Atri Dutta, Ph.D.

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I Education

- Doctor of Philosophy, Aerospace Engineering, *Georgia Institute of Technology*, USA 2009
- Master of Science, Aerospace Engineering, *Georgia Institute of Technology*, USA 2005
- Bachelor of Technology (Honors), Aerospace Engineering, *IIT Kharagpur*, India 2002

II Professional Experience

- **Assistant Professor**, Aerospace Engineering, Wichita State University, Wichita KS, USA, 2014-
  Directs the Control and Optimization Research and Education (CORE) Laboratory; Focuses on strengthening the astronautics curriculum; Advises the undergraduate organization WSU Rocket Club.
- **Postdoctoral Research Associate**, Mechanical and Aerospace Engineering, Princeton University, Princeton NJ, USA, Advisor: Dr. N. Jeremy Kasdin, 2011-2013
  Developed an optimization framework for low-thrust orbit-raising trajectories for small and large classes of telecommunication satellites; supervised 4 undergraduate students and mentored 1 graduate student.
- **Research Engineer II**, Georgia Tech, Atlanta GA, USA, Advisor: Dr. John-Paul Clarke, 2009-2011
  Developed a computational framework for determining optimal speed, heading and altitude changes for En Route aircraft; performed simulations using historic air traffic data and target generation facility.
- **Graduate Teaching Assistant**, Georgia Tech, USA, Advisor: Dr. Panagiotis Tsiotras, 2003-2009
  Conducted recitation classes; graded student work in courses Flight Mechanics, System Dynamics and Control, Advanced Dynamics; supervised student experiments in Flight System Design Laboratory.

III Teaching and Advising

Courses

- AE-415, *Introduction to Space Dynamics*, Fall 2014–16, Spring 2015,17.
- AE-715, *Intermediate Space Dynamics*, Spring 2014,16.
- AE-760, *Space Systems Engineering*, Spring 2015,17 new course developed.
- AE-773, *Intermediate Dynamics*, Spring 2016.
- AE-807, *Flight Control System Design II*, Fall 2015, revised syllabus.

Student Advisory Committees

- **Chair, Ph.D. Dissertation Committee**
  - Suwat Sreesawet, "*Novel Control Algorithms for All-Electric Spacecraft*," 2018 (expected).
  - Akshay Tummala, "*Nano-satellite Propulsion and Impact on Missions*," 2020 (expected).
- **Chair, M.S. Thesis Committee**
  - Suwat Sreesawet, "*A New Algorithm to Determine Low-Thrust Spacecraft Trajectories*," 2014.
  - Prathyusha Karampudi, "*On-orbit Debris Removal using Laser Ablation*," 2017 (expected).
- **Chair, M.S. Directed Project Committee**
  - Tyler Olson, "*Analysis of Radiation Impact on Low-Thrust Orbit-Raising Trajectories*," 2016.
  - Biraj Gupta, "*Modeling of Earth's Shadow for Low-Thrust Orbit-Raising Solver*," 2017 (expected).

- **Member, Ph.D. Dissertation Committee**
  - Scott Reed, Aerospace Engineering, Wichita State University, 2017 (expected).
  - Tonmoy Mukherjee, Electrical Engineering, Georgia Tech, 2010.
  - Prabir Saha, Electrical Engineering, Georgia Tech, 2013.
  - Debesh Bhatta, Electrical Engineering, Georgia Tech, 2014.
- **Member, M.S. Thesis Committee**
  - Shuang Xia, Electrical Engineering, Wichita State University, 2014.
  - Vinod Yadav, Electrical Engineering, Wichita State University, 2015.

Independent Study Supervision

- AE-890, "Survey of Nano-Satellite Propulsion," (Akshay Tummala, 2016).
- AE-890, "Optimal Control and Aerospace Applications," (Biraj Gupta and Burle, 2016).
- AE-890, "Attitude Dynamics and Lyapunov-based Controls," (Suwat Sreesawet, 2016).
- AE-690, "Survey of On-Orbit Debris-Removal Techniques," (Prathyusha Karampudi, 2016).
- AE-690, "Nano-launchers and Launch Stages," (Marie Yoshimizu, 2016).
- AE-690, "Attitude Control Systems Test-Bed Construction," (Manoj Panthi, 2015).
- AE-690, "Analysis of the High Earth Orbit Environment for Small Satellites," (Tyler Olson, 2015).

Other Student Supervision

- Levi Mann (NASA in Kansas JumpStart Fellow), 2015–, Arduino-based attitude measurement.
- Nathan Lipsinki (NASA in Kansas JumpStart Fellow), 2016–, Mission design for CubeSat networks.
- Gauge Carmichael (NASA in Kansas JumpStart Fellow), 2016–, Interplanetary mission design.
- Thomas Thibodeaux (NASA in Kansas JumpStart Fellow), 2016–, Attitude dynamics of CubeSats.
- Eric LaRue & Hommes Ramdial, 2016, Mission design for dark matter search experiment, won two joint awards at the 2016 WSU College of Engineering Open House.
- Sai Vijayan, Low-Thrust Trajectory Optimization, 2014–16.
- Alexander Foster, 2014–2015, Van Allen radiation and impact on all-electric satellites; won award at the 2015 Kansas Capitol Graduate Research Symposium held at Topeka, KS.
- Christina Wilson, 2014–2015, collaborative task planning.
- Nathan Templon, 2014, interplanetary transfers; won award (second) at the WSU Undergraduate Research and Creative Activity Forum.

Other Teaching

- Delivered 12 lectures of a graduate course on "Optimal Control" in Fall 2009 at Georgia Tech on behalf of Dr. John-Paul Clarke.
- Delivered 2 lectures of an undergraduate course "Space System Design" in Fall 2013 at Princeton University on behalf of Dr. Jeremy Kasdin.

IV Service

Proposal Review Service

- NASA Heliophysics Technology and Instrument Development for Science (non-panelist external reviewer for 2 proposals)

Conference Review Service

- AIAA Guidance, Navigation and Control Conference (5 manuscripts)
- American Control Conference (3 manuscripts)
- IEEE Conference on Decision and Control (3 manuscripts)

Journal Review Service

- AIAA Journal of Guidance, Control and Dynamics (9 manuscripts)
- Elsevier Aerospace Science and Technology (11 manuscripts)
- Elsevier Advances in Space Research (5 manuscripts)
- Journal of Optimization Theory and Applications (4 manuscripts)
- IEEE Transactions on Automation Science and Engineering (2 manuscripts)
- IEEE Transactions on Aerospace and Electronic Systems (1 manuscript)
- IEEE Transactions on Intelligent Transportation Systems (1 manuscript)
- American Society of Civil Engineers, Journal of Aerospace Engineering (2 manuscripts)
- Engineering and Optimization (1 manuscript)
- Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering (1 manuscript)
- The Aeronautical Journal (1 manuscript)
- www.rubriq.com (1 manuscript)

University Service

- *Advisor* for 15 undergraduate students majoring in Aerospace Engineering, 2015–.
- *Judge*, WSU Wallace Invitational for Scholarship in Engineering Competition, 2014–16.
- *Observer*, WSU Distinguish Scholarship Invitational, 2016.
- *Notebook Judge*, Kansas BEST Robotics Competition, 2016.
- *Judge*, WSU Undergraduate Research and Creative Activity Forum, 2015.
- *Mission Judge*, WSU Mindstorms Robotics Competition, 2015.
- *Judge*, Princeton Graduate Research Symposium, Princeton University, 2011.
- *Jury*, Faculty Status and Grievance Committee, Georgia Tech, 2011.

Service to Professional Society

- Member, American Institute of Aeronautics and Astronautics (AIAA)
- Member, AIAA Astrodynamics Technical Committee
- Member, American Astronautical Society (AAS)
- Member, Institute of Electrical and Electronic Engineers (IEEE)
- *Session Chair*, "ASD-08 Spacecraft GNC: Proximity Operations," AIAA Space Forum, Astrodynamicist Specialist Conference, Long Beach CA, 2016.
- *Session Chair*, "Astrodynamics-4," Astrodynamicist Specialist Conference, Vail CO, Aug, 2015.
- *Session Co-Chair*, "Optimization I," American Control Conference, Portland OR, Jun, 2014.
- *Report Judge*, AIAA Region-V Design Build Fly Competition, 2015.
- *Judge*, AIAA Region-V Student Conference, 2015.
- *Judge*, AIAA Region-I Student Conference, 2012–2013.

V Research and Scholarly Accomplishments

Research Grants

- Principal Investigator, Multi-Objective Optimization Framework for Spacecraft Low-Thrust Orbit-Raising, Kansas NASA EPSCOR Program Seed Research Initiative, 2014–2015, Award amount: $119,484, Matching Funds (WSU): $46,595, Total project funds: $166,079.
- Co-Principal Investigator, Deep Space Dark Matter Search Experiment, WSU Multidisciplinary Research Project Award, 2016, Award amount: $7,500.

Journal Publications

9) A. Dutta, J. Kasdin, E. Choueiri, P. Francken, "Minimizing Proton Displacement Damage Dose during Electric Orbit-raising of Satellites," Journal of Guidance, Control and Dynamics, Vol. 39, No. 4, pp. 963-969, 2016.
8) B. Du, Y. Zhao, A. Dutta, J. Yu, X. Chen, "Optimal scheduling of Multi-spacecraft Refueling Based on Cooperative Maneuver," Advances in Space Research, Vol 55, No 12, pp. 2808–2819, 2015.
7) P. Libraro, J. Kasdin, E. Choueiri, A. Dutta, "Quaternion-Based Coordinates for Non-Singular Modeling of High-Inclination Orbital Transfer," Journal of Guidance, Control and Dynamics, Vol 37, No. 5, pp. 1638- 1643, 2014.
6) S. Coene, F. Spieksma, A. Dutta and P. Tsiotras, "On the Computational Complexity of P2P Refueling Strategies," INFOR, Vol. 50, No 2, pp 88-94, 2012.
5) A. Dutta, N. Arora and R. Russell, "Peer-to-Peer Refueling Strategy using Low-Thrust Propulsion," AIAA Journal of Spacecraft and Rockets, Vol. 49, No 5, pp 944-954, 2012.
4) A. Dutta and P. Tsiotras, "A Network Flow Formulation for Cooperative P2P Refueling Strategies," AIAA Journal of Guidance, Control and Dynamics, 33(5), pp. 1539- 1549, 2010.
3) A. Dutta and P. Tsiotras, "Hohmann-Hohmann and Hohmann-Phasing Cooperative Rendezvous Maneuvers," AAS Journal of the Astronautical Sciences, 57, pp. 393417, 2009.
2) A. Dutta and P. Tsiotras, "An Egalitarian Peer-to-Peer Satellite Refueling Strategy," AIAA Journal of Spacecraft and Rockets, Vol. 45 (3), pp. 608-618, 2008.
1) A. Dutta and P. Tsiotras, "Asynchronous Optimal Mixed Peer-to-Peer Satellite Refueling Strategies," AAS Journal of the Astronautical Sciences, Vol. 54 (3-4), 543-565, 2006.

Conference Proceedings

(Student co-authors, working under direct supervision, have been underlined.)

29) P. Karampudi, A. Dutta, "De-Orbit Time Of On-Orbit Debris For Laser-Based Removal Methods," AAS/AIAA Space Flight Mechanics Meeting, San Antonio TX, Feb 2017 (accepted).
28) S. Sreesawet, A. Dutta, "A Novel Methodology for Fast and Robust Computation of Low-Thrust Orbit-Raising Trajectories," AAS/AIAA Space Flight Mechanics Meeting, San Antonio TX, Feb 2017 (accepted).
27) N. Solomey, H. Meyer, T. Figy, A. Dutta, A. Barghouty, L. Johnson, "Studying the Sun's Nuclear Furnace with a Neutrino Detector Spacecraft in Close Solar Orbit," American Astronomical Society, Solar Physics Division Meeting, Boulder CO, 2016.
26) Atri Dutta, "Computational Performance of GRASP Algorithms for Spacecraft Multi-Rendezvous Mission Planning", AIAA/AAS Astrodynamics Specialist Conference, AIAA SPACE Forum, Long Beach CA, 2016 (AIAA 2016-5509).
25) A. Dutta, S. Vijayan, and T. Olson, "Deployment of High Power Class All-Electric Satellites in the Geosynchronous Equatorial Orbit", AIAA/AAS Astrodynamics Specialist Conference, AIAA SPACE Forum, Long Beach CA, 2016 (AIAA 2016-5639).

24) A. Dutta, "GRASP Algorithm for Multi-Rendezvous Mission Planning for Optimized Trip Times," AAS Astrodynamics Specialist Conference, Vail CO, Aug 2015.

23) S. Sreesawet, V. Pappu, A. Dutta, J. Steck, "Neural Networks Based Adaptive Controller for Attitude Control of All-Electric Satellites," AAS Astrodynamics Specialist Conference, Vail CO, Aug 2015.

22) S. Sreesawet, A. Dutta, "Low-Thrust Orbit-Raising Trajectories using Eclipse Constraints," AAS Space Flight Mechanics Meeting, Williamsburg VA, 2015.

21) S. Vijayan, A. Dutta, "Low-Thrust Orbit-Raising using Non-Singular Orbital Elements and Proximity Quotient Approach," AAS Space Flight Mechanics Meeting, Williamsburg VA, 2015.

20) A. Foster, A. Dutta, "Analytical Model of Van Allen Proton Radiation Flux for Low-Thrust Trajectory Optimization Solvers," AAS Space Flight Mechanics Meeting, Williamsburg VA, 2015.

19) A. Dutta, "A Greedy Random Adaptive Search Procedure for Multi-Rendezvous Mission Planning," AAS Space Flight Mechanics Meeting, Williamsburg VA, 2015.

18) A. Dutta, "Optimal Low-Thrust Orbital Transfers for Rendezvous Between Active Spacecraft with Return Position Constraints," AIAA Guidance Navigation and Control Conference, Kissimmee FL, 2015.

17) A. Dutta, S. Sreesawet, S. Vijayan, A. Foster, "On the Design of the Power and Propulsion Subsystem of All-Electric Telecommunication Satellites," International Communication Satellite Systems Conference, San Diego CA, 2014.

16) P. Libraro, J. Kasdin, A. Dutta, E. Choueiri, "Application of a Quaternion-Based Formulation to the Electric Orbit-Raising of GEO Satellites from High-Inclination Injection Orbits," AAS/AIAA Astrodynamics Specialist Conference, San Diego CA, Aug 2014.

15) A. Dutta, P. Libraro, J. Kasdin, E. Choueiri, P. Fracken, "Minimum-Fuel Electric OrbitRaising of Telecommunication Satellites Subject to Time and Radiation Damage Constraints," American Control Conference, Portland OR, 2014.

14) A. Dutta, P. Libraro, J. Kasdin, E. Choueiri, P. Fracken, "Design of the Next-Generation All-Electric Telecommunication Satellites," AIAA International Communications Satellite Systems Conference, Florence, Italy, 2013.

13) A. Dutta, "Low-Thrust Egalitarian Peer-to-Peer Maneuvers for Servicing Satellites in Circular Constellations," AAS Spaceflight Mechanics Meeting, Kauai, HI, 2013.

12) A. Dutta, P. Libraro, J. Kasdin, E. Choueiri, "Satellite Power Subsystem Requirements for Time-Constrained Electric Orbit-Raising with Minimal Radiation Impact," AAS Spaceflight Mechanics Meeting, Kauai, HI, 2013.

11) A. Dutta, P. Libraro, J. Kasdin, E. Choueiri, "Minimizing Radiation Fluence during Time Constrained Electric Orbit-Raising," International Symposium of Space Flight Dynamics, Pasadena, CA, 2012.

10) A. Dutta, P. Libraro, J. Kasdin, E. Choueiri, "A Direct Optimization Based Tool to Determine Orbit-Raising Trajectories to GEO for All-Electric Telecommunication Satellites," AIAA/AAS Astrodynamics Specialist Conference, Minneapolis, MN, 2012.

9) A. Dutta, "On-Orbit Servicing of Satellites in Circular Constellations using a Single Service Vehicle," AAS Space Flight Mechanics Meeting, New Orleans, LO, 2011.

8) A. Dutta, "Peer-to-Peer Servicing of Satellites in Circular Constellations," AAS Space Flight Mechanics Meeting, New Orleans, LO, 2011.

7) A. Dutta, N. Arora, and R. Russell, "A Peer-to-Peer Refueling Strategy using Low-Thrust Propulsion," AAS Astrodynamics Specialist Conference, Pittsburg, PA, 2009.

6) A. Dutta and P. Tsiotras, "A Cooperative Egalitarian P2P Strategy for Refueling Satellites in Circular Constellations," AAS Space Flight Mechanics Meeting, Savannah, GA, 2009.

5) A. Dutta and P. Tsiotras, "A Cooperative Peer-to-Peer Strategy for Refueling Satellites in Circular Constellations," AIAA Space Conference, San Diego, CA, 2008.

4) A. Dutta and P. Tsiotras, "Hohmann-Hohmann and Hohmann-Phasing Cooperative Rendezvous Maneuvers," L. Markley Astronautics Symposium, Chesapeake Bay, MD, 2008.

3) A. Dutta and P. Tsiotras, "A Network Flow Formulation for an Egalitarian Peer-to-Peer Refueling Strategy," AAS Space Flight Mechanics Meeting, Sedona, AZ, 2007.

2) A. Dutta and P. Tsiotras, "A Greedy Random Adaptive Search Procedure for Optimal Scheduling of P2P Refueling," AAS Space Flight Mechanics Meeting, Sedona, AZ, 2007.

1) A. Dutta and P. Tsiotras, "Asynchronous Optimal Mixed Peer-to-Peer Satellite Refueling Strategies," Malcom D. Shuster Astronautics Symposium, Buffalo, NY, 2005.

Technical Reports, Dissertation, Thesis

- N. Solomey, A. Dutta, "Technology Development for a Deep Space Dark Matter Search Experiment," WSU Multidisciplinary Research Project Award Final Report, Sep 2016.
- Atri Dutta, "Kansas NASA Epscor Program Seed Research Initiative: Multi-Objective Low-Thrust Optimization Framework for Spacecraft Low-Thrust Orbit-Raising: Final Report," Kansas NASA EPSCOR Program Final Report, Nov, 2015.
- J. Kasdin, E. Choueiri, A. Dutta, P. Libraro, "Potential of Electric Propulsion on Future Geostationary Satellite Architectures," SES Final Report, Oct 2014.
- J. Clarke, K. Feigh, A. Dutta, B. Lee, S. Milway, C. Tino, "Final Findings on the Development and Evaluation of an En-Route Fuel Optimal Conflict Resolution Algorithm to Support Strategic Decision-Making," PARTNER Project 5 Report No. PARTNER-COE-2012001, Jan 2012.
- Atri Dutta, "Optimal Cooperative and Non-Cooperative Peer-to-Peer Maneuvers for Refueling Satellites in Circular Constellations," Ph.D. Dissertation, Georgia Tech, USA, 2009.
- Atri Dutta, "Parameter Estimation of Dynamic Models using Equation Error Formulation," B. Tech. Thesis, Indian Institute of Technology, Kharagpur India, 2002.

Invited Presentations

- International Conference and Exhibition on Satellite, Houston, TX, Aug, 2015.
- Department of Mechanical Engineering, *Worcester Polytechnic Institute*, Worcester, MA, 2013.
- Department of Mechanical and Aerospace Engineering, *Missouri University of Science and Technology*, Rolla MO, 2012.
- Department of Aerospace Engineering, *Indian Institute of Technology*, Kanpur India, 2011 (Webinar).
- Department of Mechanical and Aerospace Engineering, *West Virginia Univ*, Morgantown WV, 2010.
- *Optimal Synthesis*, Palo Alto CA, 2008.
- Department of Aerospace Engineering, *Mississippi State University*, Starkville MS, 2008.
- *General Electric Global Research Center*, Niskayuna NY, 2008.

Research Citations

- Number of Citations = 132 (Google Scholar), 67 (Scopus).
- Number of countries from where work has been cited = 11.

VI Citizenship Information

- Citizen of India.
- Permanent Resident of United States of America.

CV Last Updated: 11/18/2016.