

# Christopher Dean Hall

Professor and Department Head  
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## ***Background Information***

### **Security Clearance**

Top Secret/SSBI, May 1996, U.S. Citizen

### **Education**

Ph.D. in Theoretical and Applied Mechanics, Cornell University, Jan 1992

M.S. in Systems Engineering, Air Force Institute of Technology, Dec 1988

B.S. in Aerospace Engineering (with High Honor), Auburn University, Mar 1984

### **Professional Experience**

**Sep 2006 – Present** Virginia Polytechnic Institute and State University, Blacksburg, Virginia. Professor and Department Head, Department of Aerospace and Ocean Engineering

**Jan 2006 – Aug 2008** Virginia Polytechnic Institute and State University, Blacksburg, Virginia. Assistant Department Head, Department of Aerospace and Ocean Engineering

**Jun 2003 – Present** Virginia Polytechnic Institute and State University, Blacksburg, Virginia. Professor, Department of Aerospace and Ocean Engineering

**Feb 2005 – Present** Virginia Polytechnic Institute and State University, Blacksburg, Virginia. Affiliate Professor, Department of Engineering Science and Mechanics

**Jun 2000 – May 2003** Virginia Polytechnic Institute and State University, Blacksburg, Virginia. Associate Professor, Department of Aerospace and Ocean Engineering

**Aug 1997 – Jun 2000** Virginia Polytechnic Institute and State University, Blacksburg, Virginia. Assistant Professor, Department of Aerospace and Ocean Engineering

**Jan 1992 – Aug 1997** Air Force Institute of Technology (AFIT), Wright-Patterson Air Force Base, Ohio. Assistant Professor of Aerospace and Systems Engineering

Non-tenure track (Jan 1992 – Aug 1994), Tenure-track (Aug 1994 – Aug 1997)

Selected for promotion to Associate Professor with tenure on Mar 3, 1997 with effective date of Oct 1, 1997

**Jan 1989 – Dec 1991** Department of Theoretical and Applied Mechanics, Cornell University, Ithaca, New York. Graduate Student, NASA Space Grant Fellow

**Jun 1987 – Dec 1988** Department of Aeronautics and Astronautics, Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio. Graduate Student

**Jul 1984 – May 1987** Air Force Satellite Control Facility, Onizuka Air Force Base, California. Satellite Systems Integration Engineer

**Apr 1984 – Jun 1984** Air Force Officer Training School, Lackland Air Force Base, San Antonio, Texas. Officer Trainee

**Jun 1981 – Mar 1984** Department of Aerospace Engineering, Auburn University, Auburn, Alabama. Undergraduate Student

**Nov 1978 – May 1981** Air Force Communications Command, Royal Air Force Mildenhall, UK. Telecommunications Systems Control Specialist

### **Awards and Honors**

Elected Fellow, American Astronautical Society, 2005

Invited participant, National Academy of Engineering “Frontiers of Engineering Symposium,” 2002

Dean’s Award for Excellence in Teaching, 2001

Best Paper Award, AIAA Astrodynamics Specialists Conference, 1998

Ralph E. Powe Junior Faculty Enhancement Award, Oak Ridge Associated Universities, 1998

Outstanding Professor Award, Southwest Ohio Council on Higher Education, 1997

Ralph R. Teetor Educational Award, Society of Automotive Engineers, 1997  
Colonel Charles A. Stone Leadership Award, Wright Memorial Chapter, Air Force Association, Air Force Institute of Technology, 1996  
Air Force Meritorious Service Medal, 1994  
Tau Beta Pi Outstanding Professor Award, Air Force Institute of Technology, 1992  
Best Paper Award, AIAA Dayton-Cincinnati Section Mini-Symposium, Dayton, Ohio, 1992  
NASA Space Grant Fellow, Cornell University, 1991  
Air Force Achievement Medal, 1987  
Branimir D. Djordjevic Memorial Scholarship Award, Auburn University, 1984  
Outstanding Aerospace Engineering Student, Auburn University, 1984  
Member, Phi Kappa Phi Honor Society  
Member, Sigma Gamma Tau Honor Society  
Alumnus Member, Tau Beta Pi Engineering Honor Society

### **Personal**

Born: Rockingham, North Carolina  
Married to the former Rhoda Marie Taylor, with two sons, Duncan and Casey  
Assistant Scoutmaster, Boy Scout Troop 56, Blacksburg, Virginia, 1998–2006  
President, Twin Valley Riders Motorcycle Club, 2003–2004  
Hobbies: Backpacking, Biking, Camping, Canoeing, Hiking, Motorcycling

### **Teaching**

#### **Courses Taught at Virginia Tech**

AOE 2104 Introduction to Aerospace Engineering (*Notes, Introduction to Flight*, Anderson)  
AOE 4134 Astromechanics (*Fundamentals of Astrodynamics*, Bate, Mueller, and White)  
AOE 4140 Spacecraft Attitude Dynamics and Control (*Notes*)  
AOE 4065/4066 Space Systems Design (*Space Mission Analysis and Design*, Wertz and Larson)  
AOE 5204 Vehicle Dynamics and Control (*Lecture Notes*)  
AOE 6234 Spaceflight Dynamics (*Spacecraft Attitude Dynamics*, Hughes)

#### **Courses Taught at the Air Force Institute of Technology**

Astrodynamics (*Fundamentals of Astrodynamics*, Bate, Mueller, and White)  
Analytical Mechanics (*Methods of Analytical Dynamics*, Meirovitch)  
Dynamics of Aerospace Systems (*Elements of Engineering Mechanics*, Likins)  
Linear Systems Analysis (*Linear System Fundamentals*, Reid)  
Nonlinear Differential Equations (*Nonlinear Ordinary Differential Equations*, Jordan and Smith)  
Nonlinear Oscillations (*Nonlinear Oscillations*, Nayfeh and Mook)  
Spacecraft Attitude Dynamics (*Spaceflight Dynamics*, Wiesel)  
Space Systems Integration and Design (*Space Mission Analysis and Design*, Larson and Wertz)  
Spacecraft Design (*Fundamentals of Space Systems*, Pisacane and Moore)  
Spacecraft Stability (*Spacecraft Attitude Dynamics*, Hughes)  
Space Intelligence Seminar (*No text*)

## *Service*

### **Professional Service**

American Institute of Aeronautics and Astronautics, Associate Fellow

*AIAA Journal of Guidance, Control, and Dynamics*, Book Review Editor, 2003 – present

*AIAA Journal of Guidance, Control, and Dynamics*, Associate Editor, 1995 – 2000

AIAA Astrodynamics Technical Committee, Chair, 2002 – 2004; Member, 1994 – present;  
Chair, Education Subcommittee, 1994 – 2001

AIAA Mechanics and Control of Flight Award Committee, Member, 2001 – 2004; Chair,  
2004

AIAA Design Subcommittee of the Student Activities Committee, Member, 2001 – 2003

AIAA Publications Committee, Member, 2002 – 2003

AIAA General Co-chair, AIAA/AAS Astrodynamics Conference, Boston, MA, Aug 1998

American Astronautical Society, Fellow

AAS Fellows Committee, 2006 – present

*AAS Journal of the Astronautical Sciences*, Associate Editor, 2003 – present

AAS Space Flight Mechanics Technical Committee, Member, 1997 – 2005; Chair, John V.  
Breakwell Student Travel Award Subcommittee, 1998 – 2002

AAS General Co-chair, AIAA/AAS Astrodynamics Conference, Monterey, CA, Aug 2002

AAS General Co-chair, AAS/AIAA Spaceflight Mechanics Meeting, Clearwater, FL, Jan 2000

Celestial Mechanics Institute, Member

Associate Editor, *Celestial Mechanics and Dynamical Astronomy*, 2004 – present

American Society for Engineering Education, Member

Governor's Aerospace Advisory Council, Member, 2007 – present

Aerospace Advisory Committee, Virginia Joint Commission on Technology and Science,  
Member, 2007 – 2008

Virginia Space Grant Consortium Advisory Council, 2000 – present; Chair, 2004 – present

New Mexico State University, Mechanical Engineering Department, Aerospace Engineering  
Program Advisory Committee, 2007 – present

Ohio Space Grant Consortium, Associate Director, 1994 – 1997

Sigma Xi, Member, and Secretary of Virginia Tech chapter, 2001 – 2003

Judge, 7th Annual Student Scholarship Competition, 13th AIAA/Utah State University Annual  
Small Satellite Conference, Aug 1999

Technical Area Chair, Space Technologies and Applications, National Aerospace and Electronics  
Conference, Dayton, OH, Jul 1997

Technical reviewer for *Acta Astronautica*, *Aerospace Science and Technology*, *Celestial  
Mechanics and Dynamical Astronomy*, *J. of Guidance, Control and Dynamics*, *J. of Spacecraft  
and Rockets*, *J. of Applied Mechanics*, *Nonlinearity*, *J. of the Astronautical Sciences*, *J. of  
Dynamic Systems, Measurement, and Control*

Book reviewer for Academic Press, CRC Press, John Wiley and Sons, Society of Industrial and  
Applied Mathematics, Microcosm

### **University Service**

Acting Department Head, January-March 2005, September 2006 – May 2008

Assistant Department Head, January 2006 – August 2008

Department Promotion and Tenure Committee, Chair, 2004 – 2006

Department Faculty Executive Committee, Chair, 2003 – 2006  
 Sigma Gamma Tau Faculty Advisor, 2004 – present  
 Tau Beta Pi Faculty Advisor, 2003 – present  
 College of Engineering Diversity Committee Member, 2003 – 2005  
 Department representative to Engineering Faculty Organization Executive Committee, 2003 – 2006  
 Department seminar program coordinator, Spring 2003  
 Chair, Faculty search committee (two separate searches), 2002–2003  
 Department representative to Center for Excellence in Undergraduate Teaching, 2002 – 2006  
 Faculty search committees (two separate searches), 2000  
 Faculty panel member for Undergraduate Honor System, 2002 – 2003  
 Faculty counselor for Undergraduate Honor System, 1997 – 1999  
 Dayton Area Graduate Studies Institute Scholarship Selection Committee, 1997 (AFIT)  
 Dean's Advisory Panel member, 1996 – 1997 (AFIT)  
 Department ABET preparation committee, 1996 – 1997 (AFIT)  
 Faculty Council Rules Committee chair 1996 – 1997 (AFIT)  
 Curriculum Committee chair, Graduate Space Operations, 1995 – 1997 (AFIT)  
 Led department activities in reorganizing space-related curriculum in 1995, including transfer of Graduate Space Operations program from Department of Operational Sciences to Department of Aeronautics and Astronautics (AFIT)  
 Faculty Council Rules Committee member 1994 – 1995 (AFIT)  
 Curriculum Committee member, Graduate Systems Engineering and Graduate Astronautical Engineering, 1993 – 1997 (AFIT)  
 Curriculum Committee chair, Graduate Systems Engineering, 1993 (AFIT)

## ***Research***

### **Research Funding**

1. *Rocket Observations of Nitric Oxide in the Polar Night by Stellar Occultation*, Oct 2007 – Sep 2010
2. *Hy-V Program: A Virginia Student Launch Initiative*, Virginia Space Grant Consortium, Apr 2007 – May 2008
3. *MIMIC Spacecraft Design Project*, Virginia Space Grant Consortium, May 2005 – May 2006
4. *Investigation of Astrogator Usage within the ADSPIC Geoplanning Application*, Applied Defense Systems, May 2005 – Aug 2005
5. *Internal Mass Motion for Spacecraft Dynamics and Control*, Air Force Office of Scientific Research, Apr 2005– Oct 2007
6. *Magnetic Field Investigation of Mars*, Virginia Space Grant Consortium, Jul 2004 – Jun 2005
7. *Distributed Spacecraft Attitude Control System Simulator*, Star Technologies Corporation, Jan 2004 – Dec 2004
8. *Astrodynamics Algorithms*, Naval Research Laboratory, Dec 2003 – Aug 2004
9. *A Team Effort in Formation Flying*, NASA Goddard Space Flight Center, May 2003 – Aug 2006
10. *Investigation of Control Laws for Mixed Momentum Wheel and Control Moment Gyro Systems*, Honeywell, Inc., Sep 2002 – Aug 2003

11. *COM+ Simulation Architecture with Application to Tethers and Formation Flying*, Star Technologies Corporation, SBIR, Sep 2002 – Aug 2004
12. *Time-Optimal Control for Formation Establishment and Maneuvering*, NASA Goddard Space Flight Center, Jun 2002 – May 2003
13. *Base Motion Effects on Rotating Magnetic Bearings*, Air Force Research Laboratory, Jan 2002 – Dec 2004
14. *Spacecraft Design to Support a Dedicated Mission for MicroMAPS*, Virginia Space Grant Consortium, Jan 2002 – Sep 2002 (100% responsibility)
15. *Magnetic Bearing Dynamics with Base Motion*, ASPIRES, Jan 2002 – Dec 2002 (100% responsibility)
16. *Dynamics and Control of a Tethered Interferometer at L2*, NASA Goddard Space Flight Center, Sep 2001 – Aug 2003 (100% responsibility)
17. *Control Effectiveness for Leonardo Orbits*, NASA Goddard Space Flight Center, May 2001 – Sep 2002 (100% responsibility)
18. *Experimental Investigation of Distributed Attitude Control for Spacecraft Formation Flying*, Air Force Office of Scientific Research, Defense University Research Infrastructure Program (DURIP), Apr 2001 – Mar 2002 (100% responsibility)
19. *Additional Work on ION-F: A Space Based Testbed for Distributed Formation Control using the HokieSat Nanosatellite*, NASA Goddard Space Flight Center, Apr 2001 – Mar 2002 (100% responsibility)
20. *Extended Funding for 'Virginia Tech Ionospheric Scintillation Measurement Mission'*, Air Force Office of Scientific Research, Apr 2001 – Sep 2002 (100% responsibility)
21. *Coupled Orbit and Attitude Motion of Spacecraft Formations*, Air Force Office of Scientific Research, Jan 2001 – Dec 2003 (100% responsibility)
22. *Design Study Proposal: PowerSail High Power Propulsion System*, Air Force Flight Test Center, Jan 2001 – Jun 2001 (100% responsibility)
23. *Flight Safety of the Virginia Tech Ionospheric Scintillation Measurement Mission*, Universities Space Research Associates, FY00-01 (100% responsibility)
24. *Leonardo Mission Unique Orbits*, NASA Goddard Space Flight Center, FY00 (100% responsibility)
25. *Umbilical Coupling of the Motion of a Spacecraft and a PowerSail*, Air Force Office of Scientific Research, FY00 (100% responsibility)
26. *ION-F: A Space-Based Testbed for Distributed Formation Control Using the HokieSat Nanosatellite*, NASA Goddard Space Flight Center, FY00-02 (100% responsibility)
27. *Analysis of Momentum Exchange in Spacecraft Attitude Dynamics and Control*, National Science Foundation, FY00-02 (100% responsibility)
28. *Virginia Tech Ionospheric Scintillation Measurement Mission*, Universities Space Research Associates, FY99-00 (50% responsibility with W. Scales)
29. *Virginia Tech Ionospheric Scintillation Measurement Mission*, AFOSR/DARPA, FY99-00 (33% responsibility with W. Scales and W. Stutzman)
30. *Modeling and Simulation of Formation Flying*, NASA Goddard Space Flight Center, FY99 (100% responsibility)
31. *Rotational Dynamics and Control of Magnetic Bearing Systems*, Oak Ridge Associated Universities, FY99 (100% responsibility)
32. *Formations of Free-Flying Gyrostat Telescopes*, AFOSR, FY98-00 (100% responsibility)
33. *Spacecraft Simulator*, ASPIRES Grant, FY98 (100% responsibility)

34. *Using Satellites in Teaching Undergraduate Astrodynamics*, Center for Excellence in Undergraduate Teaching Grant, FY98 (100% responsibility)
35. *Satellite Tracking Laboratory*, SCHEV, FY98 (100% responsibility)
36. *Reorientation of Flexible Space Structures Using Momentum Exchange Devices*, Air Force Office of Scientific Research, FY97 (at AFIT)
37. *Satellite Applications Laboratory*, Air Education and Training Command, FY97. Co-PI with Professor D. Goldizen (at AFIT)
38. *Rotational Dynamics Laboratory*, Air Education and Training Command, FY97 (at AFIT)
39. *Integrated Power and Attitude Control of Spacecraft with Electro-Mechanical Flywheel Batteries*, Phillips Laboratory, FY97–98 (at AFIT)
40. *Techniques and Applications of Multivariable Nonlinear Control*, Air Force Office of Scientific Research, FY96-98. Co-PI with Professor D. B. Ridgley (at AFIT)
41. *Asteroid Mitigation and Spacecraft Maneuverability*, Air Force Space Command, FY96 (at AFIT)
42. *Steady Motions of Rigid Satellites in a Central Gravitational Field*, Air Force Office of Scientific Research, FY93 (at AFIT)

### Refereed Journal Publications (\* denotes student)

1. V. Lappas, J. Fausz, C. D. Hall, and D. Richie, "History of Integrated Power and Attitude Control Systems," *Journal of Guidance, Control, and Dynamics* (to appear)
2. J. R. Ellis\* and C. D. Hall, "Model Development and Code Verification for Simulation of Electrodynamic Tether System," *Journal of Guidance, Control, and Dynamics*, (to appear)
3. R. A. Sandfry\* and C. D. Hall, "Bifurcations of Relative Equilibria of an Oblate Gyrostat with a Discrete Damper," *Nonlinear Dynamics*, Vol. 48, No. 3, 2007, pp. 319–329
4. M. Kim\* and C. D. Hall, "Dynamics and Control of Tethered Satellite Systems," *Journal of Spacecraft and Rockets*, Vol. 44, No. 3, 2007, pp. 649–659
5. C. D. Hall and J. A. Beck, "Hamiltonian Mechanics and Relative Equilibria of Orbiting Gyrostats," *Journal of the Astronautical Sciences*, Vol. 55, No. 1, 2007, pp. 53–65
6. H. Schaub, C. D. Hall, and J. Berryman\*, "Necessary Conditions for Circularly-Restricted Static Coulomb Formations," *Journal of the Astronautical Sciences*, Vol. 54, Nos. 3–4, 2006, pp. 525–541
7. M. C. VanDyke\* and C. D. Hall, "Decentralized Coordinated Attitude Control of a Formation of Spacecraft," *Journal of Guidance, Control, and Dynamics*, Vol. 29, No. 5, 2006, pp. 1101–1109
8. M. Kim\* and C. D. Hall, "Symmetries in the Optimal Control of Solar Sail Spacecraft," *Celestial Mechanics and Dynamical Astronomy*, Vol. 92, No. 4, 2005, pp. 273–293
9. M. Kim\* and C. D. Hall, "Control of a Rotating Variable-Length Tethered System," *Journal of Guidance, Control and Dynamics*, Vol. 27, No. 5, 2004, pp. 849–858
10. J. L. Schwartz\*, M. A. Peck, and C. D. Hall, "Historical Review of Air-Bearing Spacecraft Simulators," *Journal of Guidance, Control and Dynamics*, Vol. 26, No. 4, 2003, pp. 513–522
11. R. A. Sandfry\* and C. D. Hall, "Steady Spins and Spinup Dynamics of Nearly Axisymmetric Dual-Spin Satellites with Damping," *Journal of Spacecraft and Rockets*, 2004, Vol. 41, No. 6, pp. 948–955
12. R. A. Sandfry\* and C. D. Hall, "Relative Equilibria of a Prolate Gyrostat with a Discrete Damper," *Journal of the Astronautical Sciences*, Vol. 50, No. 4, 2003, pp. 367–387
13. C. D. Hall and V. Collazo Perez\*, "Minimum-Time Orbital Phasing Maneuvers," *Journal of Guidance, Control, and Dynamics*, Vol. 26, No. 6, 2003, pp. 934–941

14. C. D. Hall, P. Tsiotras, and H. Shen\*, "Tracking Rigid Body Motion Using Thrusters and Momentum Wheels," *Journal of the Astronautical Sciences*, Vol. 50, No. 3, 2002, pp. 311-323
15. K. A. Ford\* and C. D. Hall, "Flexible Spacecraft Reorientations Using Gimballed Momentum Wheels," *Journal of the Astronautical Sciences*, Vol. 49, No. 3, 2001, pp. 421-441
16. P. Tsiotras, H. Shen\*, and C. D. Hall, "Satellite Attitude Control and Power Tracking with Momentum Wheels," *Journal of Guidance, Control, and Dynamics*, Vol. 24, No. 1, 2001, pp. 23-34
17. S. P. Hughes\* and C. D. Hall, "Optimal Configurations of Rotating Spacecraft Formations," *Journal of the Astronautical Sciences*, Vol. 48, Nos. 2-3, 2000, pp. 225-247
18. M. W. Marasch\* and C. D. Hall, "Application of Energy Storage to Optimal Solar Electric Propulsion Orbital Transfer," *Journal of Spacecraft and Rockets*, Vol. 37, No. 5, 2000, pp. 645-652
19. K. A. Ford\* and C. D. Hall, "Singular Direction Avoidance Steering for Control Moment Gyros," *Journal of Guidance, Control, and Dynamics*, Vol. 23, No. 4, 2000, pp. 648-656
20. J. A. Beck\* and C. D. Hall, "Relative Equilibria of a Rigid Satellite in a Circular Keplerian Orbit," *Journal of the Astronautical Sciences*, Vol. 46, No. 3, 1998, pp. 215-247
21. K. D. Hammett\*, C. D. Hall, and D. B. Ridgley, "Controllability Issues in Nonlinear State-Dependent Riccati Equation Control," *Journal of Guidance, Control, and Dynamics*, Vol. 21, No. 5, 1998, pp. 767-773
22. C. D. Hall, "Escape from Gyrostat Trap States," *Journal of Guidance, Control, and Dynamics*, Vol. 21, No. 3, 1998, pp. 421-426
23. J. D. Thorne\* and C. D. Hall, "Minimum-Time Continuous Thrust Orbit Transfers," *Journal of the Astronautical Sciences*, Vol. 45, No. 4, 1997, pp. 411-432
24. C. D. Hall, "Momentum Transfer Dynamics of a Gyrostat with a Discrete Damper," *Journal of Guidance, Control, and Dynamics*, Vol. 20, No. 6, 1997, pp. 1072-1075
25. J. D. Thorne\* and C. D. Hall, "Minimum-Time Continuous-Thrust Orbit Transfers Using the KS Transformation," *Journal of Guidance, Control, and Dynamics*, Vol. 20, No. 4, 1997, pp. 836-838
26. C. D. Hall, "Momentum Transfer in Two-Rotor Gyrostats," *Journal of Guidance, Control, and Dynamics*, Vol. 19, No. 5, 1996, pp. 1157-1161
27. J. D. Thorne\* and C. D. Hall, "Approximate Initial Lagrange Costates for Continuous Thrust Spacecraft," *Journal of Guidance, Control, and Dynamics*, Vol. 19, No. 2, 1996, pp. 283-288
28. A. P. Mazzoleni, C. D. Hall and M. C. Stabb, "Double-Averaging Approach to the Study of Spinup Dynamics of Flexible Satellites," *Journal of Guidance, Control, and Dynamics*, Vol. 19, No. 1, 1996, pp. 54-59
29. A. E. Chinnery\* and C. D. Hall, "Motion of a Rigid Body with an Attached Spring-Mass Damper," *Journal of Guidance, Control, and Dynamics*, Vol. 18, No. 6, 1995, pp. 1404-1409
30. R. Tsui\* and C. D. Hall, "Resonance Capture in Unbalanced Dual-Spin Spacecraft," *Journal of Guidance, Control, and Dynamics*, Vol. 18, No. 6, 1995, pp. 1329-1335
31. C. D. Hall, "Resonance Capture in Axial Gyrostats," *Journal of the Astronautical Sciences*, Vol. 43, No. 2, 1995, pp. 127-138
32. C. D. Hall, "Spinup Dynamics of Biaxial Gyrostats," *Journal of the Astronautical Sciences*, Vol. 43, No. 3, 1995, pp. 263-276
33. C. D. Hall, "Spinup Dynamics of Gyrostats," *Journal of Guidance, Control, and Dynamics*, Vol. 18, No. 5, 1995, pp. 1177-1183

34. C. D. Hall and R. H. Rand, "Spinup Dynamics of Axial Dual-Spin Spacecraft," *Journal of Guidance, Control, and Dynamics*, Vol. 17, No. 1, 1994, pp. 30–37
35. C. D. Hall, "Averaging of Second Order Hamiltonian Oscillators with a Slowly Varying Parameter," *Journal of Guidance, Control, and Dynamics*, Vol. 16, No. 4, 1993, pp. 782–784
36. C. D. Hall, "Equivalence of Two Classes of Dual-Spin Spacecraft Spinup Problems," *Journal of Guidance, Control, and Dynamics*, Vol. 15, No. 4, 1992, pp. 1032–1034

### **Publications In Review**

37.

### **Publications In Preparation for Submission to Refereed Journals**

38. M. S. Bitzer\* and C. D. Hall, "Optimal Electrodynamic Tether Phasing Maneuvers in Equatorial Plane"
39. J. E. Ellis\* and C. D. Hall, "Model Development and Verification for the Dynamics of Electrodynamic Tether Systems"
40. S. S. Lee\* and C. D. Hall, "Geometrical Relative Orbit Modeling of Satellite Relative Motion"
41. S. S. Lee\* and C. D. Hall, "A Parametric Approach for Satellite Constellation Design"

### **Conference Publications (\* denotes student, underline denotes presenter)**

1. S. A. Kowalchuk\* and C. D. Hall, "Spacecraft Attitude Sliding Mode Controller using Reaction Wheels," AAS/AIAA Astrodynamics Specialist Conference, Honolulu, Hawaii, 18-21 August 2008
2. S.S. Lee\* and C.D. Hall, "Geometrical Relative Orbit Modeling of Satellite Relative Motion," The F. Landis Markley Astronautics Symposium, Cambridge, Maryland, June 29 – July 2, 2008
3. J. E. Ellis\* and C. D. Hall, "Numerical Model Development and Verification for the Dynamics of an Electrodynamic Tether System," 2008 AAS/AIAA Space Flight Mechanics Meeting, Galveston, Texas, January 2008 (John V. Breakwell Student Travel Award)
4. M. S. Bitzer\* and C. D. Hall, "Optimal Electrodynamic Tether Phasing Maneuvers," International Symposium on Space Flight Dynamics (ISSFD), Annapolis, Maryland, September 2007
5. M. S. Bitzer\* and C. D. Hall, "Optimal Electrodynamic Tether Phasing Maneuvers," Virginia Space Grant Consortium Student Conference, Hampton, Virginia, April 2007
6. J. E. Ellis\* and C. D. Hall, "Dynamics of an Electrodynamic Tether System Including Gyrostat End Bodies," 2007 AAS/AIAA Space Flight Mechanics Meeting, Sedona, Arizona, February 2007d
7. S. A. Kowalchuk\* and C. D. Hall, "GPS Hardware-in-the-loop Spacecraft Formation Flying Simulation," 2007 AAS/AIAA Space Flight Mechanics Meeting, Sedona, Arizona, February 2007
8. S. A. Kowalchuk\* and C. D. Hall, "Hardware-in-the-Loop Simulation of Classical Element Feedback Controller," Flight Mechanics Symposium, NASA Goddard Space Flight Center, Greenbelt, Maryland, October 2005
9. S. A. Kowalchuk\* and C. D. Hall, "Distributed Spacecraft Attitude Control System Simulator Feedback Control Capabilities and Visualization Techniques," 7th International Symposium on Quantitative Feedback Theory (QFT) and Robust Frequency Domain Design Methods, University of Kansas, August 2005
10. H. Schaub and C. D. Hall, "Static Coulomb Formation Necessary Conditions," Malcolm Shuster Symposium, Buffalo, New York, June 2005

11. R. A. Sandfry\* and C. D. Hall, "Bifurcation of Relative Equilibria of an Oblate Gyrostat with a Discrete Damper," 6th International Conference on Dynamics and Control of Structures in Space, Riomaggiore, Cinque Terre, Liguria, Italy, July 18–22, 2004
12. J. L. Schwartz\* and C. D. Hall, "System Identification of a Spherical Air-Bearing Spacecraft Simulator," 2004 AAS/AIAA Space Flight Mechanics Meeting, Maui, Hawaii, February 2004 (John V. Breakwell Student Travel Award)
13. M. C. VanDyke\*, J. L. Schwartz\*, and C. D. Hall, "Unscented Kalman Filtering for Spacecraft Attitude State and Parameter Estimation," 2004 AAS/AIAA Space Flight Mechanics Meeting, Maui, Hawaii, February 2004
14. J. L. Schwartz\* and C. D. Hall, "The Distributed Spacecraft Attitude Control System Simulator: Development, Progress, Plans," 2003 Flight Mechanics Symposium, NASA Goddard Space Flight Center, Greenbelt, Maryland, October 28–30, 2003
15. C. D. Hall, "When Spacecraft Won't Point," 2003 AAS/AIAA Astrodynamics Specialists Conference, Big Sky, Montana, August 2003
16. A. J. Turner\* and C. D. Hall, "An Open-Source, Extensible Spacecraft Simulation Software Framework," 2003 AAS/AIAA Astrodynamics Specialists Conference, Big Sky, Montana, August 2003
17. C. E. Skelton\* and C. D. Hall, "Mixed Control Moment Gyro, Momentum Wheel, and Thruster Control Strategies," 2003 AAS/AIAA Astrodynamics Specialists Conference, Big Sky, Montana, August 2003
18. J. L. Schwartz\* and C. D. Hall, "Comparison of System Identification Techniques for a Spherical Air-Bearing Spacecraft Simulator," 2003 AAS/AIAA Astrodynamics Specialists Conference, Big Sky, Montana, August 2003
19. C. D. Hall and I. M. Ross, "Optimal Attitude Control for Coplanar Orbit Transfers," The John L. Junkins Astrodynamics Symposium, May 2003, College Station, Texas
20. M. M. Berry\*, B. J. Naasz\*, Hye-Young Kim, and C. D. Hall, "Integrated Orbit and Attitude Control for a Nanosatellite with Power Constraints," 2003 AAS/AIAA Space Flight Mechanics Conference, Ponce, Puerto Rico, Feb 9 – 12, 2003
21. C. D. Hall and V. Collazo Perez\*, "Minimum-Time Orbital Phasing Maneuvers," 2003 AAS/AIAA Space Flight Mechanics Conference, Ponce, Puerto Rico, Feb 9 – 12, 2003
22. M. Kim\* and C. D. Hall, "Control of A Rotating Variable-Length Tethered System," 2003 AAS/AIAA Space Flight Mechanics Conference, Ponce, Puerto Rico, Feb 9 – 12, 2003 (John V. Breakwell Student Travel Award)
23. J. L. Schwartz\*, M. Peck, and C. D. Hall, "Historical Survey of Spacecraft Simulators," 2003 AAS/AIAA Space Flight Mechanics Conference, Ponce, Puerto Rico, Feb 9 – 12, 2003
24. C. D. Hall and B. D. Naasz\*, "Orbit Element Feedback Control for Spacecraft Trajectories," 5<sup>th</sup> Annual Workshop on Celestial Mechanics, Albarracín, Spain, June 19 – 21, 2002
25. B. D. Naasz\*, C. D. Karlgaard\*, and C. D. Hall, "Application of Several Control Techniques for the Ionospheric Observation Nanosatellite Formation," 2002 AAS/AIAA Space Flight Mechanics Conference, San Antonio, Texas, Jan 27 – 30, 2002
26. F. S. Gulzinski III, J. H. Schilling, C. D. Hall, and J. R. Woodward\*, "PowerSail High Power Propulsion System Design Study," 2001 Joint Propulsion Conference, Salt Lake City, UT (Paper Number AIAA 2001-3346)
27. M. Kim\* and C. D. Hall, "Lyapunov and Halo Orbits about  $L_2$ ," 2001 AAS/AIAA Astrodynamics Specialists Conference, Quebec City, Canada, Jul 30 – Aug 2, 2001

28. K. L. Makovec\*, A. J. Turner\*, and C. D. Hall, "Design and Implementation of a Nanosatellite Attitude Determination and Control System," 2001 AAS/AIAA Astrodynamics Specialists Conference, Quebec City, Canada, Jul 30 – Aug 2, 2001
29. R. A. Sandfry\* and C. D. Hall, "Relative Equilibria of a Gyrostat with a Discrete Damper," 2001 AAS/AIAA Astrodynamics Specialists Conference, Quebec City, Canada, Jul 30 – Aug 2, 2001
30. C. L. Stevens\*, J. L. Schwartz\*, and C. D. Hall, "Design and System Identification of a Nanosatellite Structure," 2001 AAS/AIAA Astrodynamics Specialists Conference, Quebec City, Canada, Jul 30 – Aug 2, 2001
31. M. E. Kasarda, J. Clements\*, A. L. Wicks, C. D. Hall, and R. G. Kirk, "Effect of Sinusoidal Base Motion on a Magnetic Bearing," 2000 IEEE CCA/CACSD Joint - Control Applications/Computer Aided Control Systems Design Conference, Anchorage, AK, Sept 25–27, 2000
32. R. A. Sandfry\* and C. D. Hall, "Motion of a Gyrostat with a Discrete Damper," 2000 AIAA/AAS Astrodynamics Specialists Conference, Denver, CO, Aug 14–17, 2000
33. C. D. Hall, "Attitude Dynamics of Orbiting Gyrostats," Invited Paper, US – European Celestial Mechanics Workshop, Adam Mickiewicz University in Poznan, Poland, Jul 3 – 7 2000
34. S. P. Hughes\* and C. D. Hall, "Optimal Configurations of Rotating Spacecraft Formations," Invited Paper, Richard H. Battin Astrodynamics Symposium, Texas A&M University, College Station, TX, Mar 20 – 21, 2000
35. M. Campbell, R. R. Fullmer, and C. D. Hall, "The ION-F Formation Flying Experiments," AAS/AIAA Space Flight Mechanics Meeting, Clearwater, FL, Jan 23 – 26, 2000
36. N. Davis, J. DeLaRee, C. D. Hall, W. L. Stutzman, and W. A. Scales, "Virginia Tech Ionospheric Scintillation Measurement Mission," AIAA/Utah State University Conference on Small Satellites, Logan, UT, Aug 31- Sep 3, 1999, Paper SSC99-III-3
37. C. D. Hall and J. A. Beck, "Relative Equilibria of Orbiting Gyrostats," 1999 AAS/AIAA Astrodynamics Specialist Conference, Girdwood, AK, Aug 1999, Paper AAS 99-459
38. P. Tsiotras, H. Shen\*, and C. D. Hall, "Satellite Attitude Control and Power Tracking with Momentum Wheels," 1999 AAS/ AIAA Astrodynamics Conference, Girdwood, AK, Aug 1999, Paper AAS 99-317
39. C. D. Hall, "Laboratory Instruction in Undergraduate Astronautics," 1999 American Society of Engineering Education Annual Conference, Charlotte, NC, Jun 20–22, 1999
40. S. P. Hughes\* and C. D. Hall, "Mission Performance Measures for Spacecraft Formation Flying," 1999 Flight Mechanics Symposium, Goddard Space Flight Center, May 18-20, 1999, pp. 309–318
41. M. R. Long\* and C. D. Hall, "Attitude Tracking Control for Spacecraft Formation Flying," 1999 Flight Mechanics Symposium, Goddard Space Flight Center, May 18-20, 1999, pp. 319–332
42. K. A. Ford\* and C. D. Hall, "Singular Direction Avoidance Steering Laws for Control Moment Gyros," 1998 AIAA/AAS Astrodynamics Conference, Boston, MA, Aug 1998, pp. 287–301
43. C. D. Hall, P. Tsiotras, and H. Shen\*, "Tracking Rigid Body Motion Using Thrusters and Momentum Wheels," 1998 AIAA/AAS Astrodynamics Conference, Boston, MA, Aug 1998, pp. 302–307
44. M. W. Marasch\* and C. D. Hall, "Flywheel Energy Storage Applied to Solar Electric Orbital Transfers," 1998 AAS/AIAA Space Flight Mechanics Meeting, Monterey, CA, Feb 1998, pp. 1469–1488

45. K. A. Ford\* and C. D. Hall, "Flexible Spacecraft Reorientations Using Gimbaled Momentum Wheels," AIAA/AAS Astrodynamics Conference, Sun Valley, ID, Aug 1997, pp. 1895–1914
46. J. A. Beck\* and C. D. Hall, "Relative Equilibria of a Rigid Satellite in a Circular Keplerian Orbit," AIAA/AAS Astrodynamics Conference, Sun Valley, ID, Aug 1997, pp. 1187–1216 (AIAA Best Paper Award)
47. C. D. Hall and I. M. Ross, "Dynamics and Control Problems in the Deflection of Near-Earth Objects," AIAA/AAS Astrodynamics Conference, Sun Valley, ID, Aug 1997, pp. 613–632
48. C. D. Hall, "High-Speed Flywheels for Integrated Energy Storage and Attitude Control," Regular, Invited Paper, Proceedings of the American Control Conference, Albuquerque, NM, Jun 1997, pp. 1894-1898
49. C. D. Hall, "Momentum Transfer Dynamics of a Gyrostat with a Discrete Damper," Proceedings of the Nonlinear Dynamical Systems Symposium, 1997 AIAA Aerospace Sciences Conference, Reno NV, 6–9 Jan 1997
50. C. D. Hall, "Stationary-Platform Maneuvers of Gyrostat Satellites," *Dynamics and Control of Structures in Space III*, Computational Mechanics Publications, Southampton, 1996, pp. 337–348
51. J. D. Thorne\* and C. D. Hall, "Optimal Continuous Thrust Orbit Transfers," Proceedings of the 1996 AAS/AIAA Space Flight Mechanics Meeting
52. J. J. Hagan\*, A. L. Rizer, L. A. Obergefell, and C. D. Hall, "Validation of the Articulated Total Body Data Set Describing the Large Advanced Dynamic Anthropomorphic Manikin," Proceedings of the 1995 Survivability and Flight Equipment Symposium, Reno, NV, Oct 1995, pp. 196-209
53. C. D. Hall, "Parametric Excitation of Two-Rotor Gyrostats with Damping," Proceedings of 1995 AAS/AIAA Astrodynamics Conference. AAS 95-337
54. J. A. Beck\* and C. D. Hall, "Relative Equilibria of a Rigid Body in a Central Gravitational Field, Part I: The Orthogonal Case," Proceedings of 1995 AAS/AIAA Space Flight Mechanics Meeting, p. 723. AAS 95-179
55. J. D. Thorne\* and C. D. Hall, "Approximate Initial Lagrange Costates for Continuous Thrust Spacecraft," Proceedings of 1995 AAS/AIAA Space Flight Mechanics Meeting. AAS 95-119
56. C. D. Hall, "Spinup Dynamics of Gyrostats with Two Rotors," Proceedings of 1995 AAS/AIAA Space Flight Mechanics Meeting. AAS 95-205
57. R. Tsui\* and C. D. Hall, "Resonance Capture in Unbalanced Dual-Spin Spacecraft," Proceedings of 1994 AIAA/AAS Astrodynamics Conference, pp. 65–73. AIAA 94-3714
58. A. E. Chinnery\* and C. D. Hall, "The Motion of a Rigid Body with an Attached Spring-Mass-Damper," Proceedings of 1994 AIAA/AAS Astrodynamics Conference, pp. 74–81. AIAA 94-3715
59. A. P. Mazzoleni, C. D. Hall and M. C. Stabb, "Spinup Dynamics of Dual-Spin Satellites with Flexible Appendages," Space Flight Mechanics 1994, Vol. 87, Advances in the Astronautical Sciences, pp. 97–114, 1994. AAS 94-147
60. C. D. Hall, "Resonance Capture in Axial Gyrostats," Space Flight Dynamics 1993, Volume 84, Advances in the Astronautical Sciences, pp. 1133–1148. AAS 93-328
61. C. D. Hall, "Spinup Dynamics of Biaxial Gyrostats," Space Flight Mechanics 1993, Volume 82, Advances in the Astronautical Sciences, pp. 211–222. AAS 93-136
62. C. D. Hall and R. H. Rand, "Spinup Dynamics of Axial Dual-Spin Spacecraft," Astrodynamics 1991, Volume 76, Advances in the Astronautical Sciences, pp. 641–660. AAS 91-403

## Book Reviews

- C. D. Hall, Book Review of *Engineering Analysis in Applied Mechanics*, by J. W. Brewer, *Journal of Guidance, Control, and Dynamics*, 2003, Vol. 26, No. 4, 669–670
- C. D. Hall, Book Review of *Tensor Calculus and Analytical Dynamics*, by J. G. Papastavridis, *Journal of Guidance, Control, and Dynamics*, Vol. 23, No. 1, 2000, pp. 191–192
- C. D. Hall, Book Review of *Spacecraft Dynamics and Control*, by Marcel J. Sidi, *Journal of Spacecraft and Rockets*, Vol. 34, No. 6, 1997, pp. 851–852
- C. D. Hall, Book Review of *Control of Spacecraft and Aircraft*, by A. E. Bryson, Jr., *Journal of Guidance, Control, and Dynamics*, Vol. 20, No. 2, 1997, pp. 407–408

## Book Chapters

- C. D. Hall, “Momentum Transfer in Torque-Free Gyrostats,” in *Nonlinear Dynamics*, A. Guran (editor), World Scientific, Singapore, 1997, pp. 60–88

## Theses

- C. D. Hall, *An Investigation of Spinup Dynamics of Axial Gyrostats Using Elliptic Integrals and the Method of Averaging*, Ph.D. Dissertation, Cornell University, Ithaca, NY, Jan 1992 (Advisor: Richard H. Rand)
- C. D. Hall, R. L. Johnson, P. J. Lamatsch, D. A McCabe, P. J. Mueller, M. E Paul, and L. M. Pohl, “Preliminary Design of a Modular Unmanned Research Vehicle,” M.S. Systems Engineering Design Study, Air Force Institute of Technology, Wright-Patterson Air Force Base, OH, Dec 1988 (Advisor: Stuart C. Kramer)

## Unpublished Technical Reports

- C. D. Hall, *ION-F: A Space-Based Testbed for Distributed Formation Control using the HokieSat Nanosatellite*, for NASA Goddard Space Flight Center, 2001
- C. D. Hall, *BRDF-Related Functions for Leonardo Analysis*, for NASA Goddard Space Flight Center, 2001
- C. D. Hall, *Umbilical Coupling*, for Air Force Research Laboratory, 2001
- C. D. Hall, *Integrated Spacecraft Power and Attitude Control Systems Using Flywheels*, for Air Force Research Laboratory, Air Force Institute of Technology, 1997
- C. D. Hall and I. M. Ross, *Dynamics and Control Problems in the Deflection of Near-Earth Objects*, for Air Force Space Warfare Center, Naval Postgraduate School, Mar 1996

## Presentations

- “Dynamics of Electrodynamical Tether Systems,” 3<sup>rd</sup> International Workshop and Advanced School for Spacecraft Dynamics and Control,” Covilha, Portugal, October 8 – 11, 2007
- “Space-Related Education and Research at Virginia Tech,” Admiral Steidle, NASA HQ, Washington DC, January 18, 2005
- “CDIO Activities at Virginia Tech,” Conceive-Design-Implement-Operate Workshop, U.S. Naval Academy, June 3, 2004
- “Minimum-Time Continuous-Thrust Orbit Transfers,” Sibley School of Mechanical and Aerospace Engineering, Cornell University, March 30, 2004
- “HokieSat Attitude and Orbit Dynamics and Control,” Mechanical and Aerospace Engineering, University at Buffalo, September 3, 2003
- “HokieSat Attitude and Orbit Dynamics and Control,” Mechanical, Aerospace and Nuclear Engineering, Rensselaer Polytechnic Institute, September 5, 2003

- “Testbeds for Formation Flying Research,” Space-based Multiple Aperture Research and Technology Workshop, Albuquerque, New Mexico, April 29 – May 1, 2003
- “Design, Build, Orbit: University Spacecraft Programs,” Keynote Address, Virginia Space Grant Consortium Student Research Conference, Hampton, Virginia, April 11, 2003
- “HokieSat Attitude and Orbit Dynamics and Control,” Aeronautics and Astronautics, University of Illinois, March 31, 2003
- “Spacecraft Dynamics and Control Research at Virginia Tech,” Honeywell, Inc., Glendale, Arizona, August 13, 2002
- “Design, Analysis, Fabrication, and Testing of a Nanosatellite Structure,” Turkish Air Force Academy, Istanbul, Turkey, Jun 28, 2002
- “Design, Analysis, Fabrication, and Testing of a Nanosatellite Structure,” Faculty of Electrical & Electronic Engineering, Istanbul Technical University, Istanbul, Turkey, Jun 27, 2002
- “Orbit Element Feedback Control for Spacecraft Trajectories,” Department of Electromechanical Engineering, University of Beira Interior, Covilha, Portugal, Jun 24, 2002
- “A Career as A Military Engineer in the United States Air Force,” National Association of Military Engineers, Blacksburg, VA, Nov 8, 2001
- “The Virginia Tech Nanosatellite Project,” Sigma Xi, Blacksburg, VA, Nov 6, 2001
- “Spacecraft Dynamics and Control,” Auburn University, Auburn, AL, Oct 29, 2001
- “The Virginia Tech Nanosatellite Project,” Physics Department, James Madison University, Harrisonburg, VA, Oct 5, 2001
- “International Aerospace Engineering Design Projects,” College of Engineering Open House, Blacksburg, VA, Apr 17, 2000 (with Professor J. D. Marchman)
- “Satellite Systems for Earth Observations,” Virginia Tech Geography Department Seminar, Blacksburg, VA, Jan 31, 2000
- “Spacecraft Formation Flying,” Department of Mechanical and Aerospace Engineering, University of Colorado, Colorado Springs, CO, Mar 17, 2000
- “Virginia Tech Ionospheric Scintillation Measurement Mission,” Department of Astronautics, United States Air Force Academy, Colorado Springs, CO, Mar 16, 2000
- “Spacecraft Formation Flying,” Institute for Mechanics, Technical University of Vienna, Austria, Nov 24, 1999
- “Space Education and Research,” BWX Technologies, Lynchburg, VA, Jul 13, 1999
- “Space Exploration,” Rural Retreat Cub Scout Pack Blue and Gold Banquet, Rural Retreat, VA, Apr 15, 1999
- “Virginia Tech Ionospheric Scintillation Measurement Mission,” College of Engineering Open House, Blacksburg, VA, Mar 29, 1999
- “Satellite Systems for Earth Observations,” Virginia Tech Forestry Department Seminar, Blacksburg, VA, Mar 26, 1999
- “Military Space,” Virginia Tech Air Force ROTC Detachment, Blacksburg, VA, Mar 16, 1999
- “Virginia Tech Ionospheric Scintillation Measurement Mission,” University Nanosatellite Kickoff Meeting, Albuquerque, NM, Jan 19, 1999
- “Modeling and Simulation of Formation Flying,” Distributed Spacecraft Control Workshop, Goddard Space Flight Center, Greenbelt, MD, Dec 17, 1998
- “Dynamics and Control in Satellite Formation Flying,” Department of Theoretical and Applied Mechanics, Cornell University, Ithaca, NY, Nov 18, 1998

“Dynamics and Control in Formation Flying,” AFOSR Formation Flying and Micro-Propulsion Workshop, Lancaster, CA, Oct 20, 1998

“Flywheel Research at Virginia Tech,” 1998 Aerospace Flywheel Workshop, Albuquerque, NM, Oct 7, 1998

“Attitude Dynamics and Control of Spacecraft Using Momentum Wheels,” Department of Mechanical, Aerospace and Nuclear Engineering, University of Virginia, Charlottesville, VA, Nov 1997

“The Ohio Space Grant Consortium,” Pathfinder Conference, Ohio Aerospace Institute, Cleveland, OH, Oct 1996

“Momentum Transfer for Spacecraft Rotational Maneuvers,” Space and Missile Technology Directorate, Phillips Laboratory, Kirtland AFB, NM, Jul 1996

“Momentum Transfer for Spacecraft Rotational Maneuvers,” Department of Aerospace Engineering and Engineering Mechanics, University of Cincinnati, OH, May 1996

“Spacecraft Rotational Maneuvers,” AFOSR Astrodynamics Workshop, Colorado Springs, CO, Apr 1996

“Ohio Space Grant Consortium K-12 Outreach Activities,” Television Appearance on *In the Area*, WRGT, Dayton, OH, Dec 1994

“Spinup Dynamics of Dual-Spin Spacecraft,” Applied Mathematical Sciences Department, Rensselaer Polytechnic Institute, Troy, NY, Apr 1994

“Precession Phase Lock in Spinup of Axial Dual-Spin Spacecraft,” AIAA Dayton-Cincinnati Section Mini-Symposium, Dayton, Ohio, Mar 1992

“Spinup Dynamics of Axial Dual-Spin Spacecraft,” Center for Applied Mathematics, Cornell University, Ithaca, New York, Nov 1991

“Resonance in Axial Gyrostats,” Astronomy Department, Cornell University, Ithaca, New York, Sep 1991

## ***Advising***

### **Ph.D. Dissertations**

1. Scott A. Kowalchuk, *Investigation of Nonlinear Control Strategies Using GPS Simulator and Spacecraft Attitude Control Simulator*, September 2007. Virginia Space Grant Fellow. Currently with Analytical Mechanics Associates, Hampton, Virginia
2. Mischa Kim, *Continuous Low-Thrust Trajectory Optimization*, May 2005. Currently Assistant Professor, Embry-Riddle Aeronautical University, Prescott, Arizona. *Paul E. Torgersen Research Award Winner*
3. Jana L. Schwartz, *The Distributed Spacecraft Attitude Control System Simulator: From Design Concept to Decentralized Control*, July 2004. National Science Foundation Fellow; Amelia Earhart Fellow; NASA GSRP Fellow. Currently Senior Member Technical Staff, Draper Laboratory, Cambridge, Massachusetts
4. Matthew M. Berry, *A Variable-Step Double-Integration Multi-Step Integrator*, May 2004. Currently with Analytical Graphics, Incorporated, Malvern, Pennsylvania
5. Ralph A. Sandfry, *Equilibria of a Gyrostat with a Discrete Damper*, Jul 2001. Currently Assistant Professor, Department of Astronautics, United States Air Force Academy, Colorado Springs, Colorado. *Selected by Graduate School for Outstanding Dissertation Award*
6. Jeffrey A. Beck, *Relative Equilibria of a Rigid Satellite in a Central Gravitational Field*, Graduate School of Engineering, Air Force Institute of Technology, Wright-Patterson Air

- Force Base, Ohio, Sep 1997. Currently Systems Engineer, Northrop Grumman Electronic Systems, Azusa, California
7. Kevin A. Ford, *Reorientation of Flexible Space Structures using Momentum Exchange Devices*, Graduate School of Engineering, Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio, Sep 1997. Currently Astronaut and Space Shuttle Pilot, NASA Johnson Space Center, Houston, Texas
  8. James D. Thorne, *Optimal Continuous Thrust Orbit Transfers*, Graduate School of Engineering, Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio, May 1996. Currently with Institute for Defense Analyses, Alexandria, Virginia

### **M.S. Theses (Virginia Tech)**

1. Scott E. Lennox, *Coupled Attitude and Orbital Control System Using Spacecraft Simulators*, M.S. in Aerospace Engineering, July 2004. Currently Member of the Technical Staff, Draper Laboratory, Cambridge, Massachusetts
2. Matthew C. VanDyke, *Decentralized Coordinated Attitude Control of a Formation of Spacecraft*, M.S. in Aerospace Engineering, May 2004. Virginia Space Grant Fellow. Currently Attitude Control Systems Engineer, Orbital Sciences Corp., Dulles, Virginia
3. Marcus C. Pressl, *Internal Torques and Forces in Gyrostats with Magnetically Suspended Rotors*, M.S. in Aerospace Engineering, December 2003. Currently Engineer, AeroAstro Corp., Ashburn, Virginia
4. C. Eugene Skelton II, *Mixed Control Moment Gyro and Momentum Wheel Attitude Control Strategies*, M.S. in Aerospace Engineering, November 2003. Currently Pointing Control Subsystem Engineer, Lockheed-Martin Technical Operations, Greenbelt, Maryland
5. Andrew J. Turner, *An Open-Source, Extensible Spacecraft Simulation and Modeling Environment Framework*, M. S. in Aerospace Engineering, September 2003. Virginia Space Grant Fellow. Currently Engineer, Real Time Technologies, Inc., Royal Oak, Michigan
6. Bo J. Naasz, *Classical Element Feedback Control for Spacecraft Orbital Maneuvers*, M.S. in Aerospace Engineering, Jun 2002. Currently Flight Dynamics Engineer, NASA Goddard Space Flight Center, Greenbelt, Maryland
7. Craig L. Stevens, *Design, Analysis, Fabrication, and Testing of a Nanosatellite Structure*, M.S. in Aerospace Engineering, Jun 2002. Currently Aerospace Engineer, NASA Goddard Space Flight Center, Greenbelt, Maryland
8. Kristin L. Makovec, *A Nonlinear Magnetic Controller for Three-Axis Stability of Nanosatellites*, M.S. in Aerospace Engineering, Jul 2001. Currently Flight Dynamics Engineer, NASA Goddard Space Flight Center, Greenbelt, Maryland
9. Steven P. Hughes, *Formation-Flying Performance Measures for Earth-Pointing Missions*, M.S. in Aerospace Engineering, Dec 1999. Currently Flight Dynamics Engineer, NASA Goddard Space Flight Center, Greenbelt, Maryland
10. Matthew R. Long, *Spacecraft Attitude Tracking Control*, M.S. in Aerospace Engineering, Jul 1999. Currently Dynamics and Controls Engineer, Lockheed-Martin Space Systems, Sunnyvale, California

### **Other Graduate Advisees (College of Engineering, Virginia Tech)**

Mizuho Aoyagi, *An Inter-Computer Matlab/C++ Interface for the Space Systems Simulation Laboratory*, M.S. in Aerospace Engineering (Project), Feb 2005

Michael Edmonston, *A Numerical Model for the Density of Expelled Teflon Ions at Large Distances from a Pulsed Plasma Thruster*, M.S. in Aerospace Engineering (Project), Aug 2001

Mischa Kim, *Periodic Spacecraft Orbits for Future Space-based Deep Space Observations*, Diplomarbeit, Technical University of Vienna, Austria, 2001

Julien Kugeler, *Steady Motions of Gravity-Gradient Gyrostats*, Advanced Studies Degree, Mechanical Engineering, École Nationale Supérieure d'Ingénieurs de Constructions Aéronautiques, Toulouse, France, 1998

### **Current Graduate Advisees (College of Engineering, Virginia Tech)**

Matthew Bitzer, M.S. candidate, *Optimal Maneuvers of Electrodynamics Tethers*, expected completion May 2009 (also expected to stay for Ph.D.)

Carmen Catacora, Ph.D. candidate, NSF Fellow, *Optimal Attitude Control*, expected completion May 2010

John Dolan, M.S. candidate (non-thesis), expected completion May 2009

Joshua Ellis, Ph.D. candidate, NDSEG Fellow, *Electrodynamic Tethers*, expected completion May 2009

Timothy Janezic, M.S. candidate, *Spacecraft Simulators*, expected completion May 2008

Soung Sub Lee, Ph.D. candidate, *Relative Orbit and Attitude Control*, expected completion December 2008

Brandon Stiltner, M.S. candidate (non-thesis), expected completion May 2009

Matthew VanDyke, Ph.D. candidate, *Spacecraft Rotational Maneuvers*, currently full-time spacecraft dynamics engineer at Orbital Sciences Corporation, expected completion May 2010

Brian Williams, M.S. candidate, *Nonlinear Spacecraft Control*, expected completion May 2009

### **Undergraduate Research Projects**

Cengiz Akinli, "Semi-Autonomous Spacecraft Docking," 2003–2005, Virginia Space Grant Scholar

Michael Belcher, "Thermal Subsystem Analysis and Design," 2002–2003

Michael Belcher, Ann Bergquist, Joseph Bidwell, Kevin Earle, Scott Lennox, Daniel Pedraza, Christine Rogers, Matthew VanDyke, and Richard Winski, "VASCAT: Virginia Satellite for Carbon-monoxide Analysis and Tabulation," 2001–2002

Ann Bergquist, "Structural Testing for HokieSat," 2001–2002

Matthew Berry, "Rotating Tethered Interferometer," 2000

Matthew Bitzer, "Optimal Control of Electrodynamics Tethers," 2006–2007, Virginia Space Grant Scholar

Elizabeth Cantando, Caitlin Eubank, Peter Grossman, Brett Streetman, and Richard Winski, "HARPOSAT: Hostile Agile RaPid Orbiting Space Asset Terminator," 2003

Zarrin Chua, "Characterization of the Magnetic Field in the Space Systems Simulation Laboratory," 2004–2005, Virginia Space Grant Scholar

Joseph Eide, "GPS Emulator for Spacecraft Flight Simulation," 2004

Rolando Farrales, "HokieSat Primary Structure Prototype," 2000

Ryan Frederick, "Dynamics of a Rotating Tethered Interferometer," 2000

Bhalvinder Gulati, "Orbital Visualization for Spacecraft Simulators," 2005

Patrick Hagan, "Effects of a Reduced Gravity Environment on a Human's Ability to Remotely Control a Model Spacecraft," 2000–2001, Virginia Space Grant Scholar

Katie Hale, "Thermal Subsystem Analysis and Design," 2000–2001

Adam Harvey, "Spacecraft Structural Fabrication and Test," 2001–2002

Andre Hauschild, “Design and Fabrication of a Spacecraft Damping Mechanism,” 2004–2005, Fulbright Scholar

Mischa Kim, “Rotating Spacecraft in Halo Orbits,” 2000

Justin McFarland, “Spacecraft Simulator Thruster Characterization and Control Algorithms,” 2003–2004

Bo J. Naasz, “Mission Operations Analysis for HokieSat,” 1999–2000

Melvin Pressouyre, “Fuel-Optimal Phasing Maneuvers,” 2003

Daniel Rabin, “Spacecraft Structural Fabrication and Test,” 2001–2002

Chris Recla, “Nanosatellite Wiring Harness Design and Fabrication,” 2003

Jana Schwartz, “Modeling of Spacecraft Simulator,” 1998–1999

Michael A. Shoemaker, “Control of Spacecraft Simulators Using Immersive Virtual Environments,” 2003–2004

Elliott Shoup, “Orbital Maneuvers for the Leonardo Mission,” 2001

Craig Stevens, “Analysis and Design of a Tether for Gravity Gradient Stabilization,” 1999–2000

Brett Streetman, “Characterization of Spacecraft Simulator Momentum Wheels,” 2004

Matthew VanDyke, “Magnetometer-Only Attitude Determination,” 2001–2002, Virginia Space Grant Scholar

Sam Wright, “Automatic Balancing of Spacecraft Simulator,” 2004

Chimi Zacot, “Thermal Analysis for Spacecraft Design,” 1999

Chris Zuchowski, “The Use of Computer Hard Drives as Momentum Wheels,” 2000–2001, Virginia Space Grant Scholar

## Senior Spacecraft Design Projects

### 2004–2005

Autonomous Coulomb Vehicle

ARMOR: Asteroid Rendezvous Mission for Obliteration or Redirection

ARTEMIS: Academic Research Team for the Establishment of a Lunar Magnetic Field Investigation System

Two-Dimensional Mass Motion Spacecraft Simulator

### 2003–2004

Follow-on Mission for the Hubble Space Telescope (retrofit and orbit transfer mission)

ISiRUS: In-Situ Resource Utilization Support (hydrogen supply for Mars exploration)

SIRA: Solar Imaging Radio Array (large formation of microsatellites)

SPECS: Submillimeter Probe of the Evolution of the Cosmic Structure (rotating tethered interferometer)

### 2002–2003

CUBIK: CubeSat Universal Bus Integrated Kit

Integration of the MicroMAPS Instrument into the High-Altitude Proteus Platform (joint project with a senior Aircraft Design team)

Virginia Tech Inflatable Plant Growth Module

Virginia Tech Sounding Rocket Payload

**2001–2002**

SMARTS: Stair-stepping to Mars Autonomous Rendezvous Tether System

DIPSTICS: Deployable InterPlanetary Space Tether Infrastructure for Communications Satellites

A Tether System for Deploying Communications Satellites to Mars

**2000–2001**

Design and Definition of a Venus Sample Return Architecture

Leonardo – A Satellite Formation for Earth Remote Sensing

Mission Analysis for a Solar Orbit Transfer Vehicle

PowerSail High Power Propulsion System Design Study

**1999–2000**

Submillimeter Probe of Early Cosmic Structure (CASSANDRA)

MIGRATOR: Micro GRavity, Atmospheric Probe & Tethered Orbital Reentry Platform (joint project with Technical University of Vienna, Austria)

LOOKOUT: L2 Observer Of Kosmic Origins Using Tethers

RAPUNZEL: RAPid noncondUctive Nadir-Zenith tEther Laboratory (joint project with Technical University of Vienna, Austria)

**1998–1999**

Cygnus-X – A Single-Stage-To-Orbit Launch Vehicle using Rocket-Based Combined Cycle Propulsion (joint project with Georgia Tech)

HokieSat – The Virginia Tech Ionospheric Scintillation Mission

Leonardo – Formation Flying Mission for Bidirectional Reflectance Distribution Function

**M.S. Systems Engineering Design Studies (Air Force Institute of Technology)**

David P. Blanks, Douglas M. Bruce, Anthony M. Logue, Ralph A. Sandfry, Stephen J. Skotte, and Michael L. Zywiec, “A Two-Stage Intercontinental Ballistic Missile Design Optimization Study and Life Cycle Cost Analysis,” M.S. in Systems Engineering, Dec 1992. Research advisor

Charles D. Barondes, Eric B. Bjorn, Karen E. H. Cooper, Javier E. Hopun, and Carol R. Manda, “Design Tool For The Evaluation of Replacements for Halon in Aircraft Dry Bay Fire Suppression Systems,” M.S. in Systems Engineering, Dec 1992. Research committee member

James A. Bessel, James M. Ceney, David M. Crean, Edward A. Ingham, and David J. Pabst, “Prototype Space Fabrication Platform,” M.S. in Systems Engineering, Dec 1993. Research committee member

Martin E. Piccus, Gary A. Smith, Brian K. Standley, Tami L. Volk and Linda B. Wildes, “Creation of Prototype Aircrew Protection Equipment Based on Face Anthropometry,” M.S. in Systems Engineering, Dec 1993. Research committee member

Charles M. Carter, Kristina M. Fortmann, Stephen W. Hill, Robert M. Latin, Edward J. Masterson, Joseph A. Roh, and Sujay R. Setlur, “A Systems Engineering Approach to Environmental Risk Management: A Case Study of Depleted Uranium Test Area C-64, Eglin Air Force Base, Florida,” M.S. in Systems Engineering, Dec 1994. Research committee member

Gerald F. Ashby\*, Darren J. Buck\*, Robert W. Carneal\*, Tansel Cokuysal†, A. Tuna Donmez†, James A. From\*, Todd C. Krueger†, and Brian I. Robinson\*, “A Preliminary Design of a Standardized Spacecraft Bus for Small Tactical Satellites”, M.S. in Systems Engineering†, M.S. (Space Operations\*), Dec 1996. Research committee member

Paul J. Cotter\*, Steven A. Fischer\*, Dwight D. Fullingim†, Brian L. James\*, William A. Seeliger\*, James M. Valenti\*, and Jörg D. Walter†, “Satellite Integrated Power and Attitude Control System Design Study,” M.S. in Systems Engineering†, M.S. (Space Operations\*), Dec 1997. Research advisor

### **M.S. Theses (Air Force Institute of Technology)**

R. Kevin Adams, “A Comparison of Three Approximate Mathematical Models for the Gravity Gradient Stabilized Satellite,” M.S. in Astronautical Engineering, Dec 1993

Kevin D. Benedict, “Autonomous Onboard Command System for Launch Vehicle Range Safety,” M.S. (Space Operations), Dec 1995

Anne E. Chinnery, “Numerical Analysis of the Motion of a Rigid Body with an Attached Spring-Mass-Damper,” M.S. in Aeronautical Engineering, Dec 1993

Jules F. Desamours, “Analysis of Spacecraft Inversion for Gravity Gradient Gyrostats,” M.S. (Space Operations), Dec 1995

Joel J. Hagan, “Validation of the Articulated Total Body Model Data Set Describing the Large Advanced Dynamic Anthropomorphic Manikin,” M.S. in Aeronautical Engineering, Dec 1995

Brady P. Hauboldt, “Optimization of a Nutation Damper Attached to a Spin-Stabilized Satellite,” M.S. (Space Operations), Dec 1994

David L. Kinney, “An Approximate Solution for the Linearized Spinup Dynamics of a Dual-Spin Spacecraft,” M.S. in Astronautical Engineering, Dec 1992

Stewart J. Kowall, “An Approximate Solution for the Spinup Dynamics of Near Axisymmetric Axial Gyrostats Using the Method of Multiple Scales,” M.S. in Astronautical Engineering, Dec 1993

Mark W. Marasch, “Applying Flywheel Energy Storage to Solar Electric Orbital Transfers,” M.S. in Astronautical Engineering, Dec 1997

Cynthia A. Provost, “Steady Motions of Rigid Body Satellites in a Central Gravitational Field,” M.S. in Astronautical Engineering, Dec 1993

Gregory W. Schultz, “Optimal and Sub-Optimal Rotational Maneuvers of Spacecraft with Momentum Wheels,” M.S. in Astronautical Engineering, Dec 1995

Raymond Tsui, “Resonance Capture in Unbalanced Dual-Spin Spacecraft,” M.S. in Astronautical Engineering, Mar 1994 (Commandant’s Award Winner)

Kevin J. Walker, “Systems Analysis of GPS Electrical Power System Redesign,” M.S. (Space Operations), Dec 1995

John W. Wong, “Analysis of Tethers in Sampling Near-Earth Objects,” M.S. (Space Operations), Jun 1997