

RESUME

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AREAS OF EXPERTISE

Propulsion Systems; Use of Optimization in Systems Design; Internal Aerodynamics; Heat Transfer; Space Power Systems

EDUCATION

B.S. (Engineering Science), 1964, Florida State University.
M.S. (Engineering Science), 1965, Florida State University.
Ph.D. (Aeronautics, Astronautics, and Engineering Science), 1969, Purdue University.

EXPERIENCE

- 26 years in academia
- 10 years in industry
- Licensed Professional Engineer, Alabama Certificate No. 11548

INVITED LECTURES, SYMPOSIUMS, and SHORT COURSES

- "Liquid Propellant Rockets," a short course presented to the Central Intelligence Agency, Washington D.C., August 2007 in collaboration with Dr. Roy Hartfield.
- "Advanced Topics in Solid Rocket Motor Design," a short course presented to the Missile & Space Intelligence Center, Redstone Arsenal, AL, July, 2003 in collaboration with Dr. Roy Hartfield.
- "Solid Rocket Motor Design", a short course presented to the Missile & Space Intelligence Center, Redstone Arsenal, AL, July 2002 in collaboration with Dr. Roy Hartfield.
- "Solid Rocket Motor Component Design," a short course presented to the Missile & Space Intelligence Center, Redstone Arsenal, AL, May, 2002 in collaboration with Dr. Roy Hartfield.
- "Symposium on Genetic Algorithm Application to Missile System Design and Optimization", presented to the Naval Air Warfare Center, China Lake, CA, January 2002 in collaboration with Dr. John Burkhalter and Dr. Murray Anderson.
- "Propulsion Short Course," presented to the Missile & Space Intelligence Center, Redstone Arsenal, AL, June 2001 in collaboration with Dr. Roy Hartfield.
- "Solid Rocket Motor Ignition Transients," CIRA (Italian Center for Space Research), invited lecture presented May 9, 1996, Capua, Italy.

INVITED LECTURES, SYMPOSIUMS, and SHORT COURSES, continued

- “Hybrid Rocket Motor Stability Problems,” CIRA (Italian Center for Space Research), invited lecture presented May 10, 1996, Capua, Italy.

PAPERS AND PUBLICATIONS

“Ramjet Powered Missile Design Using a Genetic Algorithm,” Hartfield, R., Jenkins, R., and Burkhalter, J., *ASME Journal of Computing and Information Science In Engineering*, Vol.7, No. 2, June 2007, pp. 167-173.

“Design Optimization of a Space Launch Vehicle Using a Genetic Algorithm,” Bayley, D., Hartfield, R., Burkhalter, J., and Jenkins, R., AIAA Paper 2007-1863, presented at 3rd AIAA Multidisciplinary Design Optimization Specialist Conference, Honolulu, Hawaii, April 23-26, 2007

“Reverse Engineering of Solid Rocket Missiles with a Genetic Algorithm”, Metts, J., Hartfield, R., Burkhalter, J., and Jenkins, R., AIAA Paper 2007-0363, presented at the Forty-Fifth Aerospace Sciences Meeting and Exhibit, Reno, NV, Jan 8-11, 2007.

“Design of Liquid Rocket Powered Missile Systems Using a Genetic Algorithm”, Riddle, D., Hartfield, R., Burkhalter, J., and Jenkins, R., AIAA Paper 2007-0362, presented at the Forty-Fifth Aerospace Sciences Meeting and Exhibit, Reno, NV, Jan 8-11, 2007.

“Optimizing a Solid Rocket Motor Boosted Ramjet Powered Missile Using a Genetic Algorithm,” Jenkins, R., Hartfield, R., and Burkhalter, J., AIAA 2005-3507, presented at the Forty First AIAA/ASME/SAE/ASEE Joint Propulsion Conference, Tucson, AZ, July 10-13, 2005.

“Scramjet Missile Design Using Genetic Algorithms,” Hartfield, R., Burkhalter, J. and Jenkins, R., accepted for publication in *Journal of Applied Mathematics and Computation*.

“Analytical Methods for Predicting Grain Regression in Tactical Solid-Rocket Motors,” Hartfield, R., Jenkins, R., Burkhalter, J., and Foster, W., *Journal of Spacecraft and Rockets*, Vol.41 No.4, July-August 2004, pp.689-693.

"Analytical Development of a Slotted Grain Solid Rocket Motor," Hartfield, R., Burkhalter, J., Jenkins, R., and Witt, J., *Journal of Propulsion and Power*, Vol. 20, No. 4, July-August 2004, pp. 690-694.

“A Review of Analytical Methods for Solid Rocket Motor Grain Analysis”, Hartfield, R., Jenkins, R., Burkhalter, J., and Foster, W., accepted for publication in the *AIAA Journal of Spacecraft and Rockets*.

“Ramjet Powered Missile Design Using a Genetic Algorithm,” Hartfield, R., Jenkins, R., and Burkhalter, J., AIAA 2004-0451, presented at the forty-second AIAA Aerospace Sciences Meeting, Reno NV, January 5-8, 2004.

“Genetic Algorithm Design Results for a Ramjet Powered Missile”, Hartfield, R., Jenkins, R., and Burkhalter, J., AIAA-2004-6551, presented at the AIAA 1st Intelligent Systems Technical Conference, Chicago, IL, September 2004.

PAPERS AND PUBLICATIONS (Continued)

“Scramjet Missile Design Using Genetic Algorithms”, Burkhalter, J. , Jenkins, R., and Hartfield, R., AIAA-2004-6551 presented at the AIAA 1st Intelligent Systems Technical Conference, Chicago, IL, September 2004.

“Propulsion Education at Auburn University”, Foster, W.A. , Hartfield, R. and Jenkins, R., an invited paper presented at the Fortieth AIAA/ASME/SAE/ASEE Joint Propulsion Conference, Fort Lauderdale, FL July 2004.

“A Review of Analytical Methods for Solid Rocket Motor Grain Analysis”, Hartfield, R., Jenkins, R., Burkhalter, J., and Foster, W., AIAA 2003-4506, presented at the Thirty Ninth AIAA/ASME/SAE/ASEE Joint Propulsion Conference, Huntsville, Alabama, July 20-23, 2003.

“Missile Systems Design Optimization Using Genetic Algorithms”, J. Burkhalter, R. Jenkins, M. Anderson, R. Hartfield, G. Sanders, 2002 Missile Sciences Conference, Monterey, California, November 2002.

“Analytical Development of a Slotted Grain Solid Rocket Motor”, R. Hartfield, J. Burkhalter, R. Jenkins, M. Anderson, J. Witt, AIAA 02-4298, 38th AIAA Joint Propulsion Conference, Indianapolis, IN, July 2002.

“Intelligent Systems Approach to SRM Design, Part I: Single/Dual Goal Optimization”, M. Anderson, J. Burkhalter, and R. Jenkins, AIAA 01-3493, 37th AIAA ASME Joint Propulsion Conference, Salt Lake City, UT, July 2001.

“Intelligent Systems Approach to SRM Design, Part II: Multiple Goal Optimization”, M. Anderson, J. Burkhalter, and R. Jenkins, AIAA 01-3494, 37th AIAA ASME Joint Propulsion Conference, Salt Lake City, UT, July 2001.

“Performance of a TAL/D-55 in Direct-Drive Configuration”, H. Hrbud, F. Rose, S. Olesony, and R. Jenkins, accepted for publication in *AIAA Jour. of Propulsion and Power*.

“Design of a Guided Missile Interceptor Using a Genetic Algorithm”, M. Anderson, J. Burkhalter, and R. Jenkins, *AIAA Journal of Spacecraft and Rockets* Vol. 38, No. 1, January 2001, pp. 28-35.

“Missile Shape Optimization Using Genetic Algorithms”, M. Anderson, J. Burkhalter, and R. Jenkins, *AIAA Journal of Spacecraft. and Rockets*, Vol. 37, No. 5, Oct. 2000, pp.663-669.

“Intelligent Systems Approach to Designing an Interceptor to Defeat Highly Maneuverable Targets”, M. Anderson, J. Burkhalter, and R. Jenkins, presented at 39th AIAA Aerospace Science Meeting, Reno, NV, January 2001.

“Air to Air Interceptor Design Using Genetic Algorithms”, M. Anderson, J. Burkhalter, and R. Jenkins, AIAA99-4081, AIAA Guidance, Navigation, and Control Conference, Portland, OR, August 1999.

“Missile Performance Optimization Using Pareto Genetic Algorithms,” M. Anderson, J. Burkhalter, and R. Jenkins, AIAA 99-0261, presented at 37th AIAA Aerospace Science Meeting, Reno, NV, January 1999.

PAPERS AND PUBLICATIONS (Continued)

"Design of A Solid Rocket Motor Using Genetic Algorithms," M. Anderson, J. Burkhalter, and R. Jenkins, presented at IEEE Systems and Cybernetics Conference, San Diego, CA, October 1998.

"Unsteady Flow Ballistics of a Pneumatic Launch Tube", M.R. Brown, R.M. Jenkins, and M.F. Rose, AIAA 98-3738, presented at 34th Joint Propulsion Conference, Cleveland, Ohio, July 1998.

"A Pneumatic Approach to First Stage Acceleration for Highly Reusable Space Transportation Systems", M.Brown, M.F. Rose, and R. Jenkins, AIAA 97-3212, presented at 33rd Joint Propulsion Conference, Seattle, WA, July 1997.

"Direct Measurements of Internal Flow Velocities in a Star-Slot Model", W.A. Foster, Jr., R.M. Jenkins, J.E. Hengel, and A.W. Smith, AIAA 97-2716, presented at 33rd Joint Propulsion Conference, Seattle, WA, July 1997.

"TAL Performance and Mission Analysis in a CDL Capacitor Powered Direct-Drive Configuration, I. Hrbud, F. Rose, R. Jenkins, presented at 33rd Joint Propulsion Conference, Seattle, WA, July 1997.

"Analysis of a Coaxial Magnetohydrodynamic Marine Thruster, Part I: Constant Area Fully Developed Flow," P. Blouke, R. Jenkins, J.C. Williams, III, AIAA 96-3087, presented at 32nd Joint Propulsion Conference, Orlando, FL, July 1996.

"Analysis of a Coaxial Magnetohydrodynamic Marine Thruster, Part II: Variable Area Developing Flow," P. Blouke, R. Jenkins, J.C. Williams, III, AIAA 96-3087, presented at 32nd Joint Propulsion Conference, Orlando, FL, July 1996.

"Cold-Flow Study of Hybrid Rocket Motor Flow Dynamics," R. Jenkins, W. Cruit, A. Smith, AIAA 96-2843, presented at 32nd Joint Propulsion Conference, Orlando, FL, July 1996.

"Study of Hybrid Rocket Flow Dynamics in a Dual-Loop Water Tunnel," W. Cruit, A. Smith, and R. Jenkins, presented at 14th Workshop for Fluid Dynamic Applications in Rocket Propulsion and Launch Vehicle Technology, Huntsville, AL, April 23-25, 1996.

"L*-Instability Analysis of Low-Frequency Pressure Oscillations in Hybrid Rocket Motors," R. Jenkins, J. Cook, accepted for publication in *AIAA Jour. of Propulsion and Power*.

"Numerical Analysis of Unsteady Multiple Jet Plume Interactions," R. Jenkins, W. Foster, L. Wirth, *Journal of Applied Mathematics and Computation*, Vol.79, pp. 239-247, 1996.

"Analysis of Ignition and Flame Spreading in Solid Rocket Motor Star Slots," A. Ciucci, R. M. Jenkins, and W.A. Foster, Jr., *AIAA Journal of Propulsion and Power*, Vol.11, No.6., pp.1371-1373, 1995.

"A Preliminary Analysis of Low Frequency Pressure Oscillations in Hybrid Rocket Motors," AIAA 95-0874 presented at AIAA/ASME/SAE 31st Joint Propulsion Conference, San Diego, CA, July 1995.

PAPERS AND PUBLICATIONS (Continued)

"Unsteady Jet Plume Interaction in Multi-Port SRM Ignition Systems," R.M. Jenkins, W.A. Foster, Jr., and L.S. Wirth, AIAA95-0874, presented at 33rd Aerospace Sciences Meeting and Exhibit, Reno, NV, January 9-12, 1995.

"An Inverse Calculation Technique for Quasi_Three_Dimensional Turbomachinery Cascades," R.M. Jenkins and D.A. Moore, *Journal of Applied Mathematics and Computation*, Vol. 57, pp. 197-204, 1993.

"Numerical Analysis of an Unsteady Confined Supersonic Jet," A. Ciucci, R.M. Jenkins, and W.A. Foster, Jr., *Journal of Applied Mathematics and Computation*, Vol. 57, pp. 245-254, 1993.

"Preliminary Design of a Space Propulsion System Utilizing Stored Thermal Energy," G.Williams, R.M. Jenkins, and M. Frank Rose, *AIAA Journal of Propulsion and Power*, Vol. 10, No. 1, January-February 1994.

"A Simplified Model for Calculation of Backflow Contamination from Rocket Exhausts in Vacuum," R.M. Jenkins, J.E. Cochran, Jr., and K.A. Phelps, *AIAA Journal of Propulsion and Power*, Vol. 31, No. 2, March-April 1994.

"A Semi_Empirical Model for Heat Transfer and Flame_Spreading in Slotted Solid Rocket Motors," R.M. Jenkins and W.A. Foster, Jr., AIAA 93-2308, presented at AIAA/ASME/ SAE 29th Joint Propulsion Conference, Monterey, CA, June 1993.

"Ignition Transient Calculations in the Space Shuttle Solid Rocket Motor," R.M. Jenkins and W.A. Foster, Jr., Presented at Workshop for CFD Applications in Rocket Propulsion, NASA Marshall Space Flight Center, Huntsville, AL, April 20_22, 1993.

"Analysis of Ignition and Flame Spreading in the Space Shuttle Head_End Star Grain," A. Ciucci, R.M. Jenkins, and W.A. Foster, Jr., AIAA 92_3272, 28th Joint Propulsion Conference, Nashville, TN, July 1992.

"Results of an Experimental Investigation of the Flow Field in the Head_End Star Slot Section of a Solid Rocket Motor," A. Ciucci, W.A. Foster, Jr., and R.M. Jenkins, AIAA 92_3048, 28th Joint Propulsion Conference, Nashville, TN, July 1992.

"Preliminary Design of a Space Propulsion System Utilizing Stored Thermal Energy," G.J. Williams, R.M. Jenkins, and M.F. Rose, AIAA 92_3848, 28th Joint Propulsion Conference, Nashville, TN, July 1992.

"Experimental Investigation of the Flow Field in the Head_End Star Slot Section of the Solid Rocket Motor," A. Ciucci, R. Jenkins, and W. Foster, Jr., AIAA 91_2427, 27th Joint Propulsion Conference, Sacramento, CA, June 24_27, 1991.

"Numerical Analysis of Ignition Transients in Solid Rocket Motors," A. Ciucci, R. Jenkins, and W. Foster, AIAA 91_2426, 27th Joint Propulsion Conference, Sacramento, CA, June 24_27, 1991.

PAPERS AND PUBLICATIONS (Continued)

"A Direct Optimization Procedure for Spanwise Work Distribution in Non-Free Vortex Turbine Stages," R.M. Jenkins, ASME 91_GT_204, ASME/IGTI Gas Turbine Conference, Orlando, FL, June 1991.

"A Simplified Model for Calculation of Backflow Contamination from Rocket Exhausts in Vacuum," R.M. Jenkins, A. Ciucci, and J.E. Cochran, Jr., AIAA Paper 90_1846, 26th Joint Propulsion Conference, Orlando, FL, July 1990.

"Dynamics of Particulate Material Ejected from a Rotating Space Platform," R.M. Jenkins, J.E. Cochran, Jr., and K.A. Phelps, *Journal of Guidance, Control, and Dynamics*, Vol. 12, No. 6, pp. 769_770, November-December 1989.

"Direct Optimization Method for Calculating Supersonic Turbine Stator Profiles," R.M. Jenkins and J.A. Hatfield, *AIAA Journal of Propulsion and Power*, Vol. 4, No. 6, pp. 580_585, November-December 1988.

"Analysis of Thermal Performance of Penetrated Multi-Layer Insulation," W.A. Foster, R.M. Jenkins, C.H. Yoo, and W.E. Barrett, AIAA Paper 88_2644, AIAA Thermophysics, Plasmadynamics, and Lasers Conference, San Antonio, TX, June 17_19, 1988.

"Investigation of Open-Cycle H₂-O₂ Ljungstrom Turbine Configurations for Space Power Conversion," R.M. Jenkins and S.J. Skvorz, *Proceedings of the 1988 Innovative Science and Technology Symposium*, Vol. 871 (Space Structures, Power, and Power Conditioning), Jan.1988.

"Regionally Averaged Endwall Heat Transfer Correlations for a Linear Vane Cascade," with G.N. Kumar, ASME Paper No. 85_1963, ASME 30th International Gas Turbine Conference, Houston, TX, March 1985.

"A Comprehensive Method for Preliminary Design Optimization of Axial Gas Turbine Stages, Part II: Code Verification," AIAA_83_1403, 19th Joint Propulsion Conference, Seattle, WA, June 1983.

"A Comprehensive Method for Preliminary Design Optimization of Axial Gas Turbine Stages," AIAA_82_1264, 18th Joint Propulsion Conference, Cleveland, OH, June 1982.

"A Unified Theory of Particle Growth in Rocket Chambers and Nozzles," Presented at AIAA 5th Propulsion Joint Specialists Conference, USAF Academy, CO, June 1969

"Heat Transfer for One- and Two-Dimensional Pulsating Laminar Flow in a Circular Tube," presented at ASME 9th National Heat Transfer Conference, Seattle, WA, August 1967.

SELECTED TECHNICAL REPORTS

- Final Report, "Genetic Algorithms for Missile Analysis", J Burkhalter, R. Jenkins, and R. Hartfield, Missile and Space Intelligence Center, Redstone Arsenal, AL, Feb 2003.

TECHNICAL REPORTS (Continued)

- “Genetic Algorithm Developments for Liquid Missile Analysis”, Hartfield, R., Burkhalter, J., Jenkins, R., Metts, J., Riddle, D., and Dyer, J., submitted to Missile and Space Intelligence Center, Redstone Arsenal, Alabama 35898, September 2006, Reference Contract No. PAN 50353-05.
- “Hypersonic Outer Tier – Development Interceptor Concepts/Trades Solid Rocket Motor Boosted Ramjet and Other Test Cases Optimized using a Genetic Algorithm”, Hartfield, R., Burkhalter, J., Jenkins, R., Dyer, J., and McDavid, B., US Army Aviation and Missile Research Development and Engineering Center, Redstone Arsenal, AL 35898, March 2007, Under Contract: ARMYW31P4Q05CR1383AA.
- Final Report, “Missile Design Synthesis Genetic Algorithm Method”, J Burkhalter, R. Jenkins, and R. Hartfield, Dynetics, Inc., and U.S. Army Aviation & Missile Command, Redstone Arsenal, AL, December 2002.
- Final Report, “Missile Technology Expertise Assessment”, J. Burkhalter and R. Jenkins, Missile and Space Intelligence Center, Redstone Arsenal, AL, March 2002.
- Final Report: “Genetic Algorithm Development and Application to Missile Design”, J. Burkhalter and R. Jenkins, The Boeing Company, Defense and Space Group, Huntsville, AL, November 2001.
- Final Report: “Missile Design Systems Developed with Genetic Algorithms”, Dynetics, Inc., and U.S. Army Aviation & Missile Command, Redstone Arsenal, AL, October 2001
- Final Report: “MC-130H Combat Talon II Aircraft Nose Radome Study”, R.M. Jenkins and R.S. Gross, AUB-0182-97-001, Support Systems Associates, Inc., October 2000.
- Final Report: “Aerodynamic Analysis of the Jet Interaction Problem for the SLID Configuration”, J.E. Burkhalter, R.M. Jenkins, and A. Scott Payne, BOEING-PO842034/421615, Boeing North American, Inc., Autonetics and Missile System Division, July 1998-October 1998.
- Addendum to Final Report, “Operating Manual for Two-Dimensional Computational Fluid Dynamics Code: Aerodynamic Analysis of the Jet Interaction Problem for the SLID Configuration”, J.E. Burkhalter, and R.M. Jenkins, BOEING-PO842034/421615, Boeing North American, Inc., Autonetics and Missile System Division, July 1998-October 1998.
- Final Report: “A Light Gas Gun Approach to Achieving First-Stage Acceleration for the Highly Reusable Space Transportation System,” M.F. Rose, R. M. Jenkins, M.R. Brown, NASA Cooperative Agreement NCC8-107, NASA Marshall Spaceflight Center, September 15, 1997.
- “Cold-Flow Study of Low Frequency Pressure Instability in Hybrid Rocket Motors,” Final Report on NASA-PO H-13048D, NASA Marshall Space Flight Center, May 1997.
- “Analysis Supporting MSFC Cryostat Testing Unit,” Final Report on NAS8-39131-DO32 (with W.A. Foster, Jr.), April 1997.
- “Analysis of Advanced Solid Rocket Motor Ignition Phenomena,” Final Report on Contract NAG8-923 (with W.A. Foster, Jr.), July 1995.
- “Development of a New Generation Solid Rocket Motor Ignition Computer Code,” Final Report on Contract NAG8-683 (with W.A. Foster, Jr.), February 1994.
- George C. Marshall Space Flight Center, “Analysis of Thermal Performance of the Hubble Space Telescope,” Final Report on Contract NAG8_614 (with W.A. Foster, Jr.), December 1, 1988.
- George C. Marshall Space Flight Center, “Improved Internal Ballistic Analysis and Design Procedures for Solid Rocket Motors,” Final Report on Contract NAS8_36147 (with W.A. Foster, R.H. Sforzini, P.H. Shu, M.T. Langhenry, R. Rojas), Dec 15, 1987.

TECHNICAL REPORTS (Continued)

- Space Power Institute, Auburn University, Alabama, "Power_Space Platform Interaction," Report for the period January 1986_December 1986 (with J.E. Cochran, Jr.), January 15, 1987.
- U.S. Army Missile Command, Redstone Arsenal, Alabama, "Potential Flow Analyses of Arbitrary Body Shapes," Report for the period March 1986_September 1986 (with J.E. Burkhalter), November 1986.
- U.S. Army Missile Command, Redstone Arsenal, Alabama, "Potential Flow Analysis of Arbitrary Body Shapes," Report for the period June 1985_September 1985 (with J.E. Burkhalter and F.W. Martin), September 1985.
- NASA Lewis Research Center, Cleveland, Ohio, Final Report, "An Improved Model for Prediction of Axial Gas Turbine Performance Losses," Grant NSG 3295, August 1984.
- AiResearch Manufacturing Company of Arizona, "Small Turbine Engine Analysis Program (STEP), HP Turbine Aerodynamic Design Summary," AD-8078-MR, September 1972.
- AiResearch Manufacturing Company of Arizona, "A Design Procedure for Radially Oriented Turbine Stator Vanes," AD-8071-MR, April 1972.
- AiResearch Manufacturing Company of Arizona, "A Procedure for Selecting Optimized Gas_Generator Turbine Configurations_Addendum," AD-8053-RA, February 1972.
- AiResearch Manufacturing Company of Arizona, "A Procedure for Selecting Optimized Gas_Generator Turbine Configurations," AD-8053-R, September 1971.
- AiResearch Manufacturing Company of Arizona, "Model TFE 731-2 Turbofan Engine High_Pressure Turbine Component Stator Exit Survey," AD-8056-R, September 1971.