CURRICULUM VITA

ROBERT ALVIN FREDERICK, JR.

Professor of Mechanical and Aerospace Engineering
Director of the UAH Propulsion Research Center
Technology Hall Room S226
Mechanical and Aerospace Engineering Department
University of Alabama in Huntsville
Huntsville, Alabama 35899

EDUCATION

PURDUE UNIVERSITY *1983-1988* *W. LAFAYETTE, IN*

Doctor of Philosophy in Aeronautical and Astronautical Engineering awarded May 13, 1988. Dissertation: "Combustion Mechanisms of Wide Distribution Propellants," Adviser: J.R. Osborn.

PURDUE UNIVERSITY *1981-1982* *W. LAFAYETTE, IN*

Master of Science in Engineering awarded August 4, 1982. Thesis: "A Photographic Study on the Effect of Acceleration on Composite Propellant Combustion," Adviser: J.R. Osborn.

PURDUE UNIVERSITY *1976-1980* *W. LAFAYETTE, IN*

Bachelor of Science in Mechanical Engineering awarded May 18, 1980.

EMPLOYMENT

UNIVERSITY OF ALABAMA IN HUNTSVILLE *HUNTSVILLE, AL*

Director of UAH Propulsion Research Center, May 2008 to Present; *Interim Department Chair*, Department of Mechanical and Aerospace Engineering: January to August 2011; *Professor* of Mechanical and Aerospace Engineering since August 2009; Faculty Member of Department of Mechanical and Aerospace Engineering, September 1991 to Present.

SVERDRUP TECHNOLOGY, INC., AEDC GROUP *ARNOLD AFB, TN*

Engineer, Propulsion Diagnostics Technology Group, January 1988 to June 1991.

AIR FORCE ROCKET PROPULSION LABORATORY *EDWARDS AFB, CA*

Aerospace Engineer, Aerothermal Chemistry Branch, June 1981 to August 1981; June 1982 to December 1982.

ALLISON GAS TURBINES *INDIANAPOLIS, IN*

Design Engineer, Turbine Engineering, June 1979 to August 1979; June 1980 to December 1980.

HONORS, AWARDS, AND SERVICE HIGHLIGHTS

- ***UAHuntsville College of Engineering Outstanding Engineering Senior Faculty Member.*** in recognition of his consistent record of achievement in research, teaching, and service, February 2012.
- ***AMRDEC Director's Certificate,*** "This certificate is a small token of our appreciation for all of the accomplishments and dedication that you have provided to the AMRDEC over the past 10 years. The results of your Senior Design/IPT projects will remain active for many years to come." Awarded by the U.S. Army Aviation and Missile Research, Development and Engineering Center, and signed by Dr. William C. McCorkle, Director, and Dr. Virginia Young, Deputy Director, presented April 28, 2006.
- ***AIAA Special Service Citation,*** "For Exceptional Service to the Aerospace Community through Organization of the Collaborative Symposia to Provide Educational and Professional Development Opportunities," awarded by AIAA South East Region Board, and signed by Alan Mulally, AIAA President, presented May 20, 2004.
- ***AIAA 2004 Professional of the Year,*** "For Extraordinary Technical Ability in the Promotion of this Profession," Presented by the Alabama-Mississippi Section of the American Institute of Aeronautics and Astronautics, May 20, 2004.
- ***Outstanding Faculty Award for the College of Engineering,*** "for outstanding leadership and dedication to students," December 4, 2002.
- ***United States Representative,*** appointed by U.S. Air Force to represent the U.S. Air Force and the U.S. Navy to the NATO Advisory Group for Aerospace Research and Development (AGARD), Propulsion and Energetics Panel, Solid Propellant Burning Rate Measurements, 1996–2001.
- ***U.S. Professor of the Year Nominee,*** for extraordinary dedication to excellence in undergraduate teaching, nominated by Frank Franz, President UAH in 1997, 1998, 1999, and 2000.
- ***Associate Fellow,*** presented by American Institute of Aeronautics and Astronautics October 1, 1999.
- ***1998 UAH Outstanding Professor of the Year for the College of Engineering,*** "for your generosity in enlightening the minds of UAH's student body," awarded by UAH Student Government Association, April 14, 1998.
- ***AIAA Distinguished Service Award,*** "for distinguished service to the American Institute of Aeronautics and Astronautics as Chair of the Hybrid Rockets Technical Committee 1995-1997," awarded May 1998.
- ***1997 UAH Foundation Award for Distinguished Teaching,*** for "superior teaching as recognized by your faculty colleagues and by your students past and present," awarded by The University of Alabama in Huntsville, April 10, 1997.
- ***AIAA Distinguished Service Award,*** "for distinguished service to the American Institute of Aeronautics and Astronautics as a member of the Solid Rockets Technical Committee, 1995.
- ***AIAA Service Citation,*** Associate Editor, Journal of Propulsion and Power, 1994–1996, for "the time and effort you expended on behalf of AIAA helped to maintain the journal's high standard," presented February 18, 1997.

- ***The AIAA Northrop Corporation Graduate Team Missile Design Competition Award,*** "In recognition of leading a winning design team – First Place," awarded by the American Institute of Aeronautics and Astronautics, September 1994.
- ***Associate Editor, 1994-1996.*** American Institute of Aeronautics and Astronautics, Journal of Propulsion and Power, appointed by R.H.W. Waesche, Editor in Chief,
- ***Outstanding Assistant Professor,*** awarded by The University of Alabama in Huntsville College of Engineering, Huntsville, Alabama, February 25, 1994.

TEACHING ACTIVITES

EXTERNAL FUNDING [TEACHING ALSO LISTED IN RESEARCH SECTION]

1. Alabama Space Grant Consortium, "University Student Launch Initiative Level II," Contract Number: NNX10AJ80H, 10/1/10 – 9/31/11, Principal Investigator: Dr. Robert A. Frederick, Jr., Award: $11,200; Cost Share: $82,124.
2. Vice President for Research, "Internal Funding for Propulsion Classroom and USLI Laboratory Development," Principal Investigator: Robert A. Frederick, Jr., Award: $150,000.
3. ASG, "2011-2012 University Space Launch Initiative," 10/1/2011 – 9/30/2012, PI: Robert A. Frederick, Jr., $5,000; $25,000 Cost Share from OVPR. = $30,000. (Total)
4. U.S. Army Aviation and Missile Research, Development and Engineering Center, "Micro-UAVs in a Collaborative Urban Scenario," Contract W31P4Q-04-C-R172 Modification P001, Option Order 140, March 22, 2007 to December 31, 2007; Co-Principal Investigators: Robert A. Frederick, Jr., D. Brian Landrum, and N. Slegers; $49,831.
5. Jacobs Sverdrup, ESTS Group, "Advanced Solid Rocket Propulsion Class/Symposium," Contract SvT-0029, Fund/Grant 23883, December 7, 2006 to March 1, 2007; Principal Investigator: Robert A. Frederick, Jr; $85,896.
6. U.S. Army Aviation and Missile Research, Development and Engineering Center, "Micro-UAVs in a Collaborative Urban Scenario Concept Study," Contract W31P4Q-04-C-R172 Modification P00049, Option Order 074, February 1, 2006 to December 27, 2006; Principal Investigators: Robert A. Frederick, Jr. and D. Brian Landrum, $59,974.
7. U.S. Army Aviation and Missile Research, Development and Engineering Center, "Enhanced Counter Air Projectile," Contract W31P4Q-04-C-R172 Modification P00027, Option Order 27, January 26, 2005 to September 30, 2005; Principal Investigator: Robert A. Frederick, Jr.; $49,993.56
8. U.S. Army Aviation and Missile Command, "Notional Miniature Interceptor," Contract DAAH01-01-0-R160-D.O. 25, December 23, 2003 to September 30, 2004; Principal Investigator: Robert A. Frederick, Jr.; $94,903.48.
9. American Helicopter Society, "Research Support (Helicopter Thrust Stand)," November 2003 to December 2004; Principal Investigator: Robert A. Frederick, Jr.; $1,000.
10. U.S. Army Aviation and Missile Command, "Guided 2.75-in Missile Design Study," Contract DAAH01-01-0-R160-D.O. 25, December 23, 2002 to September 30, 2003; Principal Investigators: Robert A. Frederick, Jr., Brian Landrum, Dawn Utley, Rose Norman, Charles Corsetti, and Earl Wells; $24,999.
11. U.S. Army Aviation and Missile Command, "Systems Engineering of Unmanned Hybrid Vehicle," Contract DAAH01-01-0-R160-D.O. 25, March 11, 2002 to

September 30, 2002; Principal Investigator: Robert A. Frederick, Jr.; CO-Investigators: Dr. Jorge Auñón, David Berkowitz, Paul Componation, Charles Corsetti, Phillip Farrington, Brian Landrum, Dawn Utley, Earl Wells; $54,990.

12. U.S. Army Aviation and Missile Command, "Integrated Unmanned Air-Ground Robotics System," UAH Proposal 2000-547, September 8, 2000 to May 30, 2001; Principal Investigator: Robert A. Frederick, Jr.; CO-Investigators: F. Wessling and P. Componation; $49,843.20.
13. National Science Foundation, "Virtual Control-and-Dynamic-Systems Laboratory Development for Undergraduate Courses," UAH Proposal 99-441, Contract Number DUE-9952801; January 15, 2000 to December 31, 2001; Co-Principal Investigators: Robert A. Frederick, Jr., R. D. Hampton, C. D. Johnson, Yuri Shtessel, and R. L. Middleton; $52,901.00.
14. Army Aviation and Missile Command, "Modular Unmanned Logistics Express," March 12 to May 30, 1998; Principal Investigator: Robert A. Frederick, Jr.; $24,900.
15. Alabama Space Grant Consortium, "Crew Escape Contest," January 1997 to September 1997; Principal Investigator: Robert A. Frederick, Jr.; $4,969.
16. Alabama Space Grant Consortium, "Space Trajectory Simulation for the Internet," Proposal 96-202, January 1, 1996 to December 31, 1996; Principal Investigator: Robert A. Frederick, Jr.; $10,000.
17. Army Aviation and Missile Command, "Modular Unmanned Logistics Express," March 12 to May 30, 1998; Principal Investigator: Robert A. Frederick, Jr.; $24,900.
18. National Aeronautics and Space Administration, George Marshall Space Flight Center, "Hybrid Rocket Powered Upper Stage Technology Ground Demonstrator Project," Contract No. NAS8-1216, Proposal 95-647, October 1, 1995 to September 30, 1996; Co-Principal Investigators: Robert A. Frederick, Jr., D. Evans and R. Norman; $25,000.

TEACHING AWARDS

Outstanding Faculty Award for the College of Engineering, awarded by the UAH Student Government Association, December 4, 2002.

U.S. Professor of the Year Nominee, for extraordinary dedication to excellence in undergraduate teaching, nominated in 1997, 1998, 1999, and 2000 by Frank Franz, President UAH.

1998 UAH Outstanding Faculty of the Year, Engineering, awarded by UAH Student Government Association, April 14, 1998.

1997 UAH Foundation Award for Distinguished Teaching, awarded by The University of Alabama in Huntsville, April 10, 1997.

National First Place, AIAA/Northrop Graduate Team Missile Design, Faculty Advisor, awarded by the American Institute of Aeronautics and Astronautics, September 1994.

Regional First Place, Curriculum Innovation Award, with Dr. Dorla Evans of Administrative Sciences, "First Steps Toward Integrating Engineering and Business Education," awarded by South Western Business Deans' Association, Austin, Texas, February 1995.

MENTORING OF GRADUATE STUDENTS

Ph.D. Dissertations Completed

1. Bennewitz, John, "High-Frequency Combustion Instability Control through Acoustic Modulation at the Inlet Boundary for Liquid Rocket Engine Applications," Ph.D., Defense March 12, 2015, spring, 2015.
2. Whitehead, Joshua, "Mixed Oxidizer Hybrid Propulsion System Optimization Under Uncertainty Using Applied Response Surface Methodology and Monte Carlo Simulation," Ph.D., summer 2008.
3. Shelton, Joey, "Launch Vehicle Propulsion Parameter Design Multiple Selection Criteria," Ph.D., fall 2004.
4. Di Salvo, Roberto, "Direct Measurement of Solid-Propellant Pressure-Coupled Response Function with Ultrasound," Ph.D., spring 2002.
5. Greiner, Brian E., "An Experimental Investigation of Ammonium Nitrate-Oxidized Propellant Combustion Mechanisms," Ph.D., spring 1998.
6. Miyata, Kosei, "Combustion Mechanisms of AN-Based Mixed Oxidizer Propellants," Ph.D., spring 1997.

Master's Theses Completed

1. Butt, Ali, "Dynamic Calibration and Analysis of Crack Tip Propagation in Energetic Materials Using Real-Time Radiography, fall 2015, Adviser: R.A. Frederick, Jr.
2. Jones, Daniel, "Advanced Digital Methods for Solid Propellant Burning Rate Determination," summer 2015.
3. Denney, Matthew," Measurement of Solid Rocket Propellant Burning Rate Using X-Ray Imaging," summer 2015.
4. Mascaro, Michael, "Regression Rate Determination of a Gas Generator Hybrid Rocket Motor with GOX," summer 2015.
5. Colbaugh, Lauren, "Indirect and Direct Methods for Measuring a Dynamic Throat Diameter in a Solid Rocket Motor" spring 2015.
6. Evans, John, "Monte Carlo Assessment of Solid Rocket Propellant Burning Rate Measurement," Summer 2013.
7. Carpenter, Joel, "Combustion Instability Automated Acoustic Mode Detection Methodology for a Subscale Combustion Chamber with a Single Injector," Summer 2012.
8. Schoukroun, Lucas, Rendezvous and Berthing of a Spacecraft Using Solid Propulsion, spring 2012.
9. Richman, Benjamin M., "On the Method of Combustion Instability Mode Determination in a Cylindrical Chamber and Useage with Experimental Data,"spring 2012.

10. Hitt, Mathew, "Experimental Investigation of Cavitation Instability Through a Circular Orifice," spring2012.
11. Sandlin, D., "Direct Retroreflective Laser Strobography Shadowgraphs," fall 2011.
12. Penton, Ashley F., "Determination of a Solid Propellant's Burn Rate Using a New Digital Burn Rate Analysis Method;" fall 2011
13. Betts, Erin M., "Determination of a New Throttling Liquid Rocket Engine for a Mars Lander," spring 2011.
14. Brooks, John, "Evaluating Combustion Instability in a Sub-scale Combustion Experiment with Three Scaling Parameters," fall 2010.
15. Eberhart, Chad, "The Effects of Chamber Pressure Variation on Swirl Injector Atomization," fall 2010.
16. Williams, Jason, "Development of a Hover Testbed," summer 2010.
17. Sweeney, B., "Scaling a Single Element Combustor to Replicate Combustion Instability of a Liquid Rocket Engine," summer 2010.
18. Ikard, Shawn, "Experimental Injector Element Stability Characterization and Combustion Imaging," Fall 2009.
19. Wingard , Zac, "Experimental Evaluationion of Regression Rates in a Hypergolic Motor System,": Summer 2009.
20. Huynh, Huy, "Instability Mode Assessment of a Single-Element Shear Coaxial Injector," Summer 2009.
21. Marshall, Tony, "Methods of Analysis of Ultrasonic Echos to determine Solid Propellant Burning Rates," December 2008.
22. Byrd, Robert, "Injector Element Instability Mode Assessment in a Laboratory-Scale Burner," August 2008.
23. Cavitt, Ryan, "Experimental Methodology for Measuring Combustion and Pressure Coupled Response," May 2007.
24. Hahn, Philip, "Feasibility of a Guided Interceptor," December 2006.
25. Brown, Sara Paul, "Developing a Standard for the Thermal Stability of RP-1 Fuel," August, 2005.
26. Emens, J.M., "Experimental Analysis of the High Reynolds Number Thermal Stability Test Method," August 2005.
27. Gerards, A. B., High Pressure Ballistic Evaluation Motor: The Development and Characterization of the Army Ten-Pound Charge (ATPC) Motor," 2006.
28. Khodabandeh, Julia, "Hydrocarbon Fuel Deposition in HiReTS Tubes," May 2005.
29. Whitehead, James Joshua, "Experimental Evaluation of a Mixed Oxidizer Hybrid Concept with GOX," December 2004.
30. Knox, L.R., "Experimental Determination of Regressing Rates of Mixed Hybrid Propellants," September 2004.

31. Shelton, J., "Uncertainties in Nozzle Heat Flux and Hot Gas Wall Temperatures," May 2001.
32. Rasmussen, B.M., "An Intrinsic Heterogeneous Model of Composite Solid Propellant Combustion," December 1998.
33. Chiyyarath, Kairali, "Ballistic Characteristics of Bi-Plateau Solid Propellants," October 1998.
34. Bishop, R.D., "Variable Exponent Propellants," April 1997.
35. McCormick, S., "Performance of Micro-Porous LOX Injectors in a Hybrid Rocket Motor," April 1997.
36. John, Anil, "Optimization of Simple Gas Turbine Cycles for Power Generation from Pyrolysis Gases," January 1996.
37. Komai, Iwao, "An Analytical Assessment for the Temperature Sensitivity in Ducted Rocket Gas Generators," November 1993.
38. Blevins, Jr., John A., "An Analytical and Experimental Assessment of Microwave Diagnostics in Rocket Exhaust Applications," October 1993.
39. Greiner, Brian E., "Experimental Investigation of Combustion Instability Using a Labscale Hybrid Rocket Motor," October 1993.
40. Cooper, David A., "The Measurement of Electron Density in a Rocket Motor Plume," March 1993.

Non-Thesis Master's Completed

1. Kashmira Samel, Fall 2015.
2. Setayesh, Brandon, fall 2015.
3. Russell, Cooper, fall 2014.
4. Gilbert, Andrew, spring 2012.
5. Brock, Joshua, spring 2012.
6. Moore, James D., fall 2011.
7. Morgan, Justin, MSE Plan II, Anticiapted Graduation; fall 2011.
8. Nandhigam, Naresh, Plan II, spring 2011.
9. Dutton, T.A., Plan II; fall 2010
10. Battula, C., Plan II, summer 2010; Advisor: R.A. Frederick, Jr.
11. Ewere, Felix: Plan II; spring 2010.
12. Billman, Jr., Barry R., Plan II; spring 2010.
13. Hughes, Jason L., MSE Plan II; spring 2010.
14. Olatoyinbo, Seyi Festus, MSE Plan II; spring 2010.
15. James, Kevin, MSE Plan II; summer 2009.
16. Roberts, Clark, MSE Plan II, Spring 2009.

17. LeCompte, Brian, MSE Plan II; Summer 2009.
18. Dandu, Prudhviraju, MSE Plan II; Graduation: Fall 2008.
19. Devineni, Pradeep, MSE Plan II, Expected Graduation: Fall 2008.
20. Harris, Hudson, "Advanced Tactical Missile III," May 2008
21. Hayes, Jr., Phillip Gary, "Advanced Tactical Missile III," May 2008
22. Ricks, Timothy P., "Advanced Tactical Missile III," May 2008
23. Waters, Eric D., "Advanced Tactical Missile III," May 2008
24. Wood, Christopher Scott, "Advanced Tactical Missile III," May 2008
25. Williams, Kirklin Keith, "Advanced Tactical Missile III," May 2008
26. Blacklock, Kevin, "Advanced Tactical Missile II," November 2006.
27. Blackwell, Robert, "Advanced Tactical Missile II," November 2006.
28. Burdette, Douglas, "Advanced Tactical Missile II," December 2007
29. Dickson, Jerry, "Advanced Tactical Missile II," November 2006.
30. Duggan, Patrick, "Advanced Tactical Missile II," November 2006.
31. Graham, Nathan, "Advanced Tactical Missile II," November 2006.
32. Haataja, Matthew, "Advanced Tactical Missile II," November 2006.
33. Hawkins, Troy, "Advanced Tactical Missile II," November 2006.
34. Hudson, Spencer, "Advanced Tactical Missile II," November 2006.
35. Lofts, Christopher, "Advanced Tactical Missile II," November 2006.
36. Martin, Jason, "Advanced Tactical Missile II," November 2006.
37. Molton, Eric, "Advanced Tactical Missile II," November 2006.
38. Naranjo, Ricardo "Advanced Tactical Missile II," November 2006.
39. Parks, Ricardo, "Advanced Tactical Missile II," November 2006.
40. Strand, Steven, "Advanced Tactical Missile II," March 2007.
41. Williams, Craig, "Advanced Tactical Missile II," November 2006.
42. DePlachett, C., Application of the GECAT™ Software for Instruction in Gas Turbine Propulsion Analysis, May 2000.

Undergraduate Thesis Completed

1. Parrow, E., "Regression Rate from Pressure Analysis Using the Aft-Tangent Bisector Method for Determining Burn Time on a Pressure – Time Curve," spring 2015.
2. Duarte, Fernando," Determining the Erosion Rate of a Phenolic Rocket Nozzle," Undergraduate Thesis, spring 2014.

3. Lungow Niara, “Determining the Burning Rate of Solid Propellant,” Undergraduate Thesis, spring 2014.
4. Tsuda, Kenta, “Determining the Strain in a Metal Rocket Case,” Undergraduate Thesis, spring 2014.

Ph.D. Dissertations Currently Supervising .

1. Bluestone, Stephen Expected Graduation, fall 2017.
2. Eberhart, Chad, "An Investigation of Liquid Rocket Swirl Coaxial Injection Under Self-excited High Frequency Oscillations," Expected Graduationspring 2016.
3. Gerards, Amy, Expected Graduation, fall 2016.
4. Hiaat, Andrew, Passed Qualifying Examination on August 29, 2014, Expected Graduation, spring 2016.
5. Hitt, Matthew, “Regression Rate Study of Classical Hybrid Fuel with Porous Flow,” Passed Qualifying Examination on October 15, 2014, Expected Graduation, spring 2016.
6. Sweeney, Brian, The Effects of Jet Breakup Length and Acoustic Angle of Incidence on the Spray of Like-Doublet Injectors,” Expected Graduation, spring 2016.

Master’s Students Currently Supervising

1. Cook, Brian, Plan II, Anticipated graduation summer 2016.
2. Durrett, Allison, Anticipated graduation summer 2016.
3. Freeman, Charles, MSE Plan I Anticipated graduation fall 2015.
4. Helmeid, Evan, Anticipated Graduation summer 2016
5. Roy, B. , MSE Plan I, Anticipated Graduation, spring 2016.
6. Hamilton, Britteny, Anticipated Graduation, fall 2016.

CLASSROOM INSTRUCTION

Courses Taught

Undergraduate: Thermodynamics I, Numerical Methods, Aerospace Propulsion, Aerospace Propulsion Laboratory, Introduction to Engineering Design, Design of Thermal Systems, Mechanical Engineering Design, and Aerospace Engineering Design.

Graduate: MAE 540- Rocket Propulsion, MAE 640 Rocket Propulsion II, Directed Research.

New Courses Developed

MAE 640 Rocket Propulsion II, Distance Learning Spring 2011, Developed course material and also the distance learning presentation of the course. The course involved advanced rocket propulsion concepts including thermochemcial calculations, 3 DOF launch vehicle trajectory calculations, solid propulsion, liquid propulsion, hybrid propulsion, and advanced propulsion projects. Student teams each authored a short

textbook chapter on an advanced propulsion topic that included a review of literature, sample problems, and exercises.

MAE 659 Tactical Missile System Design II, Distance Learning Spring 2006; Developed a missile system design course for the AMCOM Missile Systems Engineering Master's Degree Program. Implemented the course with 17 on-campus students. Developed detailed six-degree-of-freedom missile system design curriculum with controls systems that included solid modeling, mass properties, propulsion, aerodynamics, trajectories, and autopilot simulations.

MAE 659 Tactical Missile Design I, Distance Learning Spring 2006; Developed a missile system design course for the AMCOM Missile Systems Engineering Master's Degree Program. Implemented the course with 22 on-campus students. Developed and implemented course materials for distance learning; Incorporated six-degree-of-freedom modeling and simulation tool in course that included closed-loop guidance.

MAE 559 Missile Propulsion, Distance Learning Fall 2005 (MAE 540–Rocket Propulsion I); Developed a missile-focused propulsion class for the AMCOM Missile Systems Engineering Master's Degree Program. Implemented the course with 16 on-campus students. Developed and deployed course materials for 3 distance learning students.

Introduction to Integrated Product Teams Fall 2002 (MAE 496/MAE 497); Course to introduce students to leading and working on large project teams. The course was co-developed and co-taught with the UAH Department of Industrial and Systems Engineering.

Fundamentals of Space Station Engineering, (MA 459/559, Spring 2000)**:** Technical elective that involved 14 Industry mentors. First UAH course to be offered via the Internet to 10 students in France.

Aerospace Propulsion*, (MAE 445, Fall 1992);* Course for Aerospace Engineering concentration that covers basic rocket and turbojet propulsion systems.

Aerospace Propulsion Laboratory, *(MAE 453, 1992 to 1998):* Course for Aerospace Engineering Concentration that has 7 experiments in solid, liquid, and hybrid propulsion.

Aerospace Engineering Design*, (MAE 464, 1992);* Developed innovative courses that included a missile system design and a hybrid rocket upper stage design.

Multi-Disciplinary Course Leadership

The following list outlines a multi-disciplinary, inter-college, international effort to have an Integrated Product Team design experience for undergraduates.

2011 ***USLI Level II***. This project was for the support of a dual-level, two–semester design sequence for UAH to participate in the NASA University Student Launch Initiative, Level II competition. The classes that I taught and led were: MAE 495/595 *USLI* in the fall of 2010. This course established the core team and initial design of the flight vehicle. This was followed my MAE 493/593 Rocket Design in the spring of 2011 which completed the testing and fabrication of the

launch vehicle. The team successfully launched and recovered the rocket and scientific payload from NASA Wallops Test Flight facility on May 21, 2011.

2008 ***Directed three IPT Projects***. Project 01 – Micro-Unmanned Aerial Vehicles in an Urban Environment; Project 02 – Lunar Exploration Transportation System; Project 03 – Close Combat Lethal Recon – Combined two graduate courses, MAE 632 Rotorcraft Design II and MAE 634 Tactical Missile Design II, into one integrated product Team Design Class (including Distance Learning). Each project had industrial review board. Developed and published integrated project plan for all three courses.

2007 ***Directed IPT Project.*** Segmented sounding rocket project with NASA Wallops. Negotiated Memorandum of Agreement with NASA for Project.

2006 ***Directed four IPT Projects.*** Initiated new partnership with Southern University. Strengthened involvement of ESTACA and Computer Engineering students in project. Involved undergraduate and graduate students from 19 different classes, from 5 departments and 3 universities, 2 states and 2 countries (about 200 people including review teams and support personnel); Project 1 – Robotic Lunar Lander, Project was to design an unmanned Lunar Lander for a scientific mission. Oversaw the training of the instructor and operation of the laboratory, and schedule/deliverables of the project; Project 2 – Micro Air Vehicle, Oversaw the training of the instructor and operation of the project. The goals were to design a briefcase-size air vehicle with vertical lift capabilities; Project 3 – Autonomous Air Vehicle, Oversaw the training of the instructor and operation of the project. The goals were to design an autonomous air vehicle for entry into the AUVSI International Robotics Competition; and Project 4 – Advanced Tactical Missile II, Directed and taught project to design a 70 mm rocket; class included 24 graduate students and an industry review team.

2005 ***Enhanced Counter Air Projectile.*** Directed project under contract from AMRDEC to design guided projectile system. Included 8 French students, 44 UAH Mechanical and Aerospace, Electrical, and Computer Engineers. Articulated project with Industrial Engineering, English, and Psychology classes.

2004 ***Notional Miniature Interceptor.*** Directed project under contract from AMRDEC to design 40 mm guided projectile. Included 8 French students, 45 UAH Mechanical and Aerospace, Electrical, and Computer Engineers. Articulated project with Industrial Engineering, English, and Psychology classes.

2003 ***Advanced Tactical Missile.*** Directed project under contract from AMRDEC to design a guided 70 mm rocket. Included 13 French students, 32 UAH Mechanical and Aerospace, Electrical, and Computer Engineers. Articulated project with Industrial Engineering, English, and Psychology classes.

2002 ***Unmanned Hybrid Vehicle.*** Directed project under contract from AMCOM to design robotic vehicle that flies and has ground mobility. Included 10 French students, 32 UAH Mechanical and Aerospace, Electrical, and Computer Engineers. Articulated project with Industrial Engineering, English, and Administrative Sciences classes.

2001 ***Unmanned Air/Ground Robotic Vehicle.*** Directed project under contract from AMCOM to design robotic vehicle that flies and has ground mobility. Included 12 French students, 32 UAH Mechanical and Aerospace, Electrical, and

Computer Engineers. Articulated project with Industrial Engineering, English, and Administrative Sciences classes.

2000 ***Crew Transport/Recovery Vehicle.*** IPTs designed launch vehicle to transport crew and supplies to International Space Station. Included 10 French students, 12 NASA mentors, Internet-based communications, course materials, examinations, and student portfolios. Articulated project with Industrial Engineering, English, and Administrative Sciences classes.

1999 ***Advanced Propulsion Rotorcraft.*** Designed a heavy-lift helicopter for the U.S. Army. Included over 40 industrial mentors, reviewers, and evaluators. Integrated French students and instructors via the Internet. Developed and applied web-based training and communication tools for teams. Articulated project with English and Administrative Sciences classes.

1998 ***Modular Unmanned Logistics Express.*** Designed a robotic helicopter. Included engineering, liberal arts, and business students. Integrated U.S. Army, Boeing, ESTACA (a French college), and Linden High School. Utilized Internet video conferences and rapid prototyping. Developed student personnel evaluation model.

1997 ***Crew Escape Contest.*** Student IPTs from engineering and liberal arts developed a rocket launched glider contest to interest high school students in space technology. Demonstrated and evaluated the contest.

1996 ***Hybrid Rocket Upper Stage Design.*** Integrated student IPTs from colleges of engineering, business, and liberal arts. Teamed 10 NASA and 10 Boeing mentors to assist with design and teamwork education.

1997 ***Magnetic Levitation Train.*** Integrated business and engineering students in venture capital proposal. Incorporated mentors from Army Corps of Engineers and Hickory Venture Capital Company.

1994 ***Team Missile System Design.*** Combined business and engineering students to develop a multi-mission missile system. Utilized 10 mentors from U.S. Army Missile Command.

1993 ***Hybrid Sounding Rocket.*** Student IPTs designed suborbital hybrid rocket launch system. Introduced 10 NASA technical mentors into the classroom.

CD ROM/Video Teaching Material

The CD ROMs in the following list contain technology tutorials from industry professionals and are used in design classes to assist students.

1. Rocket Propulsion II, DL, 2011
2. Missile System Design - 2009
3. Liquid Rocket Injector Technology - 2008
4. Advanced Solid Rocket Propulsion - 2007
5. Advanced Tactical Missile Design II - 2006
6. Tactical Interceptor Technology - 2005
7. Miniature Interceptor Design- 2004

8. Tactical Missile Design - 2003
9. Tactical Missile Design in France - 2002
10. Unmanned Vehicle Symposium - 2002

Directed Study Classes

1. MAE 695, "ST: Advanced Reading in Propulsion and Energy," Fall 2014
    a. Butt, Ali, "A Survey on Analyzing Crack Tip Propagation in Solid Composite Propellants Using Real-Time Radiography, Survey Paper, and, "2D Dynamic Calibration of Crack Propagation in Energetic Materials," IIDR Proposal, with R. Frederick, PI.
    b. Cook, Brian, "A Survey of Ignition Systems in Solid Rocket Motors and Lessons Learned," Survey Paper, and, "Quantifying Surface Area Changes due to Hydra-Mining during Solid Rocket Motor," IIDR Proposal, with R. Frederick, PI.
    c. Dextre, Roberto, "A Survey on Plasma Based Propulsion Systems and Microplasma Micropropulsion Sources and Technology," Survey Paper, and, Microwave Microplasma Microthruster based on Split Ring Resonator Technology for In-Space Propulsion, IIDR Proposal, with Dr. Gabe Xu, PI.
    d. Durette, A., "Combustion Mechanisms and Burning Rates of Minimum Smoke Solid Rocket Propellants," Survey Paper, and, "Mass Spectroscopy of New, Environmentally Friendly Materials for Solid Rocket Propellants," IIDR Proposal, with Dr. James Baird, PI.
    e. Hamilton, Britteny Wheatley, "A Survey of the Solid Propellant Burning Rate Modifiers," Survey Paper, and, "Solid Rocket Propellant Study with Burning Rate Modifier NANOCAT®," IIDR Proposal, with R. Frederick..
2. MAE 695/795 "ST: Advanced Reading n Propulsion and Energy," fall 2013
    a. Newland, Amy, "A Survey of Green Propulsion Technology," and UAH IIDR Proposal, "ADN-Based Propellant with Electric Resistive Ignition Technique."
    b. Freeman, Charles, "Integration of Wireless Communication and Power Sourcing Technologies for Ground and Flight Operations of Advanced Missile Systems or Spacecraft," and , IIDR Proposal, "Integration of Wireless Communication and Power Sourcing Technologies for Ground and Flight Operations of Advanced Missile Systems and Spacecraft."
    c. Nauis, L., "Energetic Materials Diagnostics with 3-D Computed Tomography," and IIDR Proposal, "Energetic Materials Diagnostics with 3-D Computed Tomography."
3. MAE 695-05, "ST: Advanced Readings in Aerospace," fall 2011
    a. Dahale, Ambarish R.; "Wildland Fire Simulation through State-of-The-Art Numerical Approaches with Emphasis on Soot Models," and "Proposal:

Three Dimensional Direct Numerical Simulation of Opposed Flow, Turbulent, Pyrolysis-Gas/Air Diffusion Flame."

b. Ferguson, Selina, "The Influence of Moisture on Fire Initiation and Propagation," and, "UAH URII Proposal: The Influence of Fuel Moisture in Gaseous Flame Combustion of Wildland Fires."

c. Gilbert, Andrew; "Survey Paper of Aerospike Rocket Nozzle/Engine Research," and "Alabama Space Grant Consortium Application; Aerospike Nozzle Research."

d. Linn, Christopher; "Ultrasonics for Solid Propellant Burning Rate Measurement," and, "ARO White Paper proposal on Ultrasonic Burning Rate Measurement."

e. McCauley; Rachael; "Survey Paper: Controllable Solid Propulsion Combustion and Acoustic Knowledge Base Improvements," and JANNAF Paper; Rachel McCauley, R., Sean Fischbach, S., and Frederick, R.A., "Controllable Solid Propulsion Combustion and Acoustic Knowledge Base Improvements, " JANNAF 59th PCM, April 2012.

f. Smith, Shushannah, 'Low Back Pain in Nurses: its Causes, Past, Current, and Future Research for Prevention." and, "Ford Foundation Predoctoral Fellowship Application.' (Awarded).

4. MAE 695-05, "ST: Advanced Readings in Aerospace," fall 2011

   a. Kargar, Sooudabeth, "One student, MAE 795, "ST: Advanced Readings in Aerospace Engineering, fall 2011, "Survey Paper; Verification and Validation of Medical Devices, Specifically, Stents," and "Application: American Association of University Women's Scholarship."

5. MAE 695-04, "ST: Advanced Readings," summer 2011

   a. Jackson, Lloyd M., "Attitude Control Thrusters and Modeling Strategies," and, "Literature Review: Analysis of Aerodynamics of Maple Seeds."

   b. Couchman, Andrew, "History of Projectile Guidance," and, "Literature Review: Analysis of Aerodynamics of Maple Seeds."

6. MAE 795-02, "ST: Advanced Readings." summer 2011;

   a. Bidadi, Shreyas, "Analysis of High Frequency Combustion Instability in Liquid Propellant Rocket Engines," and, "Literature Review: Analysis of Aerodynamics of Maple Seeds."

7. MAE 695-04, "ST: Advanced Readings," Spring 2011;

   a. Hitt, Matthew, "Cryogenic Liquid Oxygen Safety Practices," and "Application: ASTM International Graduate Scholarship."

   b. Sandlin, Destin, "Advanced Laser Schleiren Instrumentation for Ballistic Measurements," and, "Partnership Proposal Created for: Mr. Alex Palm Of Quantum Composers, Inc." *(Note: The partnership proposal was accepted and the company provided equipment for Mr. Sandlin's Thesis in exchange for demonstrations of the equipment on YouTube by Mr. Sandlin.)*

8. Grisson, Forrest, MAE 495-09, ST: Collaborative Des. Eng," spring 2011.
9. Two Students "Advanced Aerospace Propulsion, Fall 2008.
10. Five Students "Advanced Readings in Aerospace Propulsion," Fall 2006.
11. Hahn, P., "Aerospace Vehicle Design," Summer 2005.
12. Garcia, J. "Propellant Design Code Using Propellant Shape, Composition and Temperature," MAE 497, Summer 2003.
13. Goodson, B., Smith, T., Stenberg, G., "Helicopter Aerodynamics," MAE 497, Spring 2003
14. Brown, C., Ellison, R., Holden, A., Matsuda, K., McDaniel, W., Paul, S., Waters, E., Watson, J., "Introduction to Integrated Product Teams," MAE 497, Fall 2002.
15. Hirstein, C., and Lackey, S., "Unmanned Air-Ground Vehicle," MAE 496-01, Summer 2001
16. Pulliam, K., Janeka, M., Smith, N., Filz, L., "Aerospace Senior Project," MAE 497 (1 hour), Fall 2000
17. Davis, C., "Unmanned Air-Ground Vehicles, MAE 697, 3 hours Fall 2000.
18. Bennett, J., "Advanced Internet Communications for Instructional Uses," MAE 496-03, Spring 1999.
19. Tidwell, D., "Advanced Internet Communications for Instructional Uses," MAE 496-03, Spring 1999.
20. Tidwell, D., "Audio-Visual Communications for the Internet," MAE 496-03, Fall 1998.
21. Mitchell, A.D., "Experimental Assessment of Solid Rocket Motor Propellant Temperature Sensitivity," MAE 496 (2 hours); Presented to The AIAA Southeastern Student Conference, April 15-17, 1998; Spring 1998.
22. Khodabandeh, J., "The Structural Integrity of Solid Propellant Grains," MAE 496, Fall 1997.
23. Khodabandeh, J., "Numerical Methods II," MAE 496 (3 hours), Fall 1998
24. Warren, P., "Hybrid Rocket Design," Selected Topics in MAE (3 hours), MAE 496-02, Summer 1997.
25. Warren, P., "Basic Propulsion Concepts," Selected Topics in MAE (1 hour), MAE 496-01, Summer 1997.
26. Hampton, T., Mechanical Engineering Applications (3 hours), MAE 496-01, "Recommended Team Design Processes that should be Taught in Engineering Colleges," Summer 1997.
27. Shirley, M., Mechanical Engineering Applications (3 hours), MAE 496-04, "Support for MAE 465 Rocket Powered Glider-Ultimate Egg Drop," Spring 1997.
28. Carden, E., Mechanical Engineering Applications (3 hours), MAE 496-03, "Trajectory Simulation for the Internet," Spring 1997.

29. Rasmussen, B., Mechanical Engineering Applications-Honors (3 hours), MAE 496-03, “Testing of Solid Rocket Propellants with an Ultrasonic Transducer,” Spring 1997.
30. Shavers, J., Mechanical Engineering Applications-Honors (2 hours), MAE 496-07, “The Use of a Web Site as a Communications Tool for the Integrated Product Team (IPT) and Education,” Spring 1997.
31. Cristal, J.M., Mechanical Engineering Applications (3 hours), MAE 496, “Hybrid Rocket Motor Experiment,” Summer 1996.
32. Andrews, J., Mechanical Engineering Applications (1 hour), MAE 496, “Hybrid Rocket Motor Experiment,” Summer 1996.
33. Farrow, J., Mechanical Engineering Applications (1 hour), MAE 496, “Closed Bomb Combustion Chamber,” Summer 1996.
34. Newton, P, and Selby, M., Mechanical Engineering Applications-Honors (3 hours), MAE 496, “A Space Trajectory Simulation for the Internet,” Spring 1996.
35. Pope, R., Mechanical Engineering Applications (1 hour), MAE 496, “Analysis of Team Labor Distributions,” Spring 1996.
36. Carder, I., Carter, D., Cornwell, K., Hupricj, A., Mechanical Engineering Applications (1 hour), MAE 459, “Design of a Calorimeter,” Spring 1995.
37. Hoffmeyer, P., Chiyyarath, K., and Sebeck, W., Mechanical Engineering Applications (1 hour), MAE 459, “Design and Construction of an X-Ray Rocket Stand,” Spring 1995.
38. Chiyyarath, K.; Mechanical Engineering Applications (1 hour), MAE 459, “Numerical Methods Software,” Spring 1995.
39. Kodabanda, J., Moore, J., Vest, S., Solid Rocket Motion (1 hour), MAE 459, “Analysis of a Water Rocket,” Spring 1995.
40. Sims, J., Solid Rocket Motion (1 hour), MAE 459, “Analysis of a Hybrid Rocket,” Spring 1995.
41. Chan, K. and Freeman, N., Solid Rocket Propellant Combustion (1 hour), MAE 459, “Investigation of Ammonium Nitrate Propellant Combustion,” Spring 1995.
42. Mustaikis, S., Experimental Methods in Propulsion (3 hours), MAE 459, “Hybrid Rocket Motor Experiment Design,” Summer 1994.
43. Elmore, J., Experimental Methods in Propulsion (3 hours), “Digital Data Acquisition System,” Fall 1994.
44. Lingren, J., Tabletop Maglev Design (3 hours), “Preliminary Design of a Maglev Model,” Winter 1993.
45. Hollman, S., and Reddy, P., Hybrid Propulsion (1 hour), MAE 459, “Labscale Hybrid Rocket Literature Review,” Fall 1992.

46. Fowler, D., Patel, S., Reddy, P., Silvey, G., Thornton, T., Yeager, S., Experimental Methods in Propulsion (3 hours), MAE 459, "Aerospace Propulsion Experiments," Spring 1992.

TEACHING PAPERS AND MATERIALS

Conference Papers about Teaching

1. Frederick, R.A., Jr. and Frederick, R. L., "Using Regional Technical Conferences to Augment Aerospace Design Projects," American Society of Engineering Educators, 2007 Annual Conference in Honolulu, Hawaii, June 24–27, 2007.
2. Frederick, R.A., Jr., Pawlak, M-S, Utley, D.R., Corsetti, C.D., Wells, B.E., and Landrum, D.B., "International Product Teams for Aerospace Systems Design," AIAA Paper 2002-4337, July 2002.
3. Middleton, R.L., Frederick, R.A. and Norman, R.L., "UAH Network-Based Engineering Classes for International Design Teams," The Huntsville Simulation Conference, Simulation in the New Millennium, The Practice and the Effect, The Holiday Inn at Research Park, Huntsville, Alabama, October 4–5, 2000.
4. Norman, R., and Frederick, R.A., Jr., "Integrating Technical Editing Students in a Multidisciplinary Engineering Project," Conference on College Composition and Communication, Atlanta, GA, March 24–27, 1999.
5. Middleton, R.L., and Frederick, R.A., "UAH Experiences in Network-Based Classes," Southeastern Research Universities Association, Fall Workshop, October 1999.
6. Middleton, R.L. and Frederick, R.A., "UAH Experiences with Network-Based Classes between Huntsville, Alabama, and Paris, France," Super Computer Conference, Orlando Florida, November 1998.
7. Frederick, R.A., Jr., Evans, D.A., and Norman, R., "Integrating Business and Engineering Education," Invited Panel Discussion, Decision Sciences Institute, 27th Annual Meeting, Orlando, FL, November 24–26, 1996.
8. Frederick, R.A., Jr., Evans, D.A., and Norman, R.L., "Multi-Agency, Integrated Product Teams," Innovations in Engineering Education, Accreditation Board for Engineering and Technology (ABET) 1996 Annual Meeting, San Diego, CA, October 31 to November 1, 1996, pp. 165-171.
9. Frederick, R.A., Moser, M.D., and Cozza, F.L., "An Undergraduate Propulsion Laboratory for Solid and Air-Breathing Propulsion," World Aviation Congress, October 22–24, 1996.
10. Frederick, R.A., Jr., Evans, D.A., and Norman, R.L., "Multi-College Design Class with Industrial Mentors," AIAA Paper 96-2560, July 1–3, 1996.
11. Frederick, R.A., Jr. and Sanders, J., "The Effective Use of Mentors in Undergraduate Design," 1993 ASME Winter Annual Meeting, AES Vol. 30/HTD Vol. 226, Thermodynamics, Analysis, and Improvement of Energy Systems, New Orleans, November 28 to December 3, 1993, pp. 219-225.

Student Papers Resulting from Class Projects

1. Rachel McCauley, R., Sean Fischbach, S., and Frederick, R.A., "Controllable Solid Propulsion Combustion and Acoustic Knowledge Base Improvements, " JANNAF 59th PCM, April 2012.
2. Betts, A. and Frederick, Jr., R.A., "A Historical Systems Study of Liquid Rocket Engine Throttling Capabilities," AIAA Paper 2010-6541, July 2010.
3. Frederick, R.A., Jr., Geisler, R., and Creech, D.M. "An Advanced Solid Rocket Propulsion Class," AIAA Paper 2007-5150, 2007.
4. Frederick, R.A., Jr. and Frederick, R.L, Using Regional Technical Conferences to Augment Aerospace Design Projects," ASEE Paper 2007-2859, 2007 ASEE Annual Conference & Exposition, Honolulu, Hawaii, June 24–27, 2007.
5. Hahn, P., et al, "Conceptual Design of a Guided Interceptor," AIAA Paper 2005-3847, July 2005.
6. Tournes, C., Frederick, R., Carroll, T., Hester, J., and Farbman, M., "Miniature Interceptor Guidance and Control Using Second Order Sliding Mode and Adaptive Control," AIAA Paper 2005-6158, August 8, 2005.
7. Hartlage, B., Dimler, H., Owens, M., Frederick, R.A, Jr., and Davis, C., "Enhanced Counter Air Projectile," AIAA Paper 2004–4086, July 2004.
8. Paul, S., Davis, C., and Frederick, R.A., Jr., "Advanced Tactical Missile," AIAA Paper 2003–4648, July 2003.
9. Benfield, P.J., and Frederick, R.A., Jr., "A Preliminary Design Study of a Hybrid Propulsion System for APKWS," AIAA Paper 2003–4746, July 2003.
10. Akins, B. and Frederick, R.A., Jr., "Undergraduate Propulsion Laboratory Projects at UAH," AIAA Paper 2003-4501, July 2003.
11. Pierce, J.C., Morris, G.F., Quick, D.M., Frederick, R.A. Jr., and Winkeler, J.P., "Conceptual Design of an Unmanned Hybrid Vehicle for the Battlefield of 2012," AIAA Paper 2002-3518, May 2002.
12. Janetka, M., Filz, L., Smith, N., and Frederick, R.A., Jr., "Unmanned Air Ground Vehicle," AIAA Paper 2001-3433, July 8–11, 2001.
13. Filz, L., Janetka, M., Smith, N., and Frederick, R.A., Jr., "Unmanned Air/Ground Vehicle," AIAA Paper 2001-3433, AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, July 8–11, 2001. (From IPT2001)
14. DePlachett, C., and Frederick, R.A., Jr., "Application of the GECAT™ Software for Instruction in Gas Turbine Propulsion Analysis," AIAA Paper 2000-3893, 2000.
15. Thomas, S., Bollich, J., Popo, M., and Frederick, R.A., Jr., "International Space Station Crew Transfer/Recovery Vehicle," AIAA Paper AIAA-2000-3741, AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, July 16–19, 2000. (from IP2000)
16. Frederick, R.A., Jr., Takada, P., and Cook, L., "Prototype for a Multi-National Propulsion System Design Course," AIAA Paper 2000-3984, July 2000.

17. Middleton, R.L, Frederick, R.A., Jr., and Norman, R., "UAH Network-Based Engineering Classes for International Design Teams," Huntsville Simulation Conference (HSC), Sponsored by The Society for Computer Simulation International (SCS), Huntsville, Alabama, October 4–5, 2000. (Abstract and Oral).
18. DePlachett, C., and Frederick, R.A., Jr., "Application of the GECATTM Software for Instruction in Gas Turbine Propulsion Analysis," AIAA Paper 2000-3983, AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, July 16–19, 2000. (from MAE 659).
19. Middleton, R.L., and Frederick, R.A., "UAH Experiences in Network-Based Classes," Southeastern Research Universities Association, Fall Workshop, October 1999.
20. Hopper, M., Davis, K., Symes, and Frederick, R.A., Jr., A., "Preliminary Design of Rotorcraft with Multi-Disciplinary, International Teams," AIAA Paper 99-2845, June 20–23, 1999. (From IPT1999)
21. Frederick, R.A., Jr., Evans, D.A., and Norman, R., "Integrating Business and Engineering Education," Invited Panel Discussion, Decision Sciences Institute, 27th Annual Meeting, Orlando, FL, November 24–26, 1996.
22. LaSarge, P.A., Ford, S.I., and Frederick, R.A., "Conceptual Design of Hybrid Rocket Powered Upper Stage (HRPUS) Demonstrator," AIAA Paper 96-2841, July 1996.
23. Sims, J.D. and Frederick, R.A., "Preliminary Design of a Hybrid Propulsion System for Multi-Mission Missile System," 1995 JANNAF Combustion Meeting, NASA MSFC, AL, October 1995. (from IPT 1995)
24. Greiner, B.A., et al., "RAPTOR: An Advanced Combined Arms Missile System (ACAMS)," Invited Presentation, AIAA Joint Propulsion Conference, 1996 (from MAE 659 Missile System Design).
25. Worchester, K. and Frederick, R.A., Jr., "Bottle Rocket Analysis and Testing," AIAA 93-2050, 29th AIAA/SAE/ASME/ASEE Joint Propulsion Conference and Exhibit, Monterey, CA, June 28–30, 1993. (from AE 445/AE 446)
26. Hollman, S. and Frederick, R.A., Jr., "Labscale Testing Techniques for Hybrid Rockets," AIAA-2410, 29th AIAA/SAE/ASME/ASEE Joint Propulsion Conference and Exhibit, Monterey, CA, June 28–30, 1993. (from ME 459 Hybrid Rockets II)
27. Paxton, J., Achenbach, M. Patterson, P., Pyburn, J., Thomas, M., and Frederick, R.A., Jr., "Design of Turbopump-Fed Hybrid Launch Vehicle," AIAA Paper 93-2549, 29th AIAA/SAE/ASME/ASEE Joint Propulsion Conference and Exhibit, Monterey, CA, June 28–30, 1993. (from ME 446 Design of Thermal Systems and ME 459 Hybrid Rockets).
28. Frederick, R.A., Jr. and Sanders, J., "The Effective Use of Mentors in Undergraduate Design," 1993 ASME Winter Annual Meeting, AES Vol. 30/HTD

Vol. 226, Thermodynamics, Analysis, and Improvement of Energy Systems, pp. 219–225, New Orleans, November 28 to December 3, 1993.

Internships Supervised

Hamby, Donna, "English Editor Internship," 2006.

Toole, Jennifer, "Practicum in Writing," EH 320; provided students with a variety of supervised technical writing experiences related to technical reports, technical articles, and style guidelines. Instructor of record: Dr. Rose Norman; May 27–August 1, 2003.

Hullett, Rachel, "Practicum in Writing," EH 320; provided students with a variety of supervised technical writing experiences related to technical reports, online databases, web page design. Instructor of record: Dr. Rose Norman; spring 2003.

Workshops Related to Instruction

IPT Design Workshop "Shark" Enhanced Counter Air Projectile, January 2005. Organized a two-day workshop involving 16 undergraduate students, 3 faculty, and 2 staff members to introduce MAE students to Systems Engineering, Modeling and Simulation and Paperless Manufacturing concepts. The workshop used a case study to allow students to assess requirements, consider alternatives, select a design, and manufacture a prototype. The student leaders presented a summary report at the AIAA Tactical Inceptor Design Symposium in Huntsville, Alabama, on January 20, 2005.

RESEARCH ACHIEVEMENTS

REFEREED JOURNAL PUBLICATIONS

1. Frederick, R.A., Jr., Blevins, J.A., and Coleman, H.C., "An Investigation of Microwave Attenuation Measurements in a Laboratory Scale Rocket Motor Plume," *AIAA Journal of Spacecraft and Rockets,* Vol. 32, No. 5, pp. 923–925, 1995.
2. Frederick, R.A., Jr., Williams, B.M., and Bean, S.B., "Predicting and Analyzing X-Rays to Measure Propellant Crack Propagation Speed," *AIAA Journal of Propulsion and Power,* Vol. 12, No. 2, pp. 310-314, 1996.
3. Frederick, R.A., Jr. and Komai, I., "Propellant Design Relationships for Throttled Gas Generators," *AIAA Journal of Propulsion and Power*, Vol. 12, No. 3, pp.614-617, 1996,
4. Frederick, R.A and Greiner, B.E., "Laboratory-Scale Hybrid Rocket Motor Uncertainty Analysis," *AIAA Journal of Propulsion and Power,* Vol. 12, No. 3, 6, pp.605-611, 1996.
5. Frederick, R.A., "Measuring the Regression of a Burning Solid Propellant," *Review of Scientific Instruments,* Vol. 67, No. 8, pp. 2903-2909, 1996.
6. Frederick, R.A., Nichols, J.S., and Rogerson, J., "Slag Accumulation Measurements in a Strategic Solid Rocket Motor," *Journal of Image Processing and Flow Visualization,* Vol. 3, No. 2, pp.165-176, 1996.
7. Sims, J.D. and Frederick, R.A., "Preliminary Design of a Hybrid Propulsion System for a Multi-Mission Missile System," *AIAA Journal of Spacecraft and Rockets,* Vol. 34, No. 2, pp. 186-191, 1997.
8. Di Salvo, R., Dauch, F., Frederick, R.A. Jr., and Moser, M.D, "Direct Ultrasonic Measurement of Solid Propellant Ballistics," *Review of Scientific Instruments,* Vol. 70, No. 11, pp. 4416–4421, 1999.
9. Norman, R., and Frederick, R.A. "Integrating Technical Editing Students in a Multidisciplinary Engineering Project." *Technical Communication Quarterly* Vol. 9, No. 2, pp. 163–89, 2000.
10. Rasmussen, B., and Frederick, R.A., Jr., "A Nonlinear Model of Composite Solid Propellant Combustion," *AIAA Journal of Propulsion and Power*, Vol. 18, No. 5, pp. 1086–1092, 2002.
11. Greiner, B., Frederick, R.A., Jr., and Moser, M.D., "Combustion Effects of C_{60} Soot in AN Propellants," *AIAA Journal of Propulsion and Power,* Vol. 19, No. 4, pp. 713-715, 2003.
12. Kohga, M., Frederick, R.A, Jr., and Moser, M.D., "Ultrasonic Properties of Propellant Ingredients," *AIAA Journal of Propulsion and Power,* Vol. 20, No. 1, pp. 135-140, 2004.
13. Di Salvo, R., Frederick, R.A., Jr., and Moser, M.D., "Pulse-echo Measurements of Unsteady Propellant Deflagration," *Review of Scientific Instruments,* Vol. 76, No. 1, pp. 0065112.1 – 0065112.8, 2005.
14. Shelton, J.D., Frederick, R.A., Jr., and Wilhite, A.W. "Launch Vehicle Propulsion Design with Multiple Selection Criteria," *AIAA Journal of Spacecraft and Rockets,* Vol. 43, No. 4, pp. 893–902, 2006.

15. Frederick, R.A., Jr., Whitehead, J., Knox, R., and Moser, M.D., "Regression Rates Study of Mixed Hybrid Propellants," *AIAA Journal of Propulsion and Power*, Vol. 23, No. 1, (2007), pp. 175–180, 2007. doi: http://arc.aiaa.org/doi/abs/10.2514/1.14327
16. Brown, S.P and Frederick, R.A., Jr., "Laboratory-Scale Thermal Stability Experiments on RP-1 and RP-2," *AIAA Journal of Propulsion and Power*, Vol. No. 2, pp. 206-212, 2008.
17. Cavitt, R., Frederick, R.A., Jr.., and Bazarov, V.G., "Laboratory-Scale Survey of Pentad Injector Stability Characteristics," *AIAA Journal of Propulsion and Power*, Vol. 24, No. 3, pp. 534-540, 2008. link
18. Frederick, R.A. Jr., Slegers, N., and Hahn, P., "Predictive Guidance of a Hit-to-Kill Tactical Interceptor," *IEEE Transactions on Control Systems Technology*, 2008.Vol.17, No. 4, pp. 745-755.
19. Whitehead, J.J. and Fredrick, R.A., Jr., "Predicting Hybrid Propellant Regression Rate Using Response Surfaces," *AIAA Journal of Propulsion and Power*, Vol. 25, No. 3, 2009, pp. 815-818.
20. Byrd, R., and Frederick, R.A., Jr. "Instability Characteristics of a Gaseous-Oxygen/Methane Pentad Injector," *AIAA Journal of Propulsion and Power*, Vol. 26, No. 4, 2010, pp. 698-695.
21. Eberhart, C. J., Lineberry, D.M., Frederick, R.A., Jr., and, Kastengren, A. L., "Mechanistic Assessment of Swirl Coaxial Injection By Quantitative X-Ray Radiography," Vol. 30, No. 4 (2014), pp. 1070-1079, *AIAA Journal of Propulsion and Power*, doi: 10.2514/1.B35007
22. Whitehead, J.J. and Frederick, R.A., Jr., "Hybrid Rocket Motor Propellant Burning Rate Optimization Under Uncertainty Using Response Surfaces and Monte Carlo Simulation," AIAA Journal of Propulsion and Power, Vol. 30, No. 4 (2014), pp. 901-908.doi: 10.2514/1.B35084.
23. Bennewitz, J. W., Frederick, R.A., Jr., and Lineberry, D. M., "Suppressing a High-Frequency Instability with Varying Bands of White Noise", Journal of Propulsion and Power, Vol. 30, No. 4 (2014), pp. 1094-1098. doi: 10.2514/1.B35232
24. Bennewitz, J.W., Frederick Jr., R.A., Cranford, J.T., and Lineberry, D.M., "Combustion Instability Control Through Acoustic Modulation at the Inlet Boundary: Experiments," AIAA Journal of Propulsion and Power, 2015, Vol.31: 1672-1688, 10.2514/1.B35649.
25. Bennewitz, J.W., Rani,S.L, Jacob T. Cranford, J.T., and Frederick Jr., R.A "Combustion Instability Control through Acoustic Modulation at the Inlet Boundary: Analysis," AIAA Journal of Propulsion and Power, 2015, Vol.31: 1689-1695, 10.2514/1.B35650.
26. Hitt, M. and Frederick, R. A., Jr., ""Testing and Modeling of a Porous Axial-Injection, End-Burning Hybrid Motor," *AIAA Journal of Propulsion and Power*, In Press, posted online Feb. 24, 2016, doi: 10.2514/1.B35939.

JOURNAL MANUSCRIPTS SUBMITTED

27. Sweeney, B., and Frederick, R.A., Jr., "On the Jet Breakup to Impingement Length Ratio for Like-Doublet Injectors," *AIAA Journal of Propulsion and Power*, submitted Dec. 8, 2015, manuscript ID: 2015-12-B36137.

28. Eberhart, C., and Frederick, R.A., Jr., "Fluid Oscillations of a Swirl Coaxial Injector Under High Frequency Self-pulsation," *AIAA Journal of Propulsion and Power*, submitted Feb. 18, 2016, Manuscript ID 2016-01-B36177.
29. Eberhart, C., and Frederick, R.A., Jr., "On the Mechanism of High Frequency Swirl Coaxial Self- pulsations," *AIAA Journal of Propulsion and Power*, submitted Manuscript ID: 2016-02-B36216, Feb. 21, 2016.

JOURNAL MANSUCRIPTS IN PREPARATION

30. James K. Baird, J.K., Joshua R. Lang, J.R., Hiatt, A.T., and Frederick, R.A., Jr., Electrolytic Combustion in the Polyvinyl Alcohol + Hydroxyl Amine Nitrate Solid Propellant, " submitted to MDA for release in preparation for submission to the AIAA Journal of Propulsion and Power.

PEER-REVIEWED CONFERENCE PAPER

1. Frederick, R.A., Jr. and Frederick, R.L., "Using Regional Technical Conferences to Augment Aerospace Design Projects," American Society of Engineering Educators, 2007 Annual Conference in Honolulu, Hawaii June 24–27, 2007.

PEER-REVIEWED REPORT CHAPTER

1. Frederick, R., and Traineau, J-C, *Evaluation of Methods for Solid Propellant Burning Rate Measurements*, Chapter 5, "Non-Intrusive Techniques," NATO/RTO Advisory Report, AVT Working Group 016, edited by Ronald S. Fry, JHU/CPIA, January 2002.

EXTERNAL RESEARCH FUNDING – PENDING

EXTERNAL RESEARCH FUNDING[1]

Total Contract Awards from External Funding as PI or COI approx. 10 million

1. MDA, "Innovative Propulsion and Power Technology Support," Based on White Paper entitled, "Game Changing Kill Vehicle/Interceptor Technology," HQ0147-15-C-6007, 3/30/2015 to 3/29/2016, Principal Investigator: Robert A. Frederick, Jr., Co-Investigator: Jason Cassibry, $828,474.
2. Exquadrum, Inc., "Hybrid Propulsion for Upper Stage Booster," 6/2/2014 to 5/1/2015, Principal Investigator, Robert A. Frederick, Jr., $200,000.
3. C3 Propulsion, "Advanced Hybrid Combustor," Principal Investigator: Robert A. Frederick, Jr., 7/28/2014 to 9/30/2015, $67,077.
4. Alabama Space Grant Consortium, "University Student Launch Initiative," April 1, 2014, to September 31, 2014, Principal Investigator: Robert A. Frederick, Jr., and David Lineberry, $5,000.
5. MDA, "Innovative Propulsion Technology Support," HQ0147-11-C-6006, 02/10/2011 to 04/30/2014, CO-I Robert A. Frederick, Jr. with Richard Tyson $3,226,487.
6. VPR, "IIDR/Energetic Materials Diagnostics with Real-Time X-Ray Radioscopy (Hiatt)," April 1, 2013, to March 31, 2014, Principal Investigator: Robert A., Frederick, Jr., $48,901.
7. VPR, "IIDR/Combustion Instability Prediction in Rocket Engines through Computational Enhancements in Loci-Chem.," April 1, 2013, to March 31, 2014, Principal Investigator: Dr. Sarma, Rani, and CO-I, Dr. Robert A Frederick, Jr. $33,089.
8. Alabama Space Grant Consortium, "University Student Launch Initiative," April 1, 2013, to September 31, 2013, Principal Investigator: Robert A. Frederick, Jr., $5,000.
9. DoD Army, GMLRS Insensitive Munitions Rocket Motor and Launch Pod Container Study, Contract No. W31P4Q-10-D-0092, July 24, 2012 to July 19, 2013, Principal Investigator: Robert A., Frederick, Jr., $476,386.
10. DoD Army, "GMLRS Insensitive Munitions Rocket Motor GMLRS Insensitive Munitions Rocket Motor and Launch Pod Container Study," Contract No. W31P4Q-10-D-0092, September 25, 2012 to September 24, 2013, Principal Investigator: Robert A., Frederick, Jr., $125,000.
11. Alabama Space Grant, "Liquid Rocket Combustion Instability Study," August 1 2012 to July 31, 2013; Student: Brian Sweeney; Advisor: Dr. Robert A. Frederick, Jr.

[1] Educational external funding also listed in the EDUCATION section

12. Aerojet, “Vessel Testing,” September 1, 2012 to October 31, 2012, Principal Investigator: Robert A. Frederick, Jr., $3,999.
13. University of Maryland, “One Constellation University Institutes Project (CUIP), Laboratory-Scale Methodology for Injector Element Combustion Response,” Prime Contract NCC 3989; October 1, 2007 to September 31, 2012; Principal Investigator: Robert A. Frederick, Jr.; $409,545.
14. Alliant Tech. Systems, Inc., “2.75 Inch Nozzle Characterization,” 03/15/2012 to 09/30/2012; Principal Investigator: Dr. Robert A. Frederick, Jr., $86,575.
15. Army, “Guided MLRS (GMLRS) Insensitive Munitions Rocket Motor and Launch Pod Container,” 9/27/11 to 9/30/12; Principal Investigator: Dr. Robert A. Frederick, Jr., $599,319.
16. Rocketdyne, “Reverse Hybrid Testing,” Lineberry, D. and Frederick, RA., Jr., $28,733.
17. Alliant Technologies Inc., “Robotic Spacecraft Analysis,” Principal Investigators: Slegers, N., and Frederick, R.A., Jr., November, 2011 to March 31, 2012, $59,225.92.
18. ASG, “2011-2012 University Space Launch Initiative,” 10/1/2011 – 9/30/2012, PI: Robert A. Frederick, Jr., $5,000.
19. Orbitec, “STTR Phase I/Support for Liquid Rocket Engine Injector Stability Scaling,” David Lineberry PI, Robert Frederick CO-I, 5-month project, 2010-11, $25,000.
20. Orbitec, “STTR Phase I - Plus up/Support for Liquid Rocket Engine Injector Stability Scaling,” David Lineberry PI, Robert Frederick CO-I, 3-month project, 2010-11, $15,000.
21. Orbitec, “STTR Phase II - Support for Liquid Rocket Engine Injector Stability Scaling,” David Lineberry PI, Robert Frederick CO-I, 18-month project, 2011-13, $149,000.
22. ATK, “Advanced Tactical Insulation Testing,” Principal Investigator: Dr. Robert A. Frederick, Jr.,11/1/2010 to 6/30/2011, $5,830.
23. Alabama Space Grant Consortium, “University Student Launch Initiative Level II,” Contract Number: NNX10AJ80H, UAH Proposal 2011-018, 10/1/10 – 9/31/11, Principal Investigator: Dr. Robert A. Frederick, Jr., Award: $11,200; Cost Share: $82,124.
24. Vice President for Research, “Internal Funding for Propulsion Classroom and USLI Laboratory Development,” Principal Investigator: Robert A. Frederick, Jr., Award: $150,000.
25. NASA MSFC, “GFSSP Verification and Validation,” David Lineberry PI, Robert Frederick CO-I, three month project, 2010, $23,600.
26. Combustion Research and Flow Technology, STTR Phase I, “Novel Design of Orifice Type Element, “ 12 month Project in 2010-11, David Lineberry PI, Robert Frederick CO-I, $39,998.

27. ATK, “2.75 inch Nozzle Characterization,” 10/1/2009 to March 31, 2010; Principal Investigator: Robert Frederick, $72,767.
28. Metacomp, “Design Tools for Combustion Instability,” Dates: 9-month period, Principal Investigator: Dr. Robert A. Frederick, Jr., $29,895.
29. ERC, “Insensitive Munitions Development,” PO RS090601; June 1, 2009 to December 31, 2009; $41,034.
30. UAH URII, “Advanced Laboratory-Scale Solid Propellant Mixing Capability,” 10/1/2009 to 9/30/2010; Principal Investigator: Robert A. Frederick, Jr.; $45,200.
31. Lockheed Martin, “Tactical Missile Conceptual Design Tool,” 11/13/2008 to 12/15/2009, Principal Investigator: Robert A. Frederick, Jr.; CO-Investigator: N. Slegers; $39,980.
32. Orbitec, “Design Tools for Combustion Instability,” Dates: 9-month period, Principal Investigator: Dr. David Lineberry; CO-Investigator, Dr. Robert A. Frederick, Jr., $29,895.
33. NASA MSFC, “Assessment of LOX/Methane Combustion Behavior for Rocket Engine Applications,” May 2008 to September, 2009; Principal Investigator: Robert A. Frederick, Jr.; $1,345,225.
34. University of Maryland, “One Constellation University Institutes Project (CUIP), Solid Propellant Characterization Techniques,” Prime Contract NCC 3989, Z634006, July 16, 2009 to June 30, 2012; Principal Investigator: Robert A. Frederick, Jr.; $409,545.
35. University of Florida, “Combustion Instability: Experimental Methodologies for Measuring Combustion and Injection-Coupled Responses,” NNC06GA29G, August 7, 2006 to September 30, 3007; Principal Investigator: Robert A. Frederick, Jr.; $99,990.
36. U.S. Army Aviation and Missile Research, Development and Engineering Center, “Micro-UAVs in a Collaborative Urban Scenario,” Contract W31P4Q-04-C-R172, Option Order 140, March 22, 2007 to June 23, 2007, Co-Principal Investigators: Robert A. Frederick, Jr., D. Brian Landrum, and N. Slegers; $49,831.
37. Jacobs Sverdrup, ESTS Group, “Advanced Solid Rocket Propulsion Class/Symposium,” Contract SvT-0029, Fund/Grant 23883, December 7, 2006 to March 1, 2007; Principal Investigator: Robert A. Frederick, Jr.; $85,896.
38. NASA Glenn Research Center, “Constellation University Research Program, UAH Solid Propellant Characterization,” Contract: NNC06GA29G, January 1, 2006 to September 6, 2007, to December 31, 2007: Co-Principal Investigator: Robert A. Frederick, Jr.; $100,000.
39. Perkins Technology, “Thermal Stability of Methane,” 1 August 2006 to September 30, 2007; CI-I with Dr. Clark Hawk, $70,000,
40. NASA Glenn Research Center, “Combustion Instability: Experimental Methodologies for Measuring Combustion and Injection-Coupled Responses,”

January 1 to August 6, 2006; Principal Investigator: Robert A. Frederick, Jr.; $100,000.

41. U.S. Army Aviation and Missile Research, Development and Engineering Center, "Mirco-UAVs in a Collaborative Urban Scenario Concept Study," Contract W31P4Q-04-C-R172 Modification P00049, Option Order 074, February 1, 2006 to December 27, 2006, Principal Investigators: Robert A. Frederick, Jr. and D. Brian Landrum; $59,974.20.
42. NASA MSFC, "High Energy Solid Propellant Test Bed," January 2005 to December 2005; Principal Investigator: Robert A. Frederick, Jr.; $50,000.
43. U.S. Army Aviation and Missile Research, Development and Engineering Center, "Enhanced Counter Air Projectile," Contract W31P4Q-04-C-R172 Modification P00049, Option Order 49, July 18, 2005 to August 31, 2006; Principal Investigator: Robert A. Frederick, Jr., $59,974.20.
44. 3D Research, Corp., "Advanced Gel Propellants," Contract 3DRC-05-0003, February 21, 2005 to August 8, 2005; Principal Investigator with Dr. James Smith; $30,252.
45. U.S. Army Aviation and Missile Research, Development and Engineering Center, "Enhanced Counter Air Projectile," Contract W31P4Q-04-C-R172 Modification P00027, Option Order 27, January 26, 2005 to September 30, 2005; Principal Investigator: Robert A. Frederick, Jr.; $49,993.56.
46. NASA Marshall Spaceflight Center, "Advanced Fuels and Plasma Interactions," RP-1 Thermal Stability Task, Grant NCC8-200, July 9, 2003 to August 9, 2005; Co-Principal Investigator with C. Hawk, et al; $673,000.
47. U.S. Army Aviation and Missile Command, "Notional Miniature Interceptor," Contract DAAH01-01-0-R160-D.O. 25, December 23, 2003 to September 30, 2004; Principal Investigator: Robert A. Frederick, Jr., $94,903.48.
48. American Helicopter Society, "Research Support (Helicopter Thrust Stand)," November 2003 to December 2004; Principal Investigator: Robert A. Frederick, Jr.; $1,000.
49. Strategic Missile Defense Command, "Advanced Propellant Technology for Propulsion Systems," April 8, 2002 to June 30, 2004; Principal Investigator: Robert A. Frederick, Jr.; CO-Investigator: Dr. Marlow D. Moser; $119,963.
50. U.S. Army Aviation and Missile Command, "Guided 2.75-in Missile Design Study," Contract DAAH01-01-0-R160-D.O. 25, December 23, 2002 to September 30, 2003; Principal Investigator: Robert A. Frederick, Jr.; CI-Is, Brian Landrum, Dawn Utley, Rose Norman, Charles Corsetti, and Earl Wells; $24,999.
51. Sparta, "Booster Test Reporting and Analysis," MDA908-99-D-0004, Task Order 0148, August 25, 2002 to July 25, 2003; Principal Investigator: Robert A. Frederick, Jr.; CO-Investigator: Dr. Marlow Moser; $20,000.
52. U.S. Army Aviation and Missile Command, "Systems Engineering of Unmanned Hybrid Vehicle," Contract DAAH01-01-0-R160-D.O. 25, March 11, 2002 to September 30, 2002; Principal Investigator: Robert A. Frederick, Jr.; CO-

Investigators: Dr. Jorge Auñón, David Berkowitz, Paul Componation, Charles Corsetti, Phillip Farrington, Brian Landrum, Dawn Utley, Earl Wells; $54,990.

53. U.S. Army Aviation and Missile Command, "Integrated Unmanned Air-Ground Robotics System," Contract DAAH01-98-0-R001-D.O. 105, September 8, 2000 to August 17, 2002; Principal Investigator: Robert A. Frederick, Jr.; CO-Investigators: Dawn Utley, Charles Corsetti, Francis Wessling, Paul Componation; $49,500.
54. California Institute of Technology (Ballistic Missile Defense Office), "Novel Energetic Material to Stabilize Solid Propellant Rockets," Contract #PC184577, Proposal 95-644; October 1, 1995 to September 31, 2001; Principal Investigator: Robert A. Frederick, Jr.; $896,000.
55. Office of Naval Research, "Advanced Diagnostics for Combustion Stability Assessment," Contract N00014-96-1-1182; Prop. No. 96-069, August 1, 1996 to July 31, 1999; Principal Investigator: Robert A. Frederick, Jr.; $234,999.
56. National Aeronautics and Space Administration, George Marshall Space Flight Center, "Hybrid Rocket Fuel Regression Rate Tailoring Investigation," Grant No. NAG8-1216 (Augmentation), October 14, 1998 to March 15, 1999; Principal Investigator: Robert A. Frederick, Jr.; $29,452.
57. John Hopkins University "Advanced Internet Communication," Grant No. PO7807-18871-4, July to August 1998; Co-Principal Investigators: Robert A. Frederick and Robert Middleton; $10,000.
58. National Aeronautics and Space Administration, Marshall Space Flight Center, "Hybrid Rocket Fuel Regression Rate Tailoring Investigation," Contract No. NAG8-1216; Proposal 96-450 (Augmentation), July 1, 1996 to September 30, 1998; Principal Investigator: Robert A. Frederick, Jr.; $35,055.
59. Army Aviation and Missile Command, "Modular Unmanned Logistics Express," March 12 to May 30, 1998; Principal Investigator: Robert A. Frederick, Jr.; $24,900.
60. Alabama Space Grant Consortium, "Crew Escape Contest," January 1997 to September 1997; Principal Investigator: Robert A. Frederick, Jr.; $4,969.
61. National Aeronautics and Space Administration, Marshall Space Flight Center, "Hybrid Rocket Powered Upper Stage Technology Ground Demonstrator Project," Contract No. NAS8-1216; Proposal 95-647, October 1, 1995 to September 30, 1996; Co-Principal Investigators: Robert A. Frederick, Jr., D. Evans and R. Norman; $25,000.
62. Alabama Space Grant Consortium, "Water Tunnel Simulation of Hybrid Rocket Motor," Proposal 95-082; January 1, 1995 to December 31, 1995; Principal Investigator: Robert A. Frederick, Jr.; $10,000.
63. Alabama Cryogenic Engineering, Huntsville, "Hybrid Rocket Motor," Co-Principal Investigators: Robert A. Frederick, Jr. and C.W. Hawk; Proposal 94-591; January 15, 1995 to January 15, 1997; $111,832.

64. University of Alabama in Huntsville Research Institute, "Validation of an X-Ray Analysis Model," UAH Mini Grant, July 1, 1994 to December 31, 1995; Principal Investigator: Robert A. Frederick, Jr.; $1,997.

65. Alabama Cryogenic Engineering, Huntsville, "Oxidizer Injection for Hybrid Propulsion, A Novel Approach," Contract No. 34-1154, January to July1994; Co-Principal Investigators: Robert A. Frederick, Jr., C.W. Hawk and D.B. Landrum; $16,998.

66. US Army MICOM, AMSMI-RD-PC-HB, "Ducted Rocket Engine Research – Task 1 Booster Propellant Development," Contract DAAH01-93-C-R326, Proposal 93-426, October 1993 to December 1995; Principal Investigator: Robert A. Frederick, Jr.; $145,019.

67. National Aeronautics and Space Administration, Marshall Space Flight Center, "Solid Rocket Motor Expert System," Contract NAS8-38609, RFP 70, January 1993 to December 1993; Co-Principal Investigators: Robert A. Frederick, Jr. and Dr. L. Interrante; $85,350.

68. US Army MICOM Propulsion Directorate, "Advanced Motor Plume Technology," Contract DAAH01-92-R006, D.O. 6, February 16, 1993 to August 16, 1993; Principal Investigators: Robert A. Frederick, Jr. and D.B. Landrum; $68,810.

69. US Army MICOM Propulsion Directorate, "Rocket Motor Plume Simulation and Signature Demonstration," Contract DAAH0-D-R002, D.O. 37, October 1, 1992 to January 31, 1993; Principal Investigator: Robert A. Frederick, Jr.; $34,224.

70. Thiokol Corporation, Utah, "Hybrid Rocket Combustion," Contract: 92-444, July 1, 1992 to December 31, 1992; Co-Principal Investigators: Robert A. Frederick, Jr. and C.W. Hawk; $25,000.

71. Martin Marietta, New Orleans, LA, "Computational Assessment of Hybrid Rockets," Contract A71517, Proposal 92-521, August 14, 1992 to September 30, 1992; Principal Investigator: Robert A. Frederick, Jr.; $6,830.

72. Thiokol Corporation, "Combustion Studies of Clean-Burning Solid Propellants," Contract No. P.O. 0819, August 14, 1991 to September 30, 1992; Co-Principal Investigators: Robert A. Frederick, Jr. and C.W. Hawk; $50,000.

FELLOWSHIPS AWARDED

Battelle, Inc., U.S. Army Summer Faculty Research and Engineering Program; U.S. Army MICOM, Huntsville Alabama; June to August 1993; $9,000.

National Aeronautics and Space Administrations/American Society for Engineering Education Summer Faculty Fellowship Program; Marshall Space Flight Center; 1992; $10,000.

National Aeronautics and Space Administrations/American Society for Engineering Education Summer Faculty Fellowship Program, Marshall Space Flight Center, 1991; $9,000.

PAPERS SUBMITTED TO PROFESSIONAL MEETINGS

1. Frederick, R. A., Jr., "UAH Propulsion Research Center - 25th Anniversary Highlights," Abstract submitted to 2016 AIAA Propulsion and Energy Conference, January 12, 2016.
2. Hiatt, A. T., and Frederick, R. A., Jr., "Laboratory Experimentation and Basic Research Investigating Electric Solid Propellant Electrolytic Characteristics," Abstract submitted to 2016 AIAA Propulsion and Energy Conference, January 12, 2016.
3. Jones, D.A. and Frederick, Jr., R. A., "Overview of X-Ray Techniques for Solid Rocket Propellant Regression Measurements," Abstract submitted to 2016 AIAA Propulsion and Energy Conference, January 12, 2016.
4. Patel, A., Lineberry, D. M., Cassibry, J.T., Frederick, Jr., R. A., "Measurement of Micro-Thruster Performance Characteristics Using a Magnetically Levitating Thrust Stand," Abstract submitted to 2016 AIAA Propulsion and Energy Conference, January 12, 2016.
5. Roy, B.J., and Frederick, R. A., Jr., "Overview of Vortex Injected Hybrid Rocket Engines-Regression Rate Modeling," Abstract submitted to 2016 AIAA Propulsion and Energy Conference, January 12, 2016.
6. Staschus, C. I., and Frederick, R. A., Jr., "An Overview of Combustion Instabilities and Rocket Engine Injector Design," Abstract submitted to 2016 AIAA Propulsion and Energy Conference, January 12, 2016.

PAPERS AT PROFESSIONAL MEETINGS

1. Denny, M and Frederick, R.A, "Using Real-Time Radioscopy to Measure the Burning Rate of Solid Propellant, AIAA Paper 2015,41044, July 2015.
2. Butt, A., and Frederick, "Dynamic Calibration of Crack Tip Propagation in Energetic Materials using Real-Time Radiography," AIAA Paper 2015-4121, July 2015.
3. Hitt, M. and Frederick, R.A., Testing and Modeling of Polyethylene Axial-Injection, End burning Hybrid Rocket Motors," AIAA Paper 2015-4038, July 2015.
4. Jones, D., Frederick, R.A., Jr, Lineberry, D., and Moser, M.D., "An Advanced Digital Cross-Correlation Method for Solid Propellant Burning Rate Determination," Category: Solid Rocket Propulsion, AIAA Propulsion and Energy Forum, July 2015. AIAA-2015-4103.
5. Mascaro, M., Frederick, R.A., Jr., Moser, M., and Mahaffey, K, "Internal Ballistics Model for a Mixed Hybrid Rocket Motor," AIAA Propulsion and Energy Forum, July 2015. AIAA-2015-3811.
6. Sweeney, B., and Frederick, R.A., Jr., "Experimental Study on the Effects of Varying the Impingement Distance of Like-Doublet Injectors," AIAA Propulsion and Energy Forum, July 2015. AIAA-2015-3846.
7. Frederick, R.A., Jr., "Strategies for Successful University, Industry, and Government Collaborations," AIAA Paper 2014-3604, July 2014.
8. Bennewitz, J.W., Cranford, J.T., Lineberry, D.M., and Frederick, R. A., "Application of Band-Limited White Noise & Single Frequency Acoustic Modulation as a Control

Mechanism for Liquid Rocket Engine Combustion Instabilities." AIAA Paper 2014-3678, July 2014.
9. Cranford, J., Bennewitz, J.W., Rani. A.L., and Frederick, R.A., "An Analytical Investigation Characterizing the Application of Single Frequency Acoustic Modulation for High Frequency Combustion Instability Suppression," AIAA Paper 2014-3679, July 2014.
10. Sweeney, B. A., and Frederick, R.A., "The Effect of Liquid Jet Breakup Length upon the Spray Dynamics of Like-Doublet Impinging Injectors, AIAA Paper 2014-3501, July 2014.
11. Hitt, M. A., Taylor, T., and Frederick, R.A., "Design of a 3-D Printed Unified Hybrid Motor," AIAA Paper 2014-3498, July 2015.
12. Bennewitz, J. W., Lineberry, D.M., and Frederick, R.A., Jr., "Investigation of a Single Injector with Applied High Frequency Pressure Disturbances For Applications To Liquid Rocket Engine Combustion Instabilities, "AIAA Paper 2013-3853, doi: 10.2514/6.2013-3853, July 2013.
13. Bennewitz, J.W. and Frederick, R.A., Jr., "Overview of Combustion Instabilities in Liquid Rocket Engines - Coupling Mechanisms & Control Techniques," AIAA-2013-4106, DOI: 10.2514/6.2013-4106, July 2013.
14. Becknel, M. and Frederick, R.A., Jr., "UAH Sounding Rocket Project with Guided Parafoil Recovery,"AIAA-2013-4042, DOI: 10.2514/6.2013-4042, July 2013.
15. Eberhart, C.M., Lineberry, D.M., and Frederick, R.A., Jr., "The Influence of Annular Jet Dynamics on Swirl-coaxial Injection During Self-pulsations," AIAA-2013-4064, DOI: 10.2514/6.2013-4064, July, 2013.
16. Eberhart, C.J., Lineberry, D.M., Frederick, R.A., Jr., and. Kastengren, A.L., "A Mechanistic Assessment of Swirl Injection and Atomization by X-ray Radiographic and Optical Techniques," AIAA Paper 2012-3746, July 2012.
17. Setayesh, B.R., and Daniel P. Cavender, D.P., Nathan Toy, N., Frederick, R.A., "Design of a High Power Rocket Aerodynamics DAQ Payload," AIAA Paper AIAA-2012-3881, July 2012.
18. McCauley, R., Sean Fischbach, S., and Frederick, R.A., "Controllable Solid Propulsion Combustion and Acoustic Knowledge Base Improvements, "JANNAF 59th PCM, April 2012.
19. Eberhart, C., Lineberry, D. and Frederick, R.A., Jr., "Near-field Film Thickness Measurements of an LPRE Swirl Injector Spray, AIAA Paper 2011-5928.
20. Betts, A. and Frederick, Jr., R.A., "A Historical Systems Study of Liquid Rocket Engine Throttling Capabilities," AIAA Paper 2010-6541, July 2010.
21. Ikard, S., Frederick, R.A., Jr., "Experimental Swirl Injector Stability Characterization and Combustion Imaging," AIAA Paper 2010-6668, July 2010.
22. Ikard, R., Frederick, R.A., Jr., Lineberry, D.M.., Moser, M.D., and M. S. Balasubramanyam, M.S., "Program for Comprehensive Investigation of LOX/Methane Injectors," AIAA Paper 2010-6737, July 2010.
23. Sweeney, B.A., Lineberry, D.M., Frederick, R.A., Jr., "Scaling a Single Element Atmospheric Combustor," AIAA Paper 2010-6893, July 2010.
24. Brooks, J.W., Lineberry, D.M., and Frederick, R.A., Jr., "Characterization of a Single Swirl-Coaxial Injector in a Sub-Scale Combustor," AIAA Paper 2010 6894, July 2010.

25. Hiatt, A.T., Ikard, R.L., and Frederick, R.A., Jr., "Archiving Propulsion Laboratory Data," AIAA Paper 2010-7010, July 2010.
26. Ikard, Robert L., Brooks, John W., and Frederick, Jr., Robert A. "Unsteady Chemiluminescence Imaging of a Swirl Coaxial Injector," AIAA Paper 2009-5051, August, 2009.
27. Evans, J., Penton, A., and Frederick, R.A., Jr., "Uncertainty of Solid Propellant Burning Rate Measurements," AIAA Paper 2009-4975, August, 2009.
28. Huynh, H., Sweeney, B., and Frederick, R.A., Jr., "Mode Assessment of a Single Element Shear-Coaxial Injector," AIAA Paper No. 2009-5493, August, 2009.
29. Byrd, R., Huynh, H. and Frederick, R.A., Jr., "Injector Element Instability Mode Assessment in a Laboratory-Scale Burner," AIAA Paper 2008-4655, 2008.
30. Marshall, M., Evans, J., and Frederick, R.A., Jr., "Uncertainty Assessment of Ultrasonic Solid Propellant Burn Rate Characterization at UAH," AIAA Paper 2008-5147, 2008.
31. Byrd, R., Cavitt, R., Frederick, R.A., Jr., and Bazarov, V., "On the Laboratory-Scale Survey of Pentad Injector Stability Characteristics," AIAA Paper 2007-5587, 2007.
32. Lee, E., Swanner, B., Lineberry, D.,V. Bazarov, and Frederick, R., "Pulsator Designs for Rocket Injector Research," AIAA Paper 2007-5156, 2007.
33. Bazarov, V., and Rutovski, A., "Study of Atomization, Mixing and Combustion in Crossed and Swirled Flows," AIAA Paper 2007-5684, 2007.
34. Frederick, R.A., Jr., Geisler, R., and Creech, D.M. "An Advanced Solid Rocket Propulsion Class," AIAA Paper 2007-5150, 2007.
35. Marshall, T., Evans, J., Frederick, R.A., Jr., and Moser, M.D., "UAH Solid Propellant Characterization," AIAA Paper 2007-5763, 2007.
36. Frederick, R.A., Jr. and Frederick, R.L, Using Regional Technical Conferences to Augment Aerospace Design Projects," ASEE Paper 2007-2859, 2007 ASEE Annual Conference & Exposition, Honolulu, Hawaii, June 24–27, 2007.
37. Cavitt, R. and Frederick, R.A., Jr., "Subscale Modeling of Impinging Jet Injector Instability," 54th JANNAF Propulsion Conference, Denver, CO, March 2007.
38. Cavitt, R., Frederick, R.A., Jr., and Bazarov, V., "Experimental Methodology for Measuring Combustion and Injection-Coupled Responses," AIAA Paper 2006-4527, 2006.
39. Shelton, J.D., Frederick, R.A., Jr, and Wilhite, A.W. "Launch Vehicle Propulsion Design with Multiple Selection Criteria," AIAA Paper 2005-3581, July 2005.
40. Khodabandeh, J. and Frederick, R.A., Jr., "Experiments and Modeling of Jet A, Thermal Stability in a Heated Tube," AIAA Paper 2005-3769, July 2005.
41. Frederick, R.A., Jr., Whitehead, J.J., Knox, L.R., and Moser, M.D., "Regression Rate Study of Mixed Hybrid Propellants," AIAA Paper 2005-3545, July 2005.
42. Frederick, R.A., Jr., "Research in Solid Propellant Ballistics at UAH," AIAA Paper 2005-3620, July 2005.

43. Williams, J., Brekke, K., Patrick, S., Crosswy, R., Hahn, P., and Frederick, R., "Conceptual Design of a Guided Interceptor," AIAA Paper 2005-3847, July 2005.

44. Emens, J.M., Brown, S.P., and Frederick, R.A., Jr., "JP-8 and RP-1 Thermal Stability Experiments," AIAA Paper 2005-3850, July 2005.

45. Tournes, C., Frederick, R., Carroll, T., Hester, J., and Farbman, M., "Miniature Interceptor Guidance and Control Using Second Order Sliding Mode and Adaptive Control," AIAA Paper 2005-6158, August 8, 2005.

46. Hawk, C.W. and Frederick, R.A., Jr., "University Propulsion Programs at the University of Alabama in Huntsville," AIAA Paper 2004-3323, July 2004.

47. DiSalvo, R. and Frederick, R.A., Jr., "Pulse-Echo Measurements of Pulsed Propellant Deflagration," AIAA Paper 2004-2723, July 2004.

48. Frederick, R.A., Jr., Moser, M.D., Knox, L.R., and Whitehead, J.J., "Ballistic Properties of Mixed Hybrid Propellants," AIAA Paper 2004-3824, July 2004.

49. Hartlage, B., Owen, M., Dimler, H., and Frederick, R.A., Jr., "Enhanced Counter Air Projectile," AIAA Paper 2004-4086, July 2004.

50. Emens, J.M., Brown, S.P., and Frederick, R.A., Jr., "High Reynolds Number Thermal Stability Experiments," AIAA Paper 2004-4089, July 2004.

51. Knox, L.R., Frederick, R.A., Jr., and Moser, M.D., "Mixed Oxidizer Propellants," AIAA Paper 2003-4745, July 2003.

52. DiSalvo, R., Frederick, R.A., Jr., and Moser, M.D., "Response Function Measurements of Multi and Monomodal 75/25 AP/HTPB Propellant with a Direct Ultrasonic Technique," AIAA Paper 2003-4670, July 2003.

53. Paul, S., Davis, C., and Frederick, R.A., Jr., "Advanced Tactical Missile," AIAA Paper 2003-4648, July 2003.

54. Frederick, R.A., Jr., Pawlak, M-S, Utley, D.R., Corsetti, C.D., Wells, B.E., and Landrum, D.B., "International Product Teams for Aerospace Systems Design," AIAA Paper 2002-4337, July 2002.

55. Kohga, M., Frederick, R.A., Jr., and Moser, M.D., "Ultrasonic Properties of Propellant Ingredients," AIAA Paper 2002-3572, July 2002.

56. Pierce, J.C., Morris, G.F., Quick, D.M., Frederick, R.A. Jr., and Winkeler, J.P., "Conceptual Design of an Unmanned Hybrid Vehicle for the Battlefield of 2012," AIAA Paper 2002-3518, May 2002.

57. Fry, R.S., et al., "Solid Propellant Burning Rate Measurement Methods Used within the NATO Propulsion Community," AIAA Paper 2001-3948, 37th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, July 8–11, 2001.

58. Janetka, M., Filz, L., Smith, N., and Frederick, R.A., Jr., "Unmanned Air Ground Vehicle," AIAA 2001-3433, July 8–11, 2001.

59. DiSalvo, R., Frederick, R.A., Jr., and Moser, M.D., "Effect of Oxidizer Particle Size on Response Function," 2000 JANNAF CS/APS/PSHS Joint Meeting, Naval Postgraduate School, Monterey, CA, November 2000.

60. Middleton, R.L, Frederick, R.A., Jr., and Norman, R., "UAH Network-Based Engineering Classes for International Design Teams," Huntsville Simulation Conference (HSC), Sponsored by The Society for Computer Simulation International (SCS), Huntsville, Alabama, October 4–5, 2000. (Abstract and Oral).

61. Frederick, R.A., Jr. and Osborn, J.R., "Ballistic Studies of Wide Distribution Propellants," AIAA Paper 2000-3318, 36th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, July 16–19, 2000.

62. Smith, M.D., Moser, M.D., and Frederick, R.A., Jr. "Temperature Sensitivities of Energetic Binder Propellants," AIAA Paper 2000-3319, 36th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, July 16–19, 2000.

63. Frederick, R.A., Jr., Takada, P., and Cook, L., "Prototype for a Multi-National Propulsion System Design Course," AIAA Paper 2000-3894, 36th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, July 16–19, 2000.

64. DePlachett, C., and Frederick, R.A., Jr., "Application of the GECAT™ Software for Instruction in Gas Turbine Propulsion Analysis," AIAA Paper 2000-3893, 36th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, July 16–19, 2000.

65. Thomas, S., Bollich, J., Popo, M., and Frederick, R.A., Jr., "International Space Station Crew Transfer/Recovery Vehicle," AIAA Paper 2000-3741, AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, July 16–19, 2000.

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68. Greiner, B. and Frederick, R.A., Jr., "Combustion of Clean Burning Solid Propellants," Final Report, Contract 000819, Thiokol Corporation, Utah, August 1992.
69. Frederick, R.A., "Wide Distribution Propellants," AFAL-TR-88-073, Air Force Rocket Propulsion Laboratory, Edwards AFB, CA, June 1988.
70. Frederick, R.A. and Osborn, J.R., "Effect of Acceleration on Propellant Combustion," AFRPL-TR-84-073, Air Force Rocket Propulsion Laboratory, Edwards AFB, CA, 1984.
71. Frederick, R.A., "Effect of Acceleration on Surface Burning," Final Report, AFRPL-TR-82-01, Air Force Rocket Propulsion Laboratory, Edwards AFB, CA, September 1983.

Report Chapter

1. Geisler, R., Frederick, R.A., Jr., and Giarra, M., "Historical Overview and Solid Rocket Motor Fundamentals," Wiley Encyclopedia of Aerospace, 2010.
2. Frederick, Robert, *Evaluation of Methods for Solid Propellant Burning Rate Measurements*, Chapter 5, "Non-Intrusive Techniques," NATO/RTO Advisory Report, AVT Working Group 016, edited by Ronald S. Fry, JHU/CPIA, Available January 2002.
3. Frederick, R.A., Jr., Report Chapter entitled "Experimental Investigation of a Solid Rocket Combustion Simulator," appeared in "Research Reports - 1991 NASA/ASEE Summer Faculty Fellowship Program," NASA CR-184253, The University of Alabama in Huntsville, Huntsville, AL, and The University of Alabama, Tuscaloosa, AL, Final Report, October 1991, Editors: Karr, G.R.; Chappell, C.R.; Six, F., and Freeman, L.M.

4. Frederick, R.A., Jr., Report Chapter entitled "Hybrid Rocket Performance," appeared in "Research Reports -1992 NASA/ASEE Summer Faculty Fellowship Program," NASA CR-184505, Final Report, The University of Alabama, Tuscaloosa, AL, and The University of Alabama in Huntsville, Huntsville, AL, December, 1992, Editors: Freeman, L.M.; Chappell, C.R.; Six, F.; and Karr, G.R.

Invited Presentations

1. ***Invited Speaker***, "Academic Perspective on Benefits of NIRPS Solutions," National Institute of Rocket Propulsion Systems Workshop, Monterey, CA, December 6, 2012.
2. *Invited Speaker,* "Panel: National Institute of Rocket Propulsion Systems,"4th Werner von Braun Memorial Symposium, American Astronautical Society, October 24-26, 2011.
3. Frederick , R.A., Jr., invited speakers at 18th Industrial Advisory Board Meeting of NSF Industry/University Cooperative Research Center for Intelligent Maintenance Systems. The meeting was held at AVATEC in Springfield, Ohio. Dr. Frederick spoke on "Archiving Laboratory Data for Combustion Verification and Validation." October 20, 2009.
4. Frederick, R.A., Jr., "Laboratory-Scale Methodology of Injector Element Combustion Response (TCA-24)," Presented to NASA Constellation University Institutes Project FY09 Review Presentation, UAHuntsville Tom Bevill Center, Huntsville, AL , January 13, 2009.
5. Frederick, R.A., Jr., "Solid Propellant Characterization Techniques," NASA Constellation University Institutes Project FY09 Review Presentation, NASA Marshall Space Flight Center, AL, December 17, 2009.
6. Frederick, R.A., Jr., "JP-8 and RP-1 HiReTS Thermal Stability Experiments," Presented to ASTM D02J003 Combustion and Thermal Properties Committee, Pittsburg, PA, June 2005.

Workshop Reports

1. Frederick, R.A., Jr. and Mahalingam, S., "Grand Challenges in Propulsion Research First Annual – Workshop Report, Volume I, October 14, 2011.
2. Frederick, R.A., Jr. and Mahalingam, S., "Grand Challenges in Propulsion Research First Annual – Workshop Report, Volume II, October 14, 2011.

SERVICE ACTIVITES

EXTERNAL SERVICE

Professional Affiliations

Associate Fellow, American Institute of Aeronautics and Astronautics, Since, January, 1985.

Member, ASEE, since January, 2003.

Member, American Helicopter Society, 1999-2005.

Short Course

Taught, "AIAA Advanced Solid Rocket Propulsion," Short Course, Atlanta, GA, July 2012.

Taught, "AIAA Advanced Solid Rocket Propulsion," Short Course, Nashville, Tennessee, July 2010.

Organized and Taught, "AIAA Advanced Solid Rocket Propulsion," Short Course, Hartford, Connecticut, July 2009.

National Technical Committees

Member, *AIAA Solid Rockets Technical Committee, 2014 to present.*

Member JANNAF Solid Rocket Performance Panel, 2008-2009.

Member – JANNAF Liquid Rocket Instability Panel – 2007-2009.

Chairman, AIAA Hybrid Rocket Technical Committee, American Institute of Aeronautics and Astronautics International Technical Committee, 1995 to 1997.

Committee Vice Chairman, American Institute of Aeronautics and Astronautics Hybrid Rocket Motor Technical Committee, 1993–1995.

Subcommittee Member, New Directions Subcommittee, American Institute of Aeronautics and Astronautics Hybrid Rocket Motor Technical Committee, 1993.

Subcommittee Chairman, Meeting and Conferences Subcommittee, American Institute of Aeronautics and Astronautics Hybrid Rocket Motor Technical Committee, 1992.

Member, AIAA Hybrid Rocket Technical Committee, 1992–2009.

Subcommittee Member, Education Subcommittee, American Institute of Aeronautics and Astronautics Solid Rocket Technical Committee, 1989–1991.

Committee Member, AIAA Solid Rocket Technical Committee, American Institute of Aeronautics and Astronautics International Technical Committee, 1993–1995

Committee Member, AIAA Wyld Propulsion Award Evaluation Committee, 1995.

National/International Service

Organized and Chaired National Institute of Rocket Propulsion Systems Academic Workshop, May 2014,"Goals and Strategies for Successful University, Industry, and

Government Interactions," with 13 participants from leading academic, government, and industry propulsion agencies discussions on strategies in the propulsion research arena., Charleston, SC. Published results in AIAA Conference Paper.

CO-Organized and Lead National Institute of Rocket Propulsion Systems Academic Workshop, Frederick, R.A., Jr. and Mahalingam, S., "Robust Metrics and Funding Strategies to Ensure the Health of Academic Propulsion Research," December 16-17, 2013, with which Academics from 10 universities had strategic discussions on strategies in the propulsion research arena.

Organized and Lead Propulsion Symposium, *MDA Focus Day,* A Symposium on Systems Engineering, Propulsion, and Structures of Divert Attitude and Controls Systems for the Missile Defense Agency, October 7, 2012.

CO-Organized and Lead National Propulsion Workshop, Frederick, R.A., Jr. and Mahalingam, S., "Grand Challenges in Propulsion Research First Annual – Workshop Report, October 14, 2011 in which Academics from 10 universities spoke on the state of the art in propulsion research in support of the National Institute of Rocket Propulsion Systems.

NIRPS Academic Advisory Group, Chair, NASA National Institute of Rocket Propulsion Systems, 2011.

Invited Panel Member, Optimizing International Educational Experiences, ESTACA, Paris, France, November 2007.

University of Alabama in Huntsville Representative to ESTACA International Days, Paris, France, November 14, 2007.

JANAAF Liquid Rocket Instability Panel, Member, Participated in National Committee on Liquid Rocket Combustion Stability.

Organizing Committee, Member and Reviewer, JANNAF Propulsion Journal, appointed by CPIA to serve on committee to organize a new peer-reviewed journal in the chemical propulsion field, 2005–2007.

JANNAF Hydrocarbons Fuel Panel, Member, Evaluated new thermal stability measurement for rocket fuels and participated in the development of a new specification for RP-2 fuel, 2004–2005.

United States NATO Representative, appointed by U.S. Air Force to represent the U.S. Air Force and the U.S. Navy to the NATO Advisory Group for Aerospace Research and Development (AGARD), Propulsion and Energetics Panel, Solid Propellant Burning Rate Measurements, 1996–2001.

International Workshop, Co-Chair, Advanced Techniques for Burning Rate Measurement, Co-Chairman with M. Moser, UAH, Huntsville, AL, January 20–21, 1998.

International Workshop, Chairman, Multi-University Research Initiative, Propellant Ingredient Workshop, Invited Participants from Russia, U.S. Academia, and U.S. Industry, UAH, Huntsville, AL, March 1997.

National Workshop, Co-Chairman, "Hybrid Rocket Instability," American Institute of Aeronautics and Astronautics/Hybrid Rocket Technical Committee Special Workshop, Co-Chairman with Dr. David Altman, AIAA/SEA/ASME/ASEE Joint Propulsion Conference, San Diego, CA, July 1995.

Steering Committee, Member, "Hybrid Rocket Propulsion," AIAA Workshop, Washington, D.C., July 25–26, 1995.

National Workshop, Chairman, "Design of Solid Rocket Motors," American Institute of Aeronautics and Astronautics/Solid Rocket Technical Committee Special Workshop, AIAA/SAE/ASME/ASEE Joint Propulsion Conference, Monterey, CA, June 29, 1993.

National Meetings Organized

ASEE Technical Program Organizer, 50th Propulsion and Energy Forum; participated with the meeting Organizing Committee, organized propulsion education sessions and session chairs for the conference; August 2011..

ASEE Technical Program Organizer, 49th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit; participated with the meeting Organizing Committee, organized propulsion education sessions and session chairs for the conference; August 2013.

ASEE Technical Program Organizer, 48th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit; participated with the meeting Organizing Committee, organized propulsion education sessions and session chairs for the conference; August 2012

ASEE Technical Program Organizer, 47th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit; participated with the meeting Organizing Committee, organized propulsion education sessions and session chairs for the conference; August 2011..

ASEE Technical Program Organizer, 46th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit; Organized Propulsion Education sessions and Session chairs for the conference; Organized Panel Discussion Chaired by Dr. Mike Griffin entitled, "Educating the Next Generation of Engineers: Interdisciplinary Strategies," July 28, 2010; Dr. Robert A. Frederick, Jr.

ASEE Panel Discussion, "The Best of Times and the Worse of Times in Space Flight," 45th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit; participated with the meeting Organizing Committee, organized propulsion education sessions and session chairs for the conference; August 2009.

ASEE Technical Program Organizer, 45th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit; participated with the meeting Organizing Committee, organized propulsion education sessions and session chairs for the conference; August 2009.

ASEE Technical Program Organizer, 44th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit; participated with the meeting Organizing Committee, organized propulsion education sessions and session chairs for the conference; July 2008.

ASEE Technical Program Organizer, 43rd AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit; participated with the meeting Organizing Committee; organized propulsion education sessions and session chairs for the conference; July 2007.

ASEE Technical Program Organizer, 42nd AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit; participated with the meeting Organizing Committee; organized propulsion education sessions for the conference; developed K-12 session in conjunction with AIAA Passport to the Future K-12 Teacher Professional Development Program; July 2006.

ASEE Technical Program Organizer, 41st AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit; participated with the meeting Organizing Committee; organized sessions on university initiatives in propulsion and K-12 Initiatives in propulsion; July 2005.

ASEE Technical Program Organizer, 40th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit; participated with the meeting Organizing Committee; organized propulsion education sessions for the conference; July 2004.

ASEE Technical Program Organizer, 39th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit; participated with the meeting Organizing Committee; organized propulsion education sessions for the conference, August 2002 – July 2003.

Subcommittee Chairman and Session Organizer, AIAA Hybrid Rocket Motor Technical Committee, Hybrid Rocket Technical Papers, 1993 Joint Propulsion Conference, 5 Technical Sessions for July 1993 meeting.

Subcommittee Chairman and Session Organizer, AIAA Hybrid Rocket Motor Technical Committee, Hybrid Rocket Technical Papers, 1992 Joint Propulsion Conference, 4 Technical Sessions for July 1992 meeting.

Subcommittee Chairman and Session Organizer, Solid Rocket Technical Papers, 1993 Joint Propulsion Conference, 13 Technical Sessions for July 1992 meeting.

National Sessions Organized

Session Chairman, "University Initiatives in Propulsion," Session EDU-1, AIAA/SAE/ASME/ASEE Joint Propulsion Conference and Exhibit, July 8–11, 2007.

Session Chairman, "K-12 Outreach Initiates in Propulsion," AIAA/SAE/ASME/ASEE Joint Propulsion Conference and Exhibit, July 10–14, 2005.

Session Chairman, "University Propulsion Projects," AIAA/SAE/ASME/ASEE Joint Propulsion Conference and Exhibit, July 10–14, 2005.

Session Chairman, "University Propulsion Projects," AIAA/SAE/ASME/ASEE Joint Propulsion Conference and Exhibit, July 11–15, 2004.

Panel Session Chairman, "Education, Research and Service through the National Institute of Aerospace," AIAA/SAE/ASME/ASEE Joint Propulsion Conference and Exhibit, July 11–15, 2004.

Session Chairman, "University Propulsion Programs," AIAA/SAE/ASME/ASEE Joint Propulsion Conference and Exhibit, July 11–15, 2004.

Session Chairman, "University Initiates in Propulsion," AIAA/SAE/ASME/ASEE Joint Propulsion Conference and Exhibit, July 20–23, 2003.

Session Chairman, "Combustion Stability I," AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, July 16–19, 2000.

Session Chairman, "Propulsion Education," AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, July 16–19, 2000.

Session Chairman, Conference on College Composition and Communication for the National Council of Teachers of English. The session was entitled, "Writing, Learning, Engineering," Atlanta, GA, March 24–27, 1999.

Session Chair, JANNAF Combustion Subcommittee; 1999 JANNAF Meeting.

Session Co-Chairperson: Session on Slag Formation in Solid Rocket Motors, 31st AIAA/SAE/ASME/ASEE Joint Propulsion Conference, San Diego, CA, July 10–12, 1995.

SessionCo-Chairperson, Session on Hybrid Rocket Labscale Testing, 29th AIAA/SAE/ASME/ASEE Joint Propulsion Conference and Exhibit, Monterey, CA, June 28–30, 1993.

Session Co-Chairperson, Session on Structural and Heat Transfer Analysis, 27th AIAA/SAE/ASME/ASEE Joint Propulsion Conference, Sacramento, CA, June 1991.

National Archival Journal Service

Associate Editor, JANNAF Propulsion Journal, 2007 to present.

Associate Editor, American Institute of Aeronautics and Astronautics, Journal of Propulsion and Power, 1994 to 1998.

Technical Reviewer for American Institute of Aeronautics and Astronautics, Journal of Propulsion and Power, 1989 to present.

National Consulting Activities

Independent Consultant, Blue Ribbon Propulsion Review Panel, Gencorp Aerojet, Sacramento, CA, 2006.

National Peer Review Activity

Reviewer, AIAA Journal of Propulsion and Power, 2015.

Proposal Reviewer, Strategic Environmental Research and Development Program (SERDP), which funds R&D projects to address the Department of Defense's (DoD) environmental concerns, 2006.

Proposal Reviewer, National Research Council, Aeronautics and Space Engineering Board, Commission on Engineering and Technical Systems, October 1996.

Regional Service Activities

Technical Meeting Chairman and Organizer, 2nd AIAA Tactical Interceptor Technology Symposium, Huntsville, AL, January 20–21, 2005. Organized 16 presentations and produced CD ROM replay of presentations.

Technical Meeting Chairman and Organizer, AIAA Tactical Interceptor Design Symposium, Huntsville, AL, January 16, 2004. Organized 14 presentations from the

Technical Meeting Chairman and Organizer, AIAA Tactical Interceptor Design Symposium, Huntsville, AL, January 16, 2004.

Workshop Moderator, UAH Teamwork and Technology Workshop – Skylab Scientist Astronauts," Led Teamwork Workshop for UAH Faculty and Students with Skylab Astronauts Alan Bean and William Pogue, and past NASA Administrator George Mueller, the University of Alabama in Huntsville, Huntsville, AL, November 10, 2003.

Technical Meeting Chairman and Organizer, AIAA Tactical Missile Design Symposium, Huntsville, AL, January 14, 2003.

Technical Meeting Chairman and Organizer, AIAA Unmanned Vehicle Symposium, January 2002.

Invited Presentation, International Product Teams, AUVUST Symposium, Huntsville, AL, April 3, 2003.

Organizer and faculty advisor, American Helicopter Society UAH Student Chapter, 2000-2003.

Technical Judge, Technical Paper Competition for Department of Defense Science and Engineering Apprenticeship Program, U.S. Army Missile Command, Redstone Arsenal, August 1993.

Chairman of Technical Lecture Series, "Missile System Design," in Conjunction with College of Engineering Graduate Seminar, January to March, 1994. Ten Videotaped invited lectures given by U.S. Army Missile Command Engineers to UAH Students and Faculty.

Co-Chairman with Ben Shackleford of Technical Lecture Series, "Hybrid Propulsion," NASA Marshall Space Flight Center, September 11 to October 29, 1992. Developed and coordinated a Hybrid Propulsion Lecture Series in collaboration with NASA MSFC. Fourteen Lectures given by NASA Engineers and UAH Faculty/Students at Marshall Space Flight Center. Over 40 people from local industry participated.

Short Course Taught

Taught, "Advanced Solid Rocket Propulsion," AIAA Professional Development Course, Nashville, TN, June 2010

Co-Developed and Taught, "Advanced Solid Rocket Propulsion," AIAA Professional Development Course, Hartford, Connecticut, June 2008.

Taught, "Advanced Solid Rocket Propulsion," Professional Development Course, University of Alabama in Huntsville, spring 2008.

Developed and taught, "Advanced Solid Rocket Propulsion," Professional Development Course, University of Alabama in Huntsville, spring 2007.

Taught, Thermodynamics EIT Review, University of Alabama in Huntsville, Continuing Education Division, 1994.

INTERNAL SERVICE

Ph.D. Thesis Committees Served

1. Rodriguez,M.A., "TBD," Chair: Jason Cassibry.

2. Tackett, Regan B., "TBD," Chair: Jason Cassibry.
3. Benfield, P.J., "Determining the Ability of the Tuckman Group Development Model to Explain Team Development in Science and Engineering Organization," Spring 2005, Chair: D. Utley.
4. Sims, J.D., "Uncertainty," spring 2004, Chair: H.W. Coleman.
5. Benfield, M., Ph.D. Degree in ISE, Committee Member for Minor in Propulsion, Comprehensive Examination, May 2003: Chair; D. Utley.
6. Russell, Gerald, Aerothermal Environments, Chairman: S.T. Wu; Qualifier June 2000.
7. Sornsin, Elizabeth Ann, Mueller Matrix Polarimetry of PLZT Electro-Optic Modulators, Defense Observer, April 2, 1999.
8. Amro M. Al-Qutub, Friction Factors in Rotordynamic Analysis of Smooth and Honeycomb Stator Annular Gas Seals, Chairman: Prof. D. Elrod.

Master's Plan I Committees Currently Serving

1. Nix, Dustin, "Engineering Topic," Advisor: D.B. Landrum.
2. Couchman, A., MS Plan I; Advsor: Dr. Slegers.
3. Coogan, J., "Optimization of a Predictive Control of a Pulse-Jet Controlled Projectile," Advisor: N. Slegers.
4. Stewart, John W., "MAS Plan I," Advisor: Q.H. Ken Zuo.

Master's Thesis Committees Served

1. Jackson, L. "Three Dimensional Model of a Plasma Raingun Using Smoothed Particle Hydrodynamics," summer 2014, Advisor: J. Cassibry.
2. Cortez, R., Initial Design Process for a Pulsed Thermonuclear Fusion Reaction Engine," summer 2011, Advisor: J. Cassibry.
3. Casey, Douglas," CFD Analysis of Combustion Instability for a Rocket Injector," Spring 2011; Advisor: K. Frendi.
4. Fisher, A., "Observation of Rocket Pollution with Overhead Sensors, spring 2011, Advisor: K. Frendi.
5. Smith, Ryan, Missile Systems Engineering, Advisor: D.B. Landrum.
6. McDougal, K.J., Systems Engineering – ISE, Advisor: P.A. Farrington.
7. Saffell, Ryan, "Liquid Rocket Injectors," spring 2009 (Anticipated). Advisor, M.D. Moser.
8. Harris, John, "A Simulation Approach to Predicting Tactical Missile Performance with a Broken Wing," fall 2008, Advisor: Nathan Slegers.
9. Entrekin, Sean F., "Experimental Investigation of the Qu Tube Heat Pipe," fall 2008, Advisor: Jim Blackmon.
10. Williams, Kevin D. "Rotorcraft Engineering," spring 2008; Advisor: D.B. Landrum.
11. Osborn, Serena, "Stability of Uncontrolled Scaled Projectiles for Kinetic Energy Kill Studies, fall 2007, Advisor: D.B. Landrum.

12. Piputsitee, Thammanit, “Inexpensive Flight Simulation in an Academic Environment,” fall 08, Advisor: D.B. Landrum.
13. Farbman, Melissa S., “Trajectory Reconstruction with a Multi-Order Least Squares Sliding Window (LSSW), spring 2007.
14. Polsgrove, Robert H., “Characteristics of Methane Combustion, fall 2006.
15. Pei, Jing, “Introduction of Control Pins in the Vicinity of Missile Fins for Roll & Yaw Control Purposes,” Chairman: D.B. Landrum, summer 2006.
16. Locke, Justin, “Heat Transfer Analysis for Rocket Cooling,” Chairman: D.B. Landrum, fall 2005.
17. Mullis, James, “Guided Bullet Modeling and Simulation” Chairman: D.B. Landrum, spring 2005.
18. Nuar, Angelene, “Analysis of the Quick Monoplane,” Chairman: D.B. Landrum, Spring 2004.
19. Parris, Daniel, “Aerospace Engineering Topic,” MS, Work in Progress, Chairman: D.B. Landrum.
20. Dolbeer, Christi Hames, “Exergy Analysis of Air Breathing Propulsion Systems,” MS, 2004, Chairman: D.B. Landrum.
21. Davis, Christina Ann, “Solid Propulsion Control,” Defense 2004, Chairman: D.B. Landrum.
22. Polsgrove, Robert H., Propulsion Thesis in Progress, Chairman: D.B. Landrum.
23. Sims, Joseph David, “Hysteresis Effects on Thrust Measurement and Its Uncertainty,” April 3, 2000, Advisor: H.W. Coleman.
24. Ibrahim, Zuhair Mahmoud, “Numerical Simulation of the Regenerative Cooling Tubes in the 15-K Fastrac Engine,” March 22, 2000.
25. Dauch, Frederic, “Uncertainty Analysis of the Ultrasonic Technique Applied to Solid Propellant Burning Rate,” March 22, 1999, Chairman: M.D. Moser.
26. Edmund Rochford, “Temperature Sensitivity Measurements of Solid Rocket Propellants,” Defense: February 18, 1999, Chairman: Marlow Moser.
27. Thames, Mignon, “Thermal/Fluid Analysis of Perforated Plates for Transpiration Cooled Rocket Chambers,” October 1998; Chairman: Brian Landrum.
28. McQuade, W., “Ultrasonic Instrument Development for Solid Propellant Burning Rate Measurement,” March 1998, Chairman: M. Moser.
29. Spetman, D. Plan II Paper, “Design of RBCC Mixing Study;” Chairman: C.W. Hawk.
30. Vandergrift, John G., “Design, Integration and Space Flight Operations of a Microgravity Materials Processing Furnace,” January, 1997, Chairman: Dr. J. Smith

31. Markopoulos, Pete, "An Uncertainty Assessment of Performance Evaluation Methods for Solar Thermal Absorber/Thruster Testing," Spring 1996; chairman: H.W. Coleman.
32. Marotta, Stephen Anthony, "Investigation Into Gas as Steam Turbine Combined Cycles Implementing Supplemental Firing with a Solid Waste Derived Biomass Fuel," Spring 1995, Chairman: G. Guinn.
33. Russell, Gerald, "Master of Mechanical Engineering," 1994, Chairman: C.P. Chen.
34. Slaby, Matthew, Master of Mechanical Engineering, "Theoretical Analysis of a Submerged, Two-Phase Flow Turbulent Jet," March 1994, Chairman: Dr. Shih.
35. Sekita, Ryuichi, "Staged Combustion Hybrid Rocket Test Facility Design," December 1993, Chairman: Dr. C.W. Hawk.
36. Chi, Yong Mann, "Micro Gravity Fluid Mechanics of Reorientation," 1993, Chairman: Dr. R. Hung.
37. Diggle, Frederick James, III, "Solar Distillation of Volatile Organic Compounds," 1993, Chairman: Dr. G. Guinn.
38. Moylan, Bruce, "Convection Heat Transfer of a Sphere in a Subsonic Transitional Flow," 1992, Chairman: Dr. Musielak.
39. Stephens, Walter Eugene, "A Study to Find The Optimum Configuration for a New NASA Launch Vehicle," May 1992, Chairman: Dr. Musielak.

Master's Committees (Non-Thesis)

1. Bidadi, Shreyas, Investigation of Numerical Viscosities and Dissipation Rates of Numerical Viscosities and Dissipation Rates of Shock-Capturing Schemes for Implicit Large-Eddy Simulation," Dissertation, Adviser: Dr. Sarma Rani, spring 2015.
2. Olatoyinbo, Festus,"CFD Topic," Adviser: K. Frendi.
3. Dowell, B.A., Plan II, fall 2010; Advisor: Jason Cassibry.
4. McDougal. Kristopher J., "The Application of a Trade Study Methodology to determine which Capabilities to Implement in a Test Facility Data Acquisition Upgrade," fall 2008, Advisor: P.A. Farrington.
5. Nickelson, Virginia, "Rotorcraft Engineering," spring 2008, Advisor: D.B. Landrum.
6. Bednarczyk, Ronald, "Rotorcraft Engineering," spring 2008, Advisor: D.B. Landrum.
7. Wheeler, Anita, "Rotorcraft Engineering," spring 2008, Advisor: D.B. Landrum.
8. Schmidt, John B., "Rotorcraft Engineering," spring 2008, Advisor: D.B. Landrum.
9. Stockton, Andrew. "Rotorcraft Engineering," spring 2008, Advisor: D.B. Landrum.
10. Walling, Roger, "Rotorcraft Engineering," spring 2008, Advisor: D.B. Landrum.
11. Mitchell, Troy, "Unmanned Vehicles," May 2008, Chairman: Nathan Slegers.

12. Liaw, Judy, "Investigation of Control Methods for the Enhanced Counter Air Projectile," May 2004, Chairman: D. B. Landrum.
13. Moton, Tryshanda, "Design Optimization of a Nuclear Reactor for Earth-to-Orbit Applications," May 7, 2001, Chairman: D.B. Landrum.

DEPARTMENT/COLLEGE/UNIVERSITY SERVICE ACTIVITIES

University Committees

Search Committee Chair, COE Eminent Scholar in Propulsion, 2014-15.

Chair of Strategic Planning Task Group #6 to "Create a significant pool of 15-20% new and replacement faculty lines by 2013."

UAHuntsville Budget Committee, Member of an Advisory Committee to Mr. Ray Pinner, VP Finance that reviewed the UAH Budget and will assist in building the UAH budget for FY 11-13.

UAH Campus Branding Committee, member 2008.

Office of VP Research Strategic Planning Committee, serving as member 2008.

UAH University Judicial Board, served from 2001–2003, handled role of Preliminary Action Officer on Student Misconduct Cases.

UAH Foundation Teaching Awards Committee served in 2001 and 2002 on eight-person university wide committee to select the UAH recipients of the Distinguished Teaching Award.

College Committees

College of Engineering College Assessment Team (CAT), served as member for 2007–2008.

College of Engineering Promotion and Tenure Advisory Committee (PTAC), served as member for 2003/2004.

College of Engineering Curriculum Committee, Committee Member, University of Alabama in Huntsville, 1996–2000.

College of Engineering Safety Committee, Committee Member, University of Alabama in Huntsville, 1994–1995.

Department Committees

MAE Assessment Committee, University of Alabama in Huntsville, Mechanical and Aerospace Engineering; Department of Mechanical and Aerospace Engineering; 1998–2008; Chair: 2005–2006.

Aerospace Engineering Program Committee, University of Alabama in Huntsville, Department of Mechanical and Aerospace Engineering; 1993–1998; Chair 2006.

Mechanical Engineering Program Committee, University of Alabama in Huntsville, Department of Mechanical and Aerospace Engineering; 1991–1993.

Tenure Review Committee, Dr. David Berkowitz, College of Administrative Science, October 2001.

Promotion Review Committee, Dr. Yuri Shtessel, College of Engineering, October 2001.

Development/Recruitment Activities

Television, Appeared in National Geographic Special: *Known Universe: Extreme Space Technology*, Thursday, May 26th., 2011/

Television, Appeared in Local New Feature Announcing New Aerospace Systems Engineering Masters and PhD Program, April 2011.

Marketing Video, Produced and directed the production of a 4-minute video entitled "Childhood Dreams" that featured University of Alabama in Huntsville PRC/MAE faculty and students working together on the NASA Constellation University Institute Program, September 2008.

Organized and Hosted National Exhibit Booth, for University of Alabama in Huntsville Propulsion Research Center, AIAA Joint Propulsion Conference, Hartford, CT, July 2008.

UAH Integrated Product Team Recognition Banquet, Organized UAH Banquet and Presentation of the IPT 2008 with NASA and AMDRDEC speakers, May 2008.

UAH Integrated Product Team Recognition Banquet, Organized UAH Banquet and Presentation of the IPT 2007 with NASA and AMDRDEC speakers, May 2007.

UAH Integrated Product Team Recognition Banquet, Organized UAH Banquet and Presentation of the IPT 2006 with NASA and AMDRDEC speakers, May 2006.

UAH Integrated Product Team Recognition Banquet, Organized UAH Banquet and Presentation of the IPT 2005 with Mr. William Nourse, AMRDEC, as speaker, May 2005.

UAH Integrated Product Team Recognition Banquet, Organized UAH Banquet and Presentation of the IPT 2004 with Dr. James Bradas, AMRDEC, as speaker, May 2004.

Televisions interviews for representing UAH giving analysis of Space Shuttle Columbia failure on Channel 48, Huntsville; February 1, 2, 4, 8, 2003.

UAH Integrated Product Team Recognition Banquet, Organized Banquet and Presentation of the IPT 2003 with Dr. J. M. Lyon, AMCOM, as speaker, May 2003.

UAH Integrated Product Team Recognition Banquet, Organized American Helicopter Society Banquet and Presentation of the IPT 2002 Banquet with Dr. William McCorkle, AMCOM, as Keynote Speaker, May 2002.

UAH Integrated Product Team Recognition Banquet, Developed American Helicopter Society Banquet and Presentation of the IPT 2001 Banquet with General Julian Sullivan, Commanding General of AMCOM, as Keynote Speaker, May 2001.

High School Recruiting hosted Linden High School students at UAH Engineering Open House, 1998, 1999, and 2000.

***Open House,* IPT 2008**, Space and Missile Projects, Huntsville, AL, March 2008.

***Open House,* IPT 2007**, Space and Missile Projects, Huntsville, AL, March 2007

***Open House,* IPT 2006**, Robotic Lunar Lander, Micro Vertical Robot, Autonomous Air Vehicle, and Advanced Tactical Missile II, Huntsville, AL, March 11, 2006.

Open House, IPT 2005, Enhanced Counter Air Projectile, Huntsville, AL, March 2005.

Open House, IPT 2004, Notional Miniature Interceptor, Huntsville, AL, March 11, 2004.

Open House, IPT 2003, Advanced Tactical Missile, Huntsville, AL, February 18, 2003.

Open House, IPT 2002, Unmanned Hybrid Vehicle, Huntsville, AL, March 2002.

Open House, IPT 2001,Unmanned Air-Ground Vehicle, Huntsville, AL, March 2001.

Open House, IPT 2000, Crew Transport/Recovery Vehicle, Huntsville, AL, March 2000.

Open House, IPT 1999, Advanced Propulsion Rotorcraft, Huntsville, AL, March 1999.

Open House, IPT 1998, Multi-Disciplinary Education Initiative," Presentation with AMCOM, Boeing, and Students to Local Business Leaders, Huntsville, AL, March 18, 1998.

UA System New Trustee Orientation, Presentation on Integrated Product Team Class, August 27, 1998.

Promotional Interview, with Tomas Houser, President of Mevatec, "Students fly into real world by designing better helicopters," interview with James McWilliams of Huntsville Times; article appeared in May 11, 1998, edition of Huntsville Times.

Water Rocket Demonstration, Huntsville Chamber of Commerce Leadership Event, UAH, February 3, 1999.

Water Rocket Demonstration, Huntsville/Madison County Youth Leadership Event, UAH, February 11, 1999.

Rocket Launch Demonstration, Huntsville/Madison County Youth Leadership Event, UAH, February 19, 1998.

Development Interview, with Rose Norman, UAH Professor of English and Paul LaSarge, UAH undergraduate student, telephone interview with Rachel Schwartz, freelance writer, March 11, 1996; article entitled "Integrated Product Team Development Class" to appear in ASME Prism Magazine, October 1996.

Development Presentation, "Integrated Product Team Development Class," Presentation with NASA, Boeing and Students to Local and Regional Business Leaders, Huntsville, AL, March 19, 1996.

Open House, "Multi-Disciplinary Education Initiative," Presentation with NASA, Boeing, and Students to Local Business Leaders, Huntsville, AL, March 12, 1996.

Periodical Article, "Teaming Up for Success," UAH College of Engineering, *Dynamics*, Vol. 5, No. 1, summer 1996.

Promotional Interview, with Dorla Evans, Rose Norman, Kevin Crowley, Mark Stucker, "Integrated Product Team Development Class," interview with Cari Hawkins of Huntsville Times; article appeared in March 11, 1996, edition of Huntsville Times.

Periodical Article, "Is there Maglev in Houston's Future?" *Advanced Transportation News*, Volume 2, Number 9, January 1996.

Promotional Interview, with Dorla Evans and Rose Norman, "Integrated Product Team Development Class," interview with Lee J. Green of the Huntsville News; article "Shooting for the Stars," appeared in December 19, 1995, edition of the Huntsville News.

Educational Interview, Interviewed and appeared on TV-48 Evening News regarding calorimeter experiments conducted by undergraduate thermodynamics students, March 1994.

Seminar; "Propulsion at UAH," presented to high school students and parents, High School Day, 1992 and 1991.

Engineering Week Activities

IPT Presentation, UAH Open House, 1997, 1998, 1999, 2000, 2001.

Demonstrations, Propulsion Laboratory Displays and Demonstrations, UAH Open House, 1993, 1994, 1995.