CURRICULUM VITAE - ROBERT G. MELTON

Professor of Aerospace Engineering
The Pennsylvania State University
University Park, PA 16802

EDUCATIONAL BACKGROUND

- Ph.D. (1982), Engineering Physics, University of Virginia.
- M.S. (1979), Physics, University of Virginia.
- B.S. (1976), Physics (cum laude), Wake Forest University.

PROFESSIONAL EXPERIENCE

- Visiting researcher, Rutherford Appleton Laboratory, Oxfordshire, England, 1996-97 (sabbatical leave)
- Professor, Department of Aerospace Engineering, Penn State University, 2000-present.
- Associate Professor, 1987-2000.
- Assistant Professor, 1981-1987.
- Courses Taught
  - *Undergraduate*: Orbital Mechanics and Attitude Control, Spacecraft Systems, Spacecraft Design, Astronautics, Dynamics and Control Systems, Space Science and Technology (for non-technical majors), Performance of Aerospace Vehicles, Mechanics of Materials.
  - *Graduate*: Astrodynamics, Advanced Spacecraft Dynamics, Dynamics and Control of Aerospace Vehicles.
- Visiting Researcher, Applied Research Laboratory, Penn State University, 1985-1986.
- NASA/ASEE Summer Fellow, Space Systems Division, NASA Langley Research Center, 1983.
- Research Assistant, Research Laboratories for the Engineering Sciences, University of Virginia, 1979-1981.
- Research Assistant, Department of Physics, University of Virginia, 1977-1979.

RESEARCH

- Dynamics and control of satellite constellations and formation-flying
- Advanced spacecraft design
- Singular optimal control for low-thrust orbital maneuvering
- Perturbation analysis of orbital motion for low-thrust vehicles
- Optimum burn scheduling for low-thrust orbital transfers
- Control of flexible space structures, using embedded fiber-optic sensors
- Analysis of rendezvous mechanics in perturbed orbits
- Attitude determination of spacecraft using the GPS
- Optimum target scheduling for space telescopes
- Dynamics of gyro-controlled spacecraft via conjugate momentum methods
- Attitude control of multi-body spacecraft
- Conceptual design of a decentralized attitude control system for a multi-body space station

(NASA/ASEE Summer Fellowship Research 1983, and subsequent research)
- Dynamics of liquid-filled, spin-stabilized spacecraft
- Error analysis for multiple finite-burn ascent trajectories
- Optimum detumbling of space stations
- Real-time control of advanced thermal power systems via microcomputers

FUNDED RESEARCH

- "Orbit Insertion Using Low-Thrust Capture," funded by NASA/JPL, Feb. 2003-Jan. 2005, $99,530, co-PI with David B. Spencer.
- "Advanced Space Mission and Vehicle Design," funded by USRA/NASA, Aug. 1992 - June 1995, $45,000. Co-PI with Roger C. Thompson.
  - Mission designs for:
    - In-situ measurements on Mercury and the Moons of Mars
    - Project ECHO (Enhanced Communications from Halo Orbit) -- A Communications Relay Satellite in Lunar Halo Orbit
    - Project PEPE (Penn State Electric Propulsion Experiment) -- Design of a Small Satellite to Demonstrate Microwave Electric Propulsion and Measure Effects of Electron Plume on Communications
- "Engineering Research Equipment Grant: An Active Control System for Research in Dynamics and Controls," funded by NSF, $80,215. Co-PI with Roger C. Thompson.
- "Feasibility Study for a Six Degree-of-Freedom Inertial Measurement Unit (IMU) Design," funded by Conrad Technologies, Inc., Sept. 1990-Feb. 1991, $10,000. Co-PI with Roger C. Thompson, Anthony K. Amos.
- "Advanced Spacecraft Design," funded by USRA/NASA, Aug. 1989 - June 1992, $69,000. Co-PI with Roger C. Thompson.
  - Mission designs for:
    - ACRV (Assured Crew Return Vehicle from Space Station)
    - Mars Sample Return Mission
    - Comet Nucleus and Asteroid Sample Return Missions
- "Dynamics and Control of Large, Articulated Spacecraft in Low-Earth Orbit," funded by WESPACE, Inc., Jan.-March 1987. $17,600. Principal investigator.
- "Optimal Orbital Control for Low-Earth Orbit Rendezvous," funded by WESPACE, Inc., April-Oct. 1987. $15,000. Principal investigator.
- "The Analysis of an Active System to Prevent Helicopter Blade-Airframe Strikes," funded by Army Research Office, Nov. 1986-May 1988. $108,000. Co-principal investigator with B. W. McCormick.
- "Control of Composite Space Structures Using Embedded Fiber Optic Sensors," subcontracted by Dynamics Technology, Inc. (SBIR contract from DoD), Oct. 1987-Apr. 1988. Phase I: $15,500. Co-principal investigator with D. W. Jensen; Phase II: $200,000. Co-investigator with D. W. Jensen and R. C. Thompson.
- "Advanced Thermal Propulsion Systems" (control system analysis, design, and simulation), Principal Investigator-Daniel H. Kiely, Applied Research Laboratory, sponsored by Office of Naval Technology (involvement was 5% release time during academic year, 50% in summer),

April-December 1985.

GRADUATE THESES SUPERVISED

- Kaushik Basu (M.S., in progress, expected completion Aug. 2010)
- Brandon Girts (M.S., in progress)
- Seung Pil Kim (Ph.D., in progress, “Optimal Relocation of Satellites in Geostationary Orbit,” expected completion Aug. 2011)
- Timothy Meisenhelder (Ph.D., in progress)
- Chenmeng Tu (M.S., August 2008), “Application of a Homotopy Method to Low-Thrust Trajectory Optimization”
- Elizabeth Davis (M.S., May 2008), “Solar Sail Trajectory Optimization Using Collocation and NSGA II”
- Sangwoo Bae (M.S., August 2007), “Orbit Determination of Tethered Satellites via Differential Correction”
- John Iannacone (M.S., May 2007), ”A Numeric Study of a Proposed Epicycle Formulation”
- Brian Wadsley (M.S., May 2007), “Dynamic Programming Solutions for the Optimal Visitation Order for Spacecraft Servicing Missions,”
- Timothy Meisenhelder (M.S., May 2005), “Accounting for Albedo Effects in a Solar-Panel-Based Coarse Sun-Sensor”
- William Chadwick III (M.S, May 2005), “Optimizing an Interplanetary Transfer of a Low-Thrust, Gravity-Assist Mission Using Direct Collocation”
- Timothy Craychee (M.S., December 2004), “Optimal Solar-Sail Trajectories to a Pole-Sitting Orbit”
- Travis Schrift (M.S., December 2004) “Delta-V Requirements of Interplanetary Transfers Utilizing Lagrange Points”
- Matthew Brumbach (M.Eng., May 2004), “Optimization of an Earth-to-Mars Trajectory for a Solar Sail Spacecraft Using a Genetic Algorithm”
- Abby Weeks (M.Eng., May 2004), “Optimization of a Gravity-Assist Trajectory Using a Genetic Algorithm”
- Michael Safko (M.Eng., May 2004), Nanosatellite Thermal Control Subsystem Design for the Local Ionospheric Measurement Satellite – LionSat”
- Ai Shinoda (M.S., August 2004, co-advised with D.K. McLaughlin), “Parameterization and Testing of a Hybrid Rocket Engine”
- John Freeman, (M.S., May 2000), "Optimum Patching Between Ascent and Transfer Trajectories in a Restricted Three-Body Problem"
- Benjamin Bernocco, (M.S., May 1998), "Optimal Station-Keeping for Large Radar-Satellite Constellations"
- Michael J. White (M.S., May 1997), "Using Reusable Launch Vehicle For Lunar Missions"
- Wesley C. Voshell (M.S., Aug. 1997), Design Of Optimal Low Earth Orbit Satellite Constellations For Communication Networks.
- Thomas F. Starchville (Ph.D., May 1996), "Optimal Low-Thrust Trajectories for Insertion into Halo Orbits in the Earth-Moon System"

- Houzhi Jin (Ph.D., expected ?), "Optimal Satellite Retrieval Analysis"
- Nezih Mrad (Ph.D., Dec. 1995), "Optimal Control of a Flexible Structure Employing Embedded Fiber-Optic Sensors," (co-advised with Bohdan Kulakowski)
- David S. Rubenstein (Ph.D., Aug. 1995), "Attitude Control of Spacecraft Using Moveable Appendages"
- Mark E. Kotanchek (Ph.D., Dec. 1994), "Stability Exploitation and Subspace Array Processing," (co-advised with John Dzielski)
- James Bush, (M.S., May 1994), "Trajectory Optimization via Collocation and Quintic Hermite Interpolation"
- James R. Burton (M.Eng., in progress), "Perturbation Analysis of Orbital Motion Using Battin's Universal Functions"
- Michael Williams (M.S., May 1993), "Stability Analysis of Planetary Ring/Moon Systems"
- Henry J. Muessen, III, (M.S., May 1990) "A Numerical Approach to Optimal Thrust Profiles for Orbital Transfers"
- Michael Ross (Ph.D., May 1990), "First-Order Singular Thrust-Arcs in Aerospace Trajectory Optimization"
- Daniel J. Stewart (M.S., May 1990), "Perturbation Analysis for Low-Thrust Orbital Transfers"
- David P. Hanson (M.S., Dec. 1988), "Optimization of Spacecraft Pointing Sequences for Multiple Targets"
- Tommy E. Williams (M.S., Aug. 1988), "Optimal Thrust-Limited Orbital Rendezvous in the Presence of Perturbations"
- Thomas W. Vaneck (M.S., Dec. 1987), "Dynamics of Large Articulated Satellites in Low-Earth Orbit"
- Charles J. Weyandt, Jr. (M.S., Dec. 1988), "Geosynchronous Orbit Retrieval System Conceptual Design"
- Michael T. Keith (M.S., May 1987), "Optimum Ascent Trajectories for a Second-Generation Space Shuttle"
- Michael A. Thames (M.S., Dec. 1985), "Decentralized N-Body Attitude Control Methods for Spacecraft"
- David S. Rubenstein (M.S., Dec. 1985), "A Moveable-Mass Detumbler for a Disabled Space Vehicle Using a Dynamic Programming Optimization Method"
- Christopher F. Rogers (M.S., Dec. 1985), "Covariance Analysis Via the Monte Carlo Technique for Finite Burn Missions"
- Robert A. Blankenbiller (M.S., Jan. 1984), "Smart Artillery Simulation," Dual Degree Program with Operations Research
- Neil J. Adams (M.S., Jan. 1984), "Error Analysis for Multiple, Finite-Burn Ascent Trajectories"

GRADUATE THESIS COMMITTEES (Aerospace Engineering unless otherwise noted)

Ph.D.

- Scott Hanford, in progress
- Christopher Scott, May 2010
- Nadia Selami, December 2009

M.S.

- Alexander Parkhill, M.S., August 2008
- Oranuj Janrathitikarn, M.S., August 2007
- Daniel Clemens, M.S., May 2004

- Daniel Clemens, Ph.D., May 2008
- David Morris, Ph.D., May 2008 (Astronomy & Astrophysics)
- Abdul Aziz, Ph.D., in progress
- Mokin Lee, Ph.D., May 2006 (Engr. Mechanics)
- Richard Branam, Ph.D., August 2005
- Silvio Chianese, Ph.D., May 2005
- Hideaki Yamato, Ph.D., August 2003
- Eric Cardiff, Ph.D., May 2002
- Jiunn-ru Huang, Ph.D. (Electr, Eng.), Aug. 2001
- Fu-Wen Shiue, Ph.D., August 2001
- Teresa Kaltz, Ph.D., Aug. 1998
- Dennis Straussfogel, Ph.D., Aug. 1998
- Philip Baalam, Ph.D. Aug. 1997
- Daniel L. Sullivan, Ph.D. December 1995
- Jeffrey Little, Ph.D., Aug. 1996
- Li Liu, Ph.D., Aug. 1996 (Agricultural Engr.)
- Benhe Qu, Ph.D., Aug. 1996
- Sandra Scrivener, Ph.D., Dec. 1993
- Jurgen Mueller, Ph.D., May 1993
- William Check, Ph.D. (Electr. Engr.), Dec. 1988
- Joseph Akl, Ph.D. (inactive)
- Peter Vaiana, M.S., May 2007
- Nadia Selami, M.S., May 2005
- Christopher Scott, M.S., May 2005
- Ryan Kobrick, M.S., May 2005
- Matthew Wissler, M.S., May 2005
- Matthew Ferringer, M.S., May 2005
- Jugo Igarashi, M.S., Aug. 2004
- Phill-Sun Hur, M.S., May 2004
- Anthony Faulds, M.S., Aug. 2002
- Young Te Ahn, M.S., Aug. 2002
- Young Ha Kim, M.S., Aug. 2001
- Silvio Chianese, M.S., May 2001
- Gregoire Dizac, M.Eng., Aug. 1999
- Frederic Souliez, M.S., Aug. 1999
- David Nordling, M.S., Aug. 1998
- Ronald Menello, M.S., Aug. 1998
- Teresa Kaltz, M.S., Aug. 1994
- Lance Werthman, M.S., Aug. 1995
- Randall Kanzleiter, M.S., Aug. 1991
- Daniel Sullivan, M.S., May 1991
- Leon Gardner, M.S., May 1991
- David Lapioli, M.S., May 1990
- Thomas M.P. Kenney, M.S., Dec. 1987
- James P. Knecht, M.S., May 1986
- James R. Wilson, M.S., May 1985
- James R. Hulka, M.S., May 1986
- Jinho Kim, M.S., Dec. 1985
- Dennis M. Straussfogel, M.S., Aug. 1985
- Slobodan Z. Djordjevic, M.S., Nov. 1982

CONSULTING

- Trajectory analysis (Ford Research Laboratories)
- Development of simulation software for space station guidance (Battelle)
- Review of stability criteria for spinning spacecraft experiencing propellant slosh
- (INTELSAT).
- Analysis of nutational dynamics in spin-stabilized spacecraft with liquid propellants (Selenia Corp., Italy).
- Development of simulation code for IRIS nutation control system (BPD Corp., Italy).
- Development of simulation code for attitude dynamics of articulated satellites in low-Earth orbit (Westinghouse Electric Corp.).

PUBLICATIONS (refereed)

- Hur, P.-S., Melton, R.G., and Spencer, D.B., “Meeting Science Requirements for Attitude Determination and Control in a Low-Power, Spinning Nanosatellite,” *Journal of Aerospace Engineering, Sciences and Applications,* Vol. 1, No. 1, 2008, pp. 25-33.
- Wissler, M.A., Spencer, D.B., and Melton, R.G., “Coast-Arc Orbit Stability During Spiral-Down Trajectories about Irregularly Shaped Bodies,” *Journal of Spacecraft and Rockets,* Vol. 44, No. 1, 2007, pp. 254-263.
- Chianese, S., Spencer, D.B., and Melton, R.G., "Selecting Projects for a Capstone Spacecraft Design Course from Real World Solicitations," *Journal of Aviation/Aerospace Education and Research*, Vol. 16, No. 1, 2006, pp. 27-40.
- Chadwick III, W.J, Spencer, D.B., and Melton, R.G., “Geometric Visibility of Ground Sites for Beacon/Relays on the Martian Moons,” *J. of Spacecraft and Rockets,* Vol. 43, No. 1, Jan-Feb. 2006, pp. 228-231.
- Cichan, T., Melton, R.G., and Spencer, D.B., "Control Laws for Minimum Orbital Change -- The Satellite Retrieval Problem," *Journal of Guidance, Control, and Dynamics*, Vol. 24, No. 6, Nov.-Dec. 2001, pp. 1231-1233.
- Melton, R.G., Time-Explicit Representation of Relative Motion Between Elliptical Orbits, Journal of Guidance, Control, and Dynamics, Vol. 23, No. 4, July-August 2000, pp. 604-610.
- Rubenstein, D.S. and Melton, R.G., "Multiple Rigid Body Reorientation Using Relative Motion With Constrained Final System Configuration," *Journal of Guidance, Control, and Dynamics,* May-June, 1999, Vol. 22, No. 3, pp. 441-446.
- Mrad, N., Melton, R.G., and Kulakowski, B.T., "Performance of Optical Sensors in the Control of Flexible Structures," *Journal of Intelligent Material Systems and Structures,* Vol. 8, No. 11, Nov. 1997, pp. 920-928.
- Staugler, A.J., Chart, D.A., and Melton, R.G., "Reversed-Series Solution to the Universal Kepler Equation," *Journal of Guidance, Control, and Dynamics*, Nov.-Dec. 1997, Vol. 20, No. 6, pp. 1276-1277.
- Mrad, N., and Melton, R.G., "Sensitivity Effects on Distributed-Effect Optical Sensor Output," *Journal of Sound and Vibration*, Vol. 198, No. 1, 1996, pp. 123-130.
- Ross, I.M. and Melton, R.G., "Singular Arcs for Blunt Endoatmospheric Vehicles," *The Journal of the Astronautical Sciences*, Vol. 41, No. 1, January-March 1993, pp. 35-51.
- Melton, R.G., Lajoie, K.M., and Woodburn, J.W., "Optimum Burn Scheduling for Low-Thrust Orbital Transfers," *Journal of Guidance, Control, and Dynamics*, Vol. 12, No. 1, pp. 13-18 (Jan.-Feb., 1989).
- Ross, I.M. and Melton, R.G., "A Symmetric Kinematic Transformation Pair Using Euler Parameters," *Journal of Guidance, Control, and Dynamics*, Vol. 10, No. 5, pp. 506-507 (Sept.-Oct. 1987).
- Adams, N.J. and Melton, R.G., "Orbital Transfer Error Analysis for Multiple, Finite Perigee Burn Ascent Trajectories," *The Journal of the Astronautical Sciences*, Vol. 34, No. 4, pp. 355-73 (Oct.-Dec. 1986).
- Melton, R.G., "A Composite Model of Aircraft Noise," *Journal of Aircraft*, Vol. 22, No. 5, pp. 443-44 (May 1985).
- Melton, R.G. and Jacobson, I.D., "The Fallacy of Using NII in Analyzing Aircraft Operations,"

Journal of Aircraft, Vol. 21, No. 2, pp. 151-54 (Feb. 1984).

- Cook, G., Jacobson, I.D., Chang, R., and Melton, R.G., "Methodology for Multi-Aircraft Minimum Noise Landing Trajectories," *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 1, No. 18, (Jan. 1982).
- Melton, R.G., Paterson, J.L., and Kaplan, S.B., "Superconducting Tunnel-Junction Refrigerator," *Physical Review B*, Vol. 21, No. 5, pp. 1857-1867 (March 1980).
- Melton, R., Danieley, N., and Turner, T.J., "Luminescence of MgO During Mechanical Deformation," *Physica Status Solidi A*, Vol. 57, pp. 755-764 (Feb. 1980).

PUBLICATIONS (non-refereed)

- Bilén, S.G. Philbrick, C.R. Wheeler, T.F. Mathews, J.D. Melton, R.G. Spencer, D.B., "An Overview of Space Science and Engineering Education at Penn State," Aerospace and Electronic Systems Magazine, July 2006, Vol. 21, Issue 7, pp. S_23- S_27.
- Melton, R.G., Thompson, R.C., and Starchville, T.F. (eds.) "Project ECHO: Electronic Communications from Halo Orbit, " final report to NASA/USRA Advanced Design Program, July 1994, NASA-CR-197190.
- Melton, R.G., Thompson, R.C., and Starchville, T.F. (eds.), "A Mission to Mercury and a Mission to the Moons of Mars," final report to NASA/USRA Advanced Design Program, July 1993, NASA-CR-195530.
- Melton, R.G., Thompson, R.C., and Starchville, T.F. (eds.), "Comet Nucleus and Asteroid Sample Return Missions," final report to NASA/USRA Advanced Design Program, June 1992, NASA-CR-192055.
- Melton, R.G., Thompson, R.C., and Burton, J.R. (eds.), "Mars Sample Return Mission: Two Alternate Scenarios," final report to NASA/USRA Advanced Design Program, Nov. 1991, NASA-CR-189970.
- Melton, R.G., Thompson, R.C., and Burton, J.R. (eds.), "Preliminary Subsystem Designs for the Assured Crew Return Vehicle (ACRV)," Vols. 1-3, final report to NASA/USRA Advanced Design Program, Nov. 1990, NASA-CR-186662.
- Melton, R.G., "Newton's Laws," "Stability," "Spinning Tops and Gyroscopes," "Trajectories," and "Transformers," sections in *Magill's Survey of Science: Physical Science Reference Series*, Frank N. Magill, ed., Salem Press, Inc., 1992.
- Melton, R.G., "Guglielmo Marconi," *The Nobel Prize Winners: Physics*, Frank N. Magill, ed., June 1989.
- Melton, R.G., "Interplanetary Monitoring Platforms" and "Orbiting Geophysical Observatory Space-craft," sections in *Magill's Survey of Science: Space Exploration Series*, March 1989.
- Kaufman, B., Melton, R.G., and Stengle, T. "Astrodynamics," *Aerospace America*, Dec. 1988, p. 41.
- Melton, R.G. "Astrodynamics," *Aerospace America*, Dec. 1987, p. 32.
- Melton, R.G., "Why We Need A Space Station," *Washington Times*, March 13, 1985.
- Melton, R.G. and Jacobson, I.D., "Minimum Noise Impact Aircraft Trajectories," NASA-CR-164719 (Sept. 1981).

BOOKS

- Melton, R. G., *Space Station Technology*, SAE Technology series, PT-52, 1996, Society of Automotive Engineers, Warrendale, Pennsylvania.
- Melton, R.G., Wood, L.J., Thompson, R.C., Kerridge, S.J. *Spaceflight Mechanics 1993, Advances in the Astronautical Sciences Vol. 82, Parts I & II* (proceedings of the AAS/AIAA Spaceflight Mechanics Meeting, Feb. 22-24, 1993, Pasadena, CA, 1436 pages).

PRESENTATIONS (given by R.G. Melton unless otherwise noted)

- Melton, R.G., "Constrained Time-Optimal Slewing Maneuvers for Rigid Spacecraft," AAS/AIAA Astrodynamics Specialist Conference, Pittsburgh, PA, Aug. 9-13, 2009, paper AAS09-309.
- Yutko, B.M., and Melton, R.G., "Optimizing Spacecraft Reorientation Maneuvers Using a Pseudo-Spectral Method," invited paper, 4th International Workshop and Advanced School on Spaceflight Dynamics and Control, University of Beira Interior, Covilhã, Portugal, Oct. 6-8, 2008.
- Iannacone, A.J., and Melton, R.G., "Epicycle Analysis for the LISA Orbits," Proceedings of the 58th International Astronautical Congress, Sept. 23-26, 2007, Hyderabad, India, paper IAC-07-C1.4.03.
- Wadsley, B.J. and Melton, R.G., "Optimal Visitation Order For Spacecraft Servicing Missions," *Advances in the Astronautical Sciences*, Vol. 129, 2007, paper no AAS 07-425, pp. 2705-2723 (presented by Wadsley).
- Meisenhelder, T., and Melton, R.G., "Modeling Albedo Effects in Coarse Sun-Sensor Data for a Spinning Nanosatellite," AAS/AIAA Astrodynamics Specialist Conference, Lake Tahoe, California, Aug. 7-11, 2005, paper no. AAS 05-329.
- Hur, P.-S., Melton, R.G., and Spencer, D.B., "Meeting Science Requirements For Attitude Determination And Control In A Low-Power, Spinning Nanosatellite," 55th International Astronautical Congress, Oct. 4-8, 2004, Vancouver, British Columbia, paper no. IAC-04-A.4.05.
- Hur, P.-S., Melton, R.G., and Spencer, D.B., "Attitude Determination and Control of a Nanosatellite Using Geomagnetic Field Data and Sun Sensors," AAS/AIAA Spaceflight Mechanics Meeting, Feb. 8-12, 2004, Maui, Hawaii, paper no. AAS 04-144.
- Chadwick, W.J., Spencer, D.B., and Melton, R.G., "Geometric Analysis of Visibility of Mission Support Infrastructure for Phobos and Deimos," AAS/AIAA Spaceflight Mechanics Meeting, Feb. 8-12, 2004, Maui, Hawaii, paper no. AAS 04-135 (presented by Spencer)
- Spencer, D.B., Melton, R.G., and Chianese, S.G., "Selecting Projects for a Capstone Spacecraft Design Course," AAS/AIAA Astrodynamics Conference, Aug. 3-7, 2003, Big Sky, Montana, paper no. AAS 03-503 (presented by Spencer)
- Melton, R.G., "Comparison of Relative-Motion Models for Elliptical Orbits," *Proceedings of the 3rd International Workshop on Satellite Constellations and Formation Flying*, Servizio Tecnografico Área della Ricerca Del CNR, Pisa, Italy, 2003, pp. 181–189.
- Melton, R.G., "Comparison of Direct Optimization Methods Applied to Solar Sail Problems," AIAA/AAS Astrodynamics Specialist Conference and Exhibit, August 5-8, 2002, Monterey, California, paper no. AIAA-2002-4728.

- Cichan, T., and Melton, R.G., “Optimal Trajectories for Non-Ideal Solar Sails,” AAS/AIAA Astrodynamics Special Conference, July 30-August 2, 2001, Quebec City, Quebec, Canada, paper no. AAS 01-471, also in *Advances in the Astronautical Sciences,* Vol. 109 , pp. 2381-2392, (presented by Cichan).
- Cichan, T., Melton, R.G., and Spencer, D.B., "Control Laws for Minimum Orbital Changes -- The Satellite Retrieval Problem, Part II" AIAA/AAS Astrodynamics Specialist Conference and Exhibit, 14-17 August 2000, Denver, Colorado, paper no. AIAA-2000-4430, (presented by Cichan).
- Melton, R.G., and Cichan, T., "Control Laws for Minimum Orbital Changes -- The Satellite Retrieval Problem," AAS/AIAA Spaceflight Mechanics Meeting, January 23-26, 2000, Clearwater, Florida, paper no. AAS 00-206); also in *Advances in the Astronautical Sciences*, Vol. 105, pp. 1631-1638.
- Melton, R.G., "Preliminary Orbital Control Strategy for LISA," AAS/AIAA Spaceflight Mechanics Meeting, Feb. 1999, Breckenridge, CO, paper no. AAS 99-156; also in *Advances in the Astronautical Sciences*, Vol. 102, pp. 805-810.
- Starchville, T.F. and Melton, R.G., "Optimal Low-Thrust Transfers to Halo Orbits About the L_2 Libration Point in the Earth-Moon System (Elliptical Problem)," AAS/AIAA Spaceflight Mechanics Meeting, Monterey, California, Feb. 9-11, 1998, paper no. AAS 98-205; published in *Advances in the Astronautical Sciences*, Vol. 99, pp. 1489-1506.
- Starchville, T.F. and Melton, R.G., "Optimal Low-Thrust Trajectories to Earth-Moon L2 Orbits (Circular Problem)," AAS/AIAA Astrodynamics Specialist Conference, Sun Valley, Idaho, August 1997, paper no. AAS 97-714; published in *Advances in the Astronautical Sciences*, Vol. 97, pp. 1741-1756.
- Melton, R.G., "Relative Motion of Satellites in Elliptical Orbits," AAS/AIAA Astrodynamics Specialist Conference, Sun Valley, Idaho, August 1997, paper no. AAS 97-734; published in *Advances in the Astronautical Sciences*, Vol. 97, pp. 2075-2094.
- "Challenges for LISA (Laser Interferometer Space Antenna)," Rutherford Appleton Laboratory, Oxfordshire, England, Feb. 5, 1997.
- Staugler, A.J., Chart, D.A., and Melton, R.G., "A Reversed-Series Solution to the Universal Kepler Equation," AAS/AIAA Spaceflight Mechanics Meeting, Albuquerque, New Mexico, Feb. 13-16, 1995, paper no. AAS 95-192; published in *Advances in the Astronautical Sciences*, Vol. 89, Univelt, Inc., July 1995.
- "Student Groups That Work: The Issue of Authority," Instructional Development Program Seminar on Teaching, Penn State University, Nov. 16, 1994.
- "Experiences of a COMPEL Novice," presented at Exploring Computer Technologies in Engineering Instruction, Penn State University, Feb. 8, 1994.
- "Surviving the Crunches: Preparing Students for Success in Long-Term Collaborative Learning Projects," 1 hour seminar, co-presented with Robert A. Walker at the Collaborative Learning Workshop, Penn State University, Sept. 17-18, 1993
- "Team Building and Peer Evaluations," presented at 1993 NASA/USRA Summer Conference, Houston, TX (1 hour seminar)
- "Socializing Students to Work in Groups Using Peer Evaluation," Master Teacher Seminar, Instructional Development Program, Penn State University, March 4, 1993.
- Burton, James R., and Melton, R.G., "Variation of Parameters Using Battin's Universal Functions," AAS/AIAA Spaceflight Mechanics Meeting, Colorado Springs, CO, Feb. 24-26, 1992, paper no.

AAS 92-125; published in *Advances in the Astronautical Sciences*, Vol. 79, Univelt, Inc., July 1992, pp. 225-230.

- Thompson, R.C., and Melton, R.G., "The Advanced Design Program at Penn State," AIAA 1992 Aerospace Design Conference, Irvine, CA Feb. 3-6, 1992, paper no. 92-1237.
- Stewart, Daniel J., and Melton, R.G., "Approximate Analytic Representations for Low-Thrust Trajectories," Paper AAS 91-512, AAS/AIAA Astrodynamics Specialist Conference, Durango, CO, August 19-22, 1991; published in *Advances in the Astronautical Sciences*, Vol. 76, Jan. 1992, pp. 1455-1467.
- Jin, H. and Melton, R.G., "Transfers Between Circular Orbits Using Fixed Impulses," Paper No. AAS 91-161, AAS/AIAA Spaceflight Mechanics Meeting, Houston, TX, Feb. 11-13, 1991; published in *Advanced in the Astronautical Sciences*, Vol. 75, July 1991, pp. 1833-1842.
- Ross, I.M. and Melton, R.G., "Singular Arcs for Blunt Endoatmospheric Vehicles," Paper No. AIAA 90-2974, AIAA/AAS Astrodynamics Conference, Portland, OR, Aug. 20-22, 1990, (presented by Ross).
- Ross, I.M. and Melton, R.G., "The Non-Optimality of Forced Keplerian Motion in an Atmosphere," Paper No. AAS 89-409, AAS/AIAA Astrodynamics Specialist Conference, Stowe, VT, Aug. 7-10, 1989, (presented by Ross).
- Ross, I.M. and Melton, R.G., "Quaternion Formulation of a Double-Gimballed, Momentum Wheel Control System," Paper No. AAS 87-510, AAS/AIAA Astrodynamics Specialist Conference, Kalispell, MT, Aug. 10-13, 1987, (presented by Ross); published in *Advances in the Astronautical Sciences*, Vol. 65, Jan. 1988, pp. 1207-1220.
- Melton, R.G. and Thames, M.A., "Decentralized Control of Multi-Body Spacecraft," Paper No. AIAA-87-0018, AIAA 25th Aerospace Sciences Meeting, Reno, NV, Jan. 12-15, 1987.
- Melton, R.G., Lajoie, K.M. and Woodburn, J.W., "Optimum Burn Scheduling for Low-Thrust Orbital Transfers," Paper No. AIAA-86-2010-CP, AIAA/AAS Astrodynamics Conference, Williamsburg, VA, Aug. 18-20, 1986.
- Melton, R.G., Rubenstein, D.S., and Fisher, H.L., "Optimum Detumbling of Space Platforms Via a Dynamic Programming Algorithm," Paper No. AIAA-86-2154-CP, AIAA Guidance, Navigation, and Control Conference, Williamsburg, VA, Aug. 18-20, 1986.
- Everett, K.A., Adams, N.J., and Melton, R.G., "First-Order Perturbation Analysis for Low-Thrust Spacecraft," Paper No. AAS 85-442, AAS/AIAA Astrodynamics Specialist Conference, Vail, CO, Aug. 12-15, 1985, (presented by Everett); published in *Advances in the Astronautical Sciences*, Vol. 58, Part I, Univelt, Inc., 1986, pp. 139-150.
- Adams, N.J. and Melton, R.G., "Orbital Transfer Error Analysis for Multiple, Finite Perigee Burn, Ascent Trajectories," (presented by Adams) Paper No. AAS 85-302, AAS/AIAA Astrodynamics Specialist Conference, Vail, CO, Aug. 12-15, 1985, (presented by Adams); published in *Advances in the Astronautical Sciences*, Vol. 58, Part I, Univelt, Inc., 1986, pp. 37-56.
- Melton, R.G. and Jacobson, I.D., "Minimum Noise Impact Aircraft Trajectories," Virginia Academy of Sciences, Space Science and Technology Section, Charlottesville, VA, May 1980.
- Melton, R.G. and Turner, T.J., "Deformation-Luminescence in MgO," American Physical Society, Atlanta, GA, April 1976.

PROFESSIONAL AND HONORARY AFFILIATIONS

- American Institute of Aeronautics and Astronautics
  - Associate Fellow
  - Associate Editor, *Journal of Guidance, Control, and Dynamics* (1992-present)
  - Astrodynamics Technical Committee (1986-89)
  - Member, Applications Advisory Board of the *Journal of Guidance, Control, and Dynamics* (1987-89)
  - Vice-chair, Central Pennsylvania Section, 2008-2009
  - Chair, Central Pennsylvania Section, 2009-201
  - Member, Student Activities Committee (1989-1994)
- American Astronautical Society
  - Fellow
  - Vice President-Publications, 2002-2004
  - Vice President-Technical, 2000-2002
  - Spaceflight Mechanics Technical Committee, 1991-2001
    - Chairman, 1997-99.
  - Board of Directors, 2004 – 2007.
- International Astronautics Federation
  - Member, Astrodynamics Technical Committee and International Planning Committee, March 2004-March 2009
- American Society for Engineering Education
- Sigma Xi (Scientific Research Honorary)
  - President, Penn State Chapter, 1989-92
  - President-elect, 1988-89
  - Secretary, 1987-88
- Sigma Pi Sigma (Physics Honorary)
- Omicron Delta Kappa (Leadership Honorary)

HONORS AND AWARDS

- AIAA Sustained Service Award, January 2010
- Milton S. Eisenhower Award for Distinguished Teaching, 2006
- Lawrence J. Perez Memorial Student Advocate Award, 2001.
- Premier Teaching Award, College of Engineering, 1992.
- AIAA Special Service Citation, 1995.
- Outstanding Advising Award, College of Engineering, 1986.
- Ralph R. Teetor Educational Award, Society of Automotive Engineers, 1986.
- Outstanding Teaching Award, College of Engineering, 1985.

SERVICE

- Reviewer for:
  - *Journal of Guidance, Control, and Dynamics*
  - *Journal of Spacecraft and Rockets*
  - *Journal of the Astronautical Sciences*
  - *Journal of Optimization and Engineering*
  - *Journal of Advances in Space Research*
  - *Journal of Applied Mechanics*
  - *Celestial Mechanics and Dynamical Astronomy*
  - *IEEE Transactions on Aerospace and Electronic Systems*
  - *Optimal Control: Applications and Methods*
  - *Journal of Dynamic Systems, Measurement and Control*
  - *Acta Astronautica*
  - *Automatica*
  - *AIAA Journal*
  - *Journal of Applied Mechanics*
  - McGraw-Hill Publishing Co. (4 textbooks)
  - Cambridge University Press (1 textbook)

- Chaired sessions in orbital analysis, maneuvering, and trajectory optimization:
  1987 Astrodynamics Specialist Conf.(Kalispell, MT); 1988 Aerospace Sciences Meeting (Reno, NV); 1988 Astrodynamics Conf. (Minneapolis, MN); 1989 Aerospace Sciences Meeting (Reno, NV); 1989 Astrodynamics Specialist Conf. (Stowe, VT); 1991 Spaceflight Mechanics Meeting (Houston, TX); 1991 Astrodynamics Specialist Conf. (Durango, CO); 1992 Spaceflight Mechanics Meeting (Colorado Springs, CO); 1992 Astrodynamics Conference (Hilton Head, S.C.); 1993 Astrodynamics Specialist Conf. (Victoria, B.C.); 1994 Spaceflight Mechanics Meeting (Cocoa Beach, FL), 1995 Spaceflight Mechanics Meeting (Albuquerque, NM), 1995 Astrodynamics Specialist Conference (Halifax, N.S.), 1996 Spaceflight Mechanics Meeting (Austin, TX), 1997 Astrodynamics Specialist Conf. (Sun Valley, ID), 1998 Spaceflight Mechanics Meeting (Monterey, CA), 1998 AIAA/AAS Astrodynamics Specialist Conference (Boston, MA), 1999 AAS/AIAA Spaceflight Mechanics Meeting (Breckenridge, CO), 1999 AAS/AIAA Astrodynamics Specialist Conf. (Girdwood, AK), 2000 AAS/AIAA Spaceflight Mechanics Meeting (Clearwater, FL), 2000 AIAA/AAS Astrodynamics Conf. (Denver, CO), 2001 AAS/AIAA Spaceflight Mechanics Meeting (Santa Barbara, CA), 2001 AAS/AIAA Astrodynamics Specialist Conf. (Quebec City, Canada), 2002 Spaceflight Mechanics Meeting (San Antonio, TX), 2002 Astrodynamics Specialist Conf. (Monterey, CA), 2004 Spaceflight Mechanics Meeting (Maui, Hawaii), 55th International Astronautical Congress (2004, Vancouver, British Columbia)
- Technical Program Co-chairman, 1993 AAS/AIAA Spaceflight Mechanics Meeting (Pasadena, CA)
- Technical Program Co-chairman, 1990 AIAA/AAS Astrodynamics Conf. (Portland, OR)
- National Science Foundation - proposal reviewer, 1984-89
- John von Neumann Computation Center - proposal reviewer, 1987
- Assessment Steering Group, President's Commission for Undergraduate Education, 1992

- University Marshal Corps
  - Assistant University Marshal, 1983-84
  - Associate University Marshal, 1984-2004
  - University Marshal, 2004-present
- University Faculty Senate, 1987-95
  - Undergraduate Instruction Committee, 1987-90, 91-92
  - Chair, Undergraduate Education Committee, 1993-95
  - Student Life Committee, Vice-Chair, 1990-91
  - Senate Subcommittee on Cultural Diversity, 1991
  - Committee on Committees and Rules, 1995-96
- Provost's Steering Committee to implement the Institute for the Improvement of Learning, 1994-95
- Steering Team, Schreyer Institute for Innovation in Learning, 1995-96
- President's Awards Committee, 1991
- University Scholars Program - Faculty Adviser, 1984-present
- Schreyer Honors College
  - Faculty Advisory Committee, 1997-2000
  - Faculty Selection Committee (review admissions applications), 2005-2010
  - Academic Integrity Committee (chair), 1997-present
- Graduate Faculty, The Pennsylvania State University, 1981-present
- Academic Committee, College of Engineering, 1985-86
- Academic Computing Committee, College of Engineering, 1982-87, 1988-90
- Sabbatical Leave Committee, College of Engineering, 1988, 1990, 1997-98
- Faculty Advisory Committee, Leonhard Center for the Enhancement of Engineering Education, 1991-96
- Chairman, Departmental Faculty Search Committee, 1987-88
- Director of Undergraduate Studies (Dept. of Aerospace Eng.), 1991-92, 1998-present
- Director of Graduate Academic Affairs (Dept. of Aerospace Eng.), 1993-1998
- Departmental Promotion and Tenure Committee, 1987-88, 1989-90, 1992-95, 1997-2001
- Departmental Strategic Planning Committee, 1987-89
- Aerospace Engineering Computational Facilities Coordinator, 1984-87
- Chairman, Departmental Computer Coordination Committee, 1988-90
- NASA Get Away Special Experiments, College of Engineering - Faculty Adviser, 1982-86
- AIAA Student Branch - Faculty Adviser, 1983-present
- University Faculty Senate Subcommittee on Academic Standards (review of petitions for exceptions to University policies), 2008-09.
- College of Engineering Promotion and Tenure Committee
  - Member 2004-2005
  - Chair 2005-2006
- Dept. of Civil and Environmental Engineering – Faculty Search Committee (external member) 2009-2010