

## JOHN DAVID SCHMISSEUR

### University of Tennessee Space Institute

411 B.H. Goethert Parkway, MS-03

Tullahoma, TN 37388-9700

931.393.7274 (o)

571.723.5515 (m)

### Current Position

University of Tennessee Space Institute (2014- present)

Professor Department of Mechanical, Aerospace and Biomedical Engineering – UT Knoxville

- H.H. Arnold Chair of Excellence in Computational Fluid Dynamics
- B.H. Goethert Professor

### Air Force Experience (1991-2014)

- 2013-2014: Chief of the Energy, Power & Propulsion Sciences Division - Responsible for division strategic direction, fiscal performance, personnel development and management, and coordination with other agencies.
- 2001-2014: Program Manager, Air Force Office of Scientific Research - Responsible for the strategic direction, development, execution and communication of Air Force basic research in high-speed aerodynamics and the related scientific disciplines
  - Program Manager for Aerothermodynamics and Turbulence: 2001-2014
  - Program Manager for Flow Control and Aeroelasticity: 2005, 2007-2009
  - Program Manager for Test and Evaluation: 2006-2007, 2008
- 1998-2001: Research Aerospace Engineer, Computational Sciences Branch, Air Vehicles Directorate. Numerical simulation of viscous hypersonic flows.
- 1997-1998: Research Aerospace Engineer, Experimental Operations and Diagnostics Branch, Air Vehicles Directorate. Experimental investigation of supersonic viscous flows.
- 1993-1997: Doctoral Student at Purdue University, supported by USAF Palace Knight Program. Conducted experimental investigation of supersonic boundary-layer transition and developed optical perturbation technique for high-speed wind tunnels.
- 1992-1993: Aerospace Engineer, Optical Diagnostics Group, Air Vehicles Directorate. Developed and applied optical diagnostic methods for hypersonic flows.
- 1991-1992; Master's degree candidate at The University of Texas at Austin, supported by USAF Palace Knight Program. Conducted experimental investigation of shock wave/turbulent boundary layer interactions.

## Education

- Ph.D., Dept. of Aeronautics and Astronautics, Purdue University, 1997  
Dissertation: “Receptivity of the Boundary Layer on a Mach-4 Elliptic Cone to Laser-Generated Localized Freestream Perturbations”; advisor: S.P. Schneider
- M.S. Aerospace Engineering, The University of Texas at Austin, 1992  
Thesis: “An Experimental Study of Fluctuating Wall Pressures in a Highly Swept, Sharp Fin-Induced, Mach 5 Shock Wave/Turbulent Boundary Layer Interaction”; advisor: D.S. Dolling
- B.S. Aerospace Engineering, The University of Texas at Austin, 1990
- Department of Defense Acquisition Professional Development Program
  - Level III Certified in Science and Technology Management, 2012

## Honors and Awards

- 2013 Elected AFRL Fellow: *The highest honor awarded within AFRL with a selection rate limited to 0.2% of the Professional Technical Staff*
- 2012 Elected Fellow of the American Institute of Aeronautics and Astronautics
- 2012 Air Force Civilian Achievement Award
- 2008 Air Force Science and Engineering Award in Research Management  
*For exemplary leadership in directing the efforts of more than sixty leading experts from the Air Force, NASA and Dept of Energy in creating a multi-agency national strategic vision for advancement of hypersonic science and technology*
- 1991 Selected for Air Force Palace Knight program

## Professional Service

### American Institute of Aeronautics and Astronautics (Fellow)

- 2013-Present, Deputy Director, Aerospace Sciences Group
- 2006 – 2014, Member of AIAA Fluid Dynamics Technical Committee
  - Fluid Dynamics Technical Committee Chair 2011-2013
  - Flow Control Subcommittee Chair 2009-2011
  - Secretary/Treasurer, 2008-2009
  - Fluid Mechanics Chair, AIAA 46<sup>th</sup> Aerospace Sciences Meeting , Reno, NV
- 2005-2006, Member of AIAA Plasmadynamics and Lasers Technical Committee
  - 2006 – Chair, AIAA 37<sup>th</sup> Plasmadynamics and Lasers Conference, San Francisco, CA
- Reviewer for *Journal of Propulsion and Power*, *AIAA Journal*

### NATO Research & Technology Organization (RTO)

- 2012- present, Member of AVT 205, *Assessment of Predictive Capabilities for Aerothermodynamic Heating of Hypersonic Systems*
- 2005 – 2009, Directed Task Group AVT-136, *Assessment of Aerothermodynamic Flight Prediction Tools through Ground and Flight Experimentation*
- 1998 – 2002, Topic Organizer for WG 10, *Technologies for Propelled Hypersonic Flight*

### **National Space and Missile Materials Symposium**

- Steering Committee member, 2008-2014

### **Editorial Board – Journal of Progress in Aerospace Sciences, 2013-Present**

#### **NASA**

- Chair of Independent Panel for 2011 Review of NASA Fundamental Aeronautics Program
- Member of Independent Panel for Review of NASA Fundamental Aeronautics Program – 2009, 2013
- Member of Independent Panel for 2013 Review of NASA GRC Computational Fluid Dynamics Capabilities
- Member of Assessment Team for Boundary Layer Transition Prediction Methods for Shuttle Return to Flight

### **ABET Aerospace Program Evaluator - 2013**

### **Publications and Communication**

#### ***Refereed Articles***

- Schmisser, J.D. and Dolling, D.S., “Fluctuating Wall Pressures Near Separation in Highly Swept Turbulent Interactions”, *AIAA Journal*, Vol. 32, June 1994, pp. 1151-1157.
- Schmisser, J.D. and Maurice, M.S., “Laser Velocimetry Seed-Particle Behavior in Shear Layers at Mach 12”, *J. Spacecraft and Rockets*, Vol. 32, No. 1, pp. 185-187.
- Ladoon, Dale W., Schneider, Steven P. and Schmisser, John D., “Resonance in a Forward-Facing Cavity at Mach 4 Using Controlled Perturbations”, *Journal of Spacecraft and Rockets*, Vol. 35, No. 5, 1998.
- Schmisser, J.D., Collicott, Steven H. and Schneider, Steven P., “Laser-Generated Localized Freestream Perturbations in Supersonic and Hypersonic Flows”, *AIAA Journal*, Vol. 38, No. 4, pp. 666-671, April, 2000.
- Schmisser, J.D. and Gaitonde, D.V., “Numerical Simulation of Strong Crossing Shock-Wave/Turbulent Boundary-Layer Interactions”, *AIAA Journal*, Vol.39 no.9 (1742-1749), 2001
- Schmisser, J.D., Schneider, S.P. and Collicott, S.H., “Supersonic boundary-layer response to optically generated freestream disturbances”, *Experiments in Fluids*, Volume 33, Number 2, August, 2002
- Schmisser, J.D. and Gaitonde, D.V., “Numerical Simulation of Mach Reflections in Steady Flows”, *Shock Waves*, Vol. 21, No. 6, p. 499-509, 2011

- Schmisseeur, J.D., “Introduction: Assessment of Aerothermodynamic Flight Prediction Tools through Ground and Flight Experimentation”, *Journal of Progress in Aerospace Sciences*, Vol. 48-49, p. 2-7, Jan-Feb 2012.
  - *Guest Editor of this edition of JPAS*

### ***International Symposia***

- Schmisseeur, J.D., Schneider, S.P., Salyer, T.R. and Collicott, S.H., “A Repeatable Laser-Generated Localized Perturbation for Application to Fluid Mechanics”, *Proceedings of the Eighth International Symposium on Applications of Laser Techniques to Fluid Mechanics*. Lisbon, Portugal. 8-11 July 1996.
- Zheltovodov, A.A., Maksimov, A.I., Schulein, E., Gaitonde, Datta V. and Schmisseeur, J.D., “Verification of Crossing-Shock-Wave/Boundary Layer Interaction Computations with the k- $\epsilon$  Turbulence Model”, *Proceedings of the International Conference on the Methods of Aerophysical Research (ICMAR) 2000, part 1*, Novosibirsk, Russia, pp. 231-241.
- Schmisseeur, J.D. and Gaitonde, D.V., “Numerical Simulation of Mach Reflection in Steady Flow”, proceedings of the 23<sup>rd</sup> *International Symposium on Shock Waves*, Arlington, TX, July 2001

### ***Conference Papers and Technical Reports***

- Schmisseeur, J.D., and Dolling, D. S., Unsteady separation in sharp fin-induced shock wave/turbulent boundary layer interaction at Mach 5, AIAA-1992-748, Aerospace Sciences Meeting and Exhibit, 30th, Reno, NV, Jan 6-9, 1992
- Smith, L., Tyler, C. and Schmisseeur, J., "Advanced Diagnostics Research for High Speed Aerodynamic Testing," SAE Technical Paper 922007, 1992, doi:10.4271/922007
- Schmisseeur, John D., An Experimental Study of Fluctuating Wall Pressures in a Highly Swept, Sharp Fin-Induced, Mach 5 Shock Wave/Turbulent Boundary Layer Interactions, WL-TR-93-3058, January 1993, Wright Laboratory Technical Report
- Schmisseeur, J. D. and Maurice, M. S., An investigation of laser velocimetry particle behavior within flow structures at Mach 12, AIAA-1994-668, Aerospace Sciences Meeting and Exhibit, 32nd, Reno, NV, Jan 10-13, 1994
- Smith, Linda G., Maurice, Mark S., Tyler, Charles, Schmisseeur, John D. and Seibert, George L., Developments in Laser-Based Diagnostics for Wind Tunnels in the Aeromechanics Division: 1987-1992, WL-TR-94-3054, May 1994, Wright Laboratory Technical Report
- Schmisseeur, J. D., Young, J. O. and Schneider, S. P., Purdue Univ., Measurements of boundary-layer transition on the flat sidewall of a rectangular Mach 4 quiet-flow nozzle, AIAA-1996-852, Aerospace Sciences Meeting and Exhibit, 34th, Reno, NV, Jan. 15-18, 1996
- Schneider, Steven P., Collicott, Steven H., Schmisseeur, J. D., Ladoon, Dale, Randall, Laura A., Munro, Scott E., and Salyer, T. R., Laminar-turbulent transition research in the Purdue Mach-4 Quiet-Flow Ludwig Tube, AIAA-1996-2191

- Advanced Measurement and Ground Testing Technology Conference, 19th, New Orleans, LA, June 17-20, 1996
- Ladoon, D. W., Schmisser, J. D., and Schneider, S. P., Purdue Univ., Laser-induced resonance in a forward-facing cavity at Mach 4, AIAA-1997-339  
Aerospace Sciences Meeting and Exhibit, 35th, Reno, NV, Jan. 6-9, 1997
  - Schmisser, J. D., Schneider, Steven P. and Collicott, Steven H., Receptivity of the Mach-4 boundary layer on an elliptic cone to laser-generated localized freestream perturbations AIAA-1998-532, Aerospace Sciences Meeting and Exhibit, 36th, Reno, NV, Jan. 12-15, 1998
  - Schmisser, J. D., Collicott, Steven H., and Schneider, Steven P., Laser-generated localized freestream perturbations in supersonic/hypersonic flows, AIAA-1998-2495  
Advanced Measurement and Ground Testing Technology Conference, 20th, Albuquerque, NM, June 15-18, 1998
  - Schmisser, J. D., Schneider, Steven P., and Collicott, Steven H., Response of the Mach-4 boundary layer on an elliptic cone to laser-generated freestream perturbations, AIAA-1999-410, Aerospace Sciences Meeting and Exhibit, 37th, Reno, NV, Jan. 11-14, 1999
  - Buck, Gregory A., Kimmel, Roger L., and Schmisser, John D., Characterization of acoustic sources for hypersonic receptivity research, AIAA-1999-3708  
AIAA Fluid Dynamics Conference, 30th, Norfolk, VA, June 28-July 1, 1999
  - Schmisser, J. D., Poggie, J., and Kimmel, R. L., Acoustic source for compressible flow receptivity experiments, AIAA-2000-285, Aerospace Sciences Meeting and Exhibit, 38th, Reno, NV, Jan. 10-13, 2000
  - Kimmel, Roger L., Poggie, Jonathan, and Schmisser, John D., Effect of pressure gradients on axisymmetric hypersonic boundary layer stability, AIAA-2000-538  
Aerospace Sciences Meeting and Exhibit, 38th, Reno, NV, Jan. 10-13, 2000
  - Schmisser, J. D. and Gaitonde, Datta V., Numerical investigation of new topologies in strong crossing shock-wave/turbulent boundary-layer interactions, AIAA-2000-931  
Aerospace Sciences Meeting and Exhibit, 38th, Reno, NV, Jan. 10-13, 2000
  - Schmisser, J. D., Gaitonde, Datta V., and Zheltovodov, Alexander A., Exploration of 3-D shock turbulent boundary layer interactions through combined experimental/computational analysis, AIAA-2000-2378, AIAA Aerodynamic Measurement Technology and Ground Testing Conference, 21st, Denver, CO, June 19-22, 2000
  - Schmisser, J. D. and Gaitonde, Datta V., Numerical simulation of Mach reflection in steady flows, AIAA-2001-741, Aerospace Sciences Meeting and Exhibit, 39th, Reno, NV, Jan. 8-11, 2001
  - Walker, S. and Schmisser, J. D., CFD validation of shock-shock interaction flow fields, AIAA-2002-436, AIAA Aerospace Sciences Meeting and Exhibit, 40th, Reno, NV, Jan. 14-17, 2002

### ***Keynote Lectures***

- Keynote speaker at The (2012) Annual Conference on Materials, Composites, and Structures, Cocoa Beach, FL
- US national report on Science and Technology at the 2011 AIAA International Space Planes and Hypersonic Systems and Technologies Conference, San Francisco, CA

- Plenary lecture on basic science in aerothermodynamics at the 7<sup>th</sup> European Aerothermodynamics Symposium – 2011, Brugge, Belgium
- Invited speaker and panel member, 2010 Next-Generation Suborbital Researchers Conference, Boulder, CO
- Panel member for 2009 AIAA New Horizons Forum basic research session
- Plenary speaker at 2008 AIAA International Space Planes and Hypersonic Systems and Technologies Conference
- Approximately 75 additional invited conference, workshop, and academic seminar presentations

### ***Specialist Meeting and Workshop Organization***

- AFOSR/NASA/Sandia *Ablation Workshops* (2008, 2009, 2010, 2011)
- AFOSR/Air Mobility Command Symposium - *Innovative Aerodynamics: Potential Solutions for Improving Mobility Efficiency* (2010)
- AFOSR/DoD Joint Technology Office for Hypersonics/ AIAA HyTASP PC – *Emerging Capabilities for the Design and Analysis of High-Speed/Hypersonic Systems* (2012)
- Annual program review for AFOSR Principal Investigators (2001-2011)
  - Annual format varies from 20 speaker single program review with 50-75 attendees to multi-agency/multi-portfolio reviews with 100+ presentations and 300+ attendees
- Numerous specialist workshops for the development of research strategy and initiatives

### **Leadership and Notable Accomplishments**

- Created and secured national leadership support for the joint Air Force Research Laboratory/ Australian Defense Science and Technology Organization HIFiRE program – Hypersonic International Flight Research Experimentation
  - \$60M program is the largest scientific collaboration between the Air Force and Australia
  - HIFiRE is considered one of the marquee national hypersonic programs and is unique in its goal to provide hypersonic flight data on basic scientific phenomena
  - HIFiRE has received the 2012 International Council of the Aeronautical Sciences *von Kármán Award for International Cooperation*
- Envisioned and led approximately 60 subject matter experts from multiple agencies in the definition of the *National Hypersonic Foundational Research Plan*
  - The plan unifies the scientific objectives of the DoD, NASA and DoE in the scientific disciplines essential for hypersonic technologies
  - *The plan has been adopted by the DoD Joint Technology Office for Hypersonics as the national basic research plan for hypersonics*
- Collaborated with NASA senior leadership to establish joint support for three *National Hypersonic Science Centers* which addressing priority scientific gaps in the areas of aerothermodynamics, high-temperature materials and structures, and propulsion

- The centers represent a joint investment of \$30M in new funding over five years
- The centers support research in over 20 academic institutions
- Organized the *Hypersonic Academic Research Partnership* which coordinates over \$20M in annual funding from five federal and international organizations invested in 11 major academic research centers
- Active contributor to the NATO Research & Technology Organization, most recently coordinating the scientific contributions of five countries as the leader of a Task Group on the extension of ground test and computational simulations to flight research
- Organized transfer of NASA M6 Quiet Tunnel to Texas A&M
- By request, organizer of efforts to utilize leading-edge scientific tools to identify sources and mitigation of critical aerodynamic issues for the Falcon HTV-2 and X-51 programs
- Member of the AFRL Steering Committee for the development of Micro Air Vehicles

### **Management Experience**

- Responsible for the development and management of well over \$100M in Air Force sponsored research during the past decade
- In 2008 managed three portfolios simultaneously with a total annual investment of over \$20M in approximately 135 projects supporting over 250 researchers
- Teamed with Air Force Research Laboratory Chief Scientist Corp to develop laboratory wide *Discovery Challenge Thrusts* (basic research initiatives) that address Air Force Flagship technology development objectives (*Focused Long-Term Challenges*)
- Partnered with senior technical leadership in the Test and Evaluation community to define a process for ensuring basic research investments addressed technical priorities identified by the T&E community at an AF corporate level
- Proactive in helping academic research community navigate ITAR restrictions

### **Advising and Researcher Development**

- Featured speaker at the 2010 and 2011 American Physical Society Division of Fluid Dynamics *Young Investigator Luncheon*
- Developed and taught an AFRL workshop on intramural proposal development attended by over 300 scientists and engineers from eight of the ten AFRL Research Directorates
- Active in the recruitment and selection of new Program Managers within AFOSR
- Developed with AFRL leadership an innovative initiative to identify and support potential future research leaders within the Air Force Research Laboratory
- Frequent advisor for young investigators who have expressed an interest in performing research sponsored by the DoD on the development of their research proposals and academic research programs
- Mentor of eight new AFOSR program managers and one DARPA program manager on the development, management and presentation of their portfolios
- Increased the number of women Principal Investigators supported by portfolio by 500%

- Frequent author of letters of endorsement for awards, tenure and endowed chair positions for researchers within academia
- Advisor to DARPA, Office of Naval Research and NASA on development of science and technology programs