William Allen Waters, Jr.

Research/Professional Interests:

Buckling/postbuckling behavior of shell structures, effects of initial geometric imperfections in shells, applications of composite materials to aerospace structures, mechanics of composite materials, structural analysis, structures/materials testing, experimental methods.

Education

- BS, Civil Engineering, 1977, Virginia Military Institute, Lexington, VA.
- MS, Engineering Mechanics, 1996, Old Dominion University, Norfolk, VA (Thesis: "Effects of Initial Geometric Imperfections on the Behavior of Graphite-Epoxy Cylinders Loaded in Compression")

Professional Experience

1980 to Present - Lockheed Martin, Langley Program Office, NASA Langley Research Center, Hampton, VA: Applications of fibrous composite materials for aerospace applications. Experience with large-scale structural analysis software systems such as STAGS, NASTRAN, ABAQUS, and LS-DYNA. Experience with other computer codes including Panel Analysis and Sizing COde (PASCO), Buckling Of Shells Of Revolution (BOSOR4), PANDA2, and NASTRAN. Studied postbuckling behavior of and effects of initial geometric imperfections in composite shells. Studied crack propagation issues in pressurized metallic shells. Participated in the investigation of the crash of American Airlines Flight 587 (November 12, 2001). Other issues investigated include curvilinear fibers in tension applications, elevated temperature problems for the high speed civil transport, and stiffener runout. Performed nonlinear transient heat transfer analyses to assist in determining optimal sizing to thermal protection materials on cryogenic tanks. Worked with the Space Shuttle Return-to-Flight effort. Investigated the loss of stiffness in the Space Shuttle solid rocket booster joint due to O-ring grooves in connection with the Space Shuttle Challenger accident investigation. Worked as a test engineer in proof testing of Space Shuttle tiles. Performed tests to determine the structural integrity of the Space Shuttle thermal protection system. Extensive experience in structural testing.

1979-1980: Vought Corporation, Dallas, TX. Assigned to the Space Shuttle Leading Edge Structural Subsystem (LESS) Program.

1977-1978: Kentron International, Inc., Wallops Island, VA. Systems engineering support for the NASA Wallops Flight Center. Performed analyses of the island's seawall protection system including erosion effects and potential storm damage. Performed safety analyses for a launch facility and the airfield lighting system.

Selected Publications (authored or co-authored)

- Herring, H. M. and Waters, W. A., Jr.: "Results of Three-Point Bend Tests on the Ames Space Shuttle Tile Gap Filler Material," NASA/CR-2008-215355, December 2008.

- Bey, K. S.; Scott, R. C.; Bartels, R. E.; Waters, W. A., Jr. and Chen, R. R.: "Flutter Analysis of the Shuttle Tile Overlay Repair Concept," NASA TM-2007-214857, March 2007.
- Rouse, M.; Jegley, D. C.; McGowan, D. M.; Bush, H. G. and Waters, W. A., Jr.: "Utilization of the Building-Block Approach in Structural Mechanics Research," AIAA-2005-1874, 46th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, Austin, TX, 18-21 April 2005.
- Johnson, T. F., Waters, W. A., Jr., Singer, T. N. and Haftka, R. T.: "Thermal-Structural Optimization of Integrated Cryogenic Propellant Tank Concepts for a Reusable Launch Vehicle," AIAA-2004-1931, AIAA/ASME/ASCE/AHS/ASC 45th Structures, Structural Dynamics, and Materials Conference, Palm Springs, CA, 19-22 April 2004.
- Smeltzer, S. S. and Waters, W. A., Jr.: "Nonlinear Thermal Analyses of a Liquid Hydrogen Tank Wall," to be published in the Proceedings of Joint Army-Navy-NASA-Air Force (JANNAF) 39th Combustion (CS)/27th Airbreathing Propulsion (APS)/21st Propulsion Systems Hazards (PSHS)/3rd Modeling and Simulation (MSS) Joint Subcommittee Meeting, December 2003, Colorado Springs, CO.
- Corona, E.; Waters, W. A., Jr. and Starnes, J. H., Jr.: "Collapse of Rectangular Aluminum Plates with Axial Cracks," AIAA Journal, Vol. 40, No. 8, pp. 1665-1672, August 2002.
- Saha, M.; Prabhakaran, R. and Waters, W. A., Jr.: "Compressive Properties of Pultruded Composites," Mechanics of Composite Materials, Vol. 36, No. 6, 2000, pp. 781-790. (Riga, Latvia)
- Saha, M.; Prabhakaran, R. and Waters, W. A., Jr.: "Modeling of Pultruded Composite Sheet Materials and Their Response Under Compressive Loading", 1999 ASME Mechanical and Materials Conference, Virginia Polytechnic Institute and State University, Blacksburg, VA, June 1999.
- Cerro, J. A.; Vause, R. F.; Bowman, L. M., Jensen, J. K.; Martin, C. J.; Stockwell, A. E. and Waters, W. A., Jr.: "A Study of Facilities and Fixtures for Testing of a High Speed Civil Transport Wing Component," NASA CR-19852, July 1996.
- Ambur, D. R.; Chunchu, P. B. and Waters, W. A., Jr.: "A Dropped-Weight Apparatus for Low-Speed Impact Testing of Composite Structures," Journal of Experimental Mechanics, pp. 77-82, March 1995.
- McGowan, D. M.; Young, R. D.; Swanson, G. D. and Waters, W. A., Jr.: "Compression Tests and Nonlinear Analyses of a Stringer- and Frame-Stiffened Graphite-Epoxy Fuselage Crown Panel," Fifth NASA/DoD Advanced Composites Technology Conference, SeattIe, WA, 22-25 August 1994.
- Ambur, D. R.; Starnes, J. H., Jr. and Waters, W. A., Jr.: "Effects of Low-Speed Impact Damage on the Compression Strength of a Graphite-Epoxy Laminated Plate with a Skewed Thickness Taper," AIAA-94-1403, AIAA/ASME/ASCE/AHS/ASC 35th Structures, Structural Dynamics, and Materials Conference, Hilton Head Island, SC, 18-20 April 1994.
- Jegley, D. C. and Waters, W. A., Jr.: "Test and Analysis of a Stitched RFI Graphite-Epoxy Panel with a Fuel Access Door," NASA Technical Memorandum 108992, March 1994.

- Hyer, M. W.; Rust, R. J. and Waters, W. A., Jr.: "Design, Manufacturing and Testing of Plates Utilizing Curvilinear Fiber Trajectories," 10th DoD/NASA/FAA Conference on Fibrous Composites in Structural Design, Hilton Head Island, SC, November 1993.
- Hinrichs, S. C.; Madan, R. C.; Voldman, M.; Wu, H-Y.; Jegley, D. C.; and Waters, W. A., Jr.: "Analysis and Test Results from Static Testing of Wing and Fuselage Subcomponents," 10th DoD/NASA/FAA Conference on Fibrous Composites in Structural Design, Hilton Head Island, SC, November 1993.
- Noor, A. K.; Starnes, J. H., Jr. and Waters, W. A., Jr.: "Postbuckling Response Simulations of Laminated Anisotropic Panels," Journal of Aerospace Engineering (American Society of Civil Engineers), Vol. 5, No. 3, July 1992.
- Noor, A. K.; Starnes, J. H., Jr. and Waters, W. A., Jr.: "Numerical and Experimental Simulations of the Postbuckling Response of Laminated Anisotropic Panels," AIAA 90-0964, presented at the AIAA/ASME/ASCE/AHS 31st Structures, Structural Dynamics, and Materials Conference, Long Beach, CA, April 1990.
- Knight, N. F.; Starnes, J. H., Jr. and Waters, W. A., Jr.: "Postbuckling Behavior of Selected Graphite-Epoxy Cylindrical Panels Loaded in Axial Compression," AIAA 86-0881-CP, presented at the AIAA/ASME/ASCE/ AHS 27th Structures, Structural Dynamics and Materials Conference, San Antonio, TX, May 1986.
- Waters, W. A., Jr. and Williams, J. G.: "Failure Mechanisms of Laminates Transversely Loaded by Bolt Push-Through," presented at the Seventh DoD/NASA Conference on Fibrous Composites in Structural Design, Denver, CO, June 1985.
- Waters, W. A., Jr.: "Tension Tests on Densified and Undensified LI900 Orbiter Thermal Protection System Tiles With Substructure Curvature," NASA CR-165777, August 1981.
- Sawyer, J. W. and Waters, W. A., Jr.: "Room Temperature Shear Properties of the Strain Isolator Pad for the Shuttle Thermal Protection System," NASA TM-81900, January 1981.

Patents

- "Internally Damped, Self-Arresting Vertical Drop-Weight Impact Test Apparatus," United States Patent No. 5,457,984 17 October 1995.
- "Internally Damped, Self-Arresting Vertical Drop-Weight Impact Test Apparatus," United States Patent No. 5,497,649 12 March 1996.

Awards

- Letter of Appreciation (Center Director, NASA Langley Research Center) for efforts in returning the Space Shuttle Discovery to flight, 23 September 2005.
- Center Team Award (Center Director, NASA Langley Research Center) Return-to-Flight (RTF) Team/Lockheed Martin for outstanding performance and commitment to preparing for NASA's Return to Flight, 9 September 2005.
- Letter of Recognition (Center Director, NASA Langley Research Center) for work completed in support of the X-43 Program, 2 December 2004.

- Turning Goals Into Reality (TGIR) Award for outstanding contributions to Reusable Composite Cryogenic Tank Team and exceptional progress toward New Sources of Technology for NASA, 1 December 2004.
- Lockheed Martin Corporation, Special Recognition Award (Excellence Award) for outstanding technical leadership and teamwork in conducting and managing structural tests and analyses as part of the American Airlines Flight 587 Investigation Team, 17 November 2004.
- Group Achievement Award, NASA Langley Research Center American Airlines Flight 587 Accident investigation Team, from the National Aeronautics and Space Administration, August 2004.
- Certificate of Appreciation from the Science Museum of Virginia for activities in Support of the Space Gallery in the Aerospace Exhibition, June 2002.
- Group Achievement Award, Space Shuttle Superlightweight LOX Tank nonlinear Structural Analysis Team, from the National Aeronautics and Space Administration, November 2001.
- Certificate of Appreciation from the National Aeronautics and Space Administration for Contributions toward the achievement of the High-Speed Research Program Goals, 29 November 1999.
- "Internally Damped, Self-Arresting Vertical Drop-Weight Impact Test Apparatus," Certificate of Recognition from the National Aeronautics and Space Administration, 28 September 1994.
- Certificate of Appreciation from the National Aeronautics and Space Administration, Manned Flight Awareness for Support of the Presidential Commission Investigating the Space Shuttle Challenger Accident, November 1986.
- Group Achievement Award, Random Dynamic Loads Test Team from Langley Research Center (National Aeronautics and Space Administration), 29 October 1981.
- Group Achievement Award, STS-1 Baseline TPS Life Assessment Team from the National Aeronautics and Space Administration, 14 August 1981.
- First Shuttle Flight Achievement Award from the National Aeronautics and Space Administration, 1981.

Short Courses, Continuing Education

- "Airframe Structural Design," Short Course conducted by Michael C. Y. Niu, AD Airframe Consulting Company, 1992.
- "Composite Airframe Structures," Short Course conducted by Michael C. Y. Niu, AD Airframe Consulting Company, 1993.
- "Introduction to Delft Interactive Shell DEsign COde (DISDECO)," Short Course conducted by Prof. Johann Arbocz, Technical University, Delft, The Netherlands, taught at NASA Langley Research Center, October 1996.