rosales (NASA Goddard Space Flight Center)

9:00 AM

AAS-378 : Challenges of Koopman Operator Approximations in the Circular Restricted Three-Body Problem

Rolfe Power (Purdue University), Kathleen C. Howell (Purdue University)

9:20 AM

AAS-201 : Exploiting the Laplace Resonance for Designing Trajectories in the Jupiter-Io-Europa-Ganymede System

Nicola Baresi (University of Surrey), **Danny Owen** (University of Surrey), Daniel Scheeres (University of Colorado Boulder)

9:40 AM

AAS-456 : Time-Frequency Analysis for Long-term Propagation in the Circular Restricted Three-Body Problem

Jack Li (The Pennsylvania State University), Roshan Thomas Eapen (The Pennsylvania State University)

10:00 AM

Morning Break

10:20 AM

AAS-483 : Towards Stable Orbiting around Small Moons using J2-Perturbed Elliptic-restricted Three-Body Problem

Hongru Chen (Kyushu University), Mai Bando (Kyushu University), Xiyun Hou

10:40 AM

AAS-382 : Relative Motion in the Center Subspace of Periodic Solutions to the CR3BP

Ian Down (Texas A&M University), Kathleen C. Howell (Purdue University), Manoranjan Majji (Texas A&M University, College Station), Kyle T. Alfriend (Texas A&M University)

11:00 AM

AAS-366 : Normal Form Methods to Define Admissible Control Regions in the Circular Restricted Three-Body Problem

David Schwab (The Pennsylvania State University), Roshan Thomas Eapen (The Pennsylvania State University), Puneet Singla (The Pennsylvania State University)

11:20 AM

AAS-246 : Exploring Europa: Investigating the Stability of Orbital Dynamics and Potential for Life on Jupiter's Second Largest Moon

Lawanya Awasthi (University of Michigan, Ann Arbor)



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Space Domain Awareness IV

Room: Madison, Thursday, August 17, 8:00 AM : 12:00 PM

Session Chair: Craig McLaughlin (University of Kansas)

8:00 AM

AAS-487 : HISTORY AND USAGE OF A FIGURE OF MERIT FOR INJECTION COVARIANCES

Troy Goodson (NASA / Caltech / JPL)

8:20 AM

AAS-132 : The Establishment of a New Probability of Lasing Threshold and Line-of-Sight Filter for Use in ICESat-2 Laser Conjunction Operations

Russell DeHart (NASA/GSFC)

8:40 AM

AAS-138 : Ballistic Leverage for Conjunction Avoidance During the Lunar Transit Trajectory of NASA's Co-Manifested Vehicle

Scott Karn (NASA Glenn Research Center), Steven McCarty (NASA Glenn Research Center), Joseph Scalora (NASA Johnson Space Center), Jonathan Brogan (NASA Glenn Research Center), Christine Schmid (NASA Glenn Research Center), Melissa McGuire (NASA GRC)

9:00 AM

AAS-465 : Dynamic Model Fidelity Effects on Covariance Based Track Association

Woosang Park (Texas A&M University), Kyle T. Alfriend (Texas A&M University)

9:20 AM

AAS-491 : The Complete Set of Orbits of a Test Particle in the Exterior Schwarzschild Gravitational Field

Ken Chan (Chan Aerospace)

9:20 AM

AAS-492 : Collision of Super Massive Black Holes

Ken Chan (Chan Aerospace)

10:00 AM

Morning Break

10:20 AM

AAS-493 : A New Cosmological Model

Ken Chan (Chan Aerospace)



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Trajectory, Mission, and Maneuver Design and Optimization IV

Room: Jefferson, Thursday, August 17, 8:00 AM : 12:00 PM

Session Chair: Rohan Sood (University of Alabama)

8:00 AM

AAS-290 : Orbital Logistics: Optimal Planning to Service Multiple Satellites in LEO through Mixed Integer Linear Programming and Q-law

Riccardo Apa (Politecnico di Torino), Isaac Kaminer (Naval Postgraduate School), Jennifer Hudson (Naval Postgraduate School), Marcello Romano (Naval Postgraduate School & Politecnico di Torino)

8:20 AM

AAS-308 : Interplanetary Rideshare Leveraging RAAN-Agnostic Three-Burn Earth Departure

Mike Loucks (Space Exploration Engineering (SEE)), John Carrico (Space Exploration Engineering, LLC), Chelsea Welch (Space Exploration Engineering), Stephen West (Space Exploration Engineering)

8:40 AM

AAS-324 : Low-Thrust, Many-Revolution, Orbit Transfer Design for the LunaH-Map Lunar Cubesat Mission

Daniel Wibben (KinetX, Inc.), Jeremy Knittel (KinetX Aerospace, Inc.), Andrew Levine (KinetX Aerospace), Derek Nelson (KinetX, Inc.), Craig Hardgrove (Arizona State University)

9:00 AM

AAS-346 : Study on Direct Transfer Strategies from Lunar Gateway to Different Types of Low Lunar Orbit.

Kohei Takeda (Tohoku University), Saki Komachi (Tohoku University), Toshinori Kuwahara (Tohoku University), Shinya Fujita (Tohoku University)

9:20 AM

AAS-359 : From Earth to Moon with Low Thrust Electric Propulsion: System Trades

Nathan (Parrish) Ré (Advanced Space, LLC)

9:40 AM

AAS-363 : Trajectory Operations of the Artemis I Mission

Randy Eckman (NASA Johnson Space Center), Charles Barrett (NASA Johnson Space Center), Amelia Batcha (NASA Johnson Space Center), Brian Killeen (NASA/Johnson Space Center)

10:00 AM

Morning Break

10:20 AM

AAS-409: Revisiting Trajectory Design with STK Astrogator, Part 3

John Carrico (Space Exploration Engineering, LLC), Doug Cather (AGI, an Ansys Company), Giuseppe Corrao (Ansys), Marisa Exnicious (AGI), Linda Kay-Bunnell (AGI, an Ansys Company), Novarah F. Kazmi Policht (AGI), Nathaniel Kinzly (Ansys), Ryan Lee (AGI), Jennifer Locke (Ansys Government Initiatives), Mike Loucks (Space Exploration Engineering (SEE)), Zahid Moghal (AGI (Ansys Government Initiatives)), Nikita Popel (AGI (Ansys Government Initiatives)), Jens Ramrath (AGI), **Cody Short** (AGI (Ansys Government Initiatives)), Nicholas Stankey (AGI (Ansys Government Initiatives)), Caelen Van Doren (Ansys Government Initiatives), James Woodburn (AGI

10:40 AM

AAS-259 : SEVEN SISTERS - MISSION DESIGN TO STUDY SOLAR WIND AND A PATHFINDER TO ADVANCE SPACE WEATHER PREDICTION

Mitchell Rosen (Advanced Space, LLC), Jeff Parker (Advanced Space, LLC), Lauren De Moudt (Advanced Space, LLC), Katariina Nykyri (Embry Riddle University)

11:00 AM

AAS-291: Closed Loop Guidance for Low-Thrust Spacecraft Using Convex Optimization

Christian Hofmann (Politecnico di Milano), Francesco Topputo, (Politecnico di Milano)