Biographical Summary:

Professor Werner J.A. Dahm

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ASU Foundation Professor of Mechanical and Aerospace Engineering
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Professor Emeritus
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Ph.D.	Aeronautics	California Institute of Technology	1985
M.S.	Mechanical Engineering	University of Tennessee Space Institute	1981
B.S.E.	Mechanical Engineering	University of Alabama in Huntsville	1978

- ASU Foundation Professor of Mechanical and Aerospace Engineering – Arizona State University
- Emeritus Professor, College of Engineering – The University of Michigan
- Editorial Advisory Board Member, AIAA Journal of Propulsion and Power
- Fellow – American Institute of Aeronautics & Astronautics (AIAA)
- Fellow – American Physical Society (APS), Division of Fluid Dynamics
- George J. Huebner Research Excellence Award – The University of Michigan
- 1938E Distinguished Achievement Award – The University of Michigan
- Chairman, U.S. Air Force Scientific Advisory Board (SAB) – Air Force Pentagon, Washington, D.C.
- Former Chief Scientist of the U.S. Air Force (AF/ST) – Headquarters Air Force, Pentagon, Washington, D.C.
- Secretary of the Air Force Award for Distinguished Public Service – Headquarters Air Force, Washington, D.C.
- Air Force Decoration for Exceptional Civilian Service – United States Air Force
- William F. Ballhaus Aeronautics Prize – Caltech
- Donald Wills Douglas Prize Fellowship – Caltech

Werner J.A. Dahm is Professor Emeritus of Engineering at the University of Michigan, where he served on the faculty for 25 years, and since 2010 is the ASU Foundation Professor of Mechanical and Aerospace Engineering at Arizona State University, where he leads the Laboratory for Turbulence, Combustion and Propulsion. He specializes in fluid dynamics, thermodynamics, combustion, heat transfer, thermal sciences, propulsion, fuel efficiency, emissions, powertrains, and other areas relevant to a broad range of automotive, aerospace, and industrial applications.

Dr. Dahm is a member of the Society of Automotive Engineers (SAE International), the American Society of Mechanical Engineers (ASME), a Fellow of the American Physical Society (APS) in the Division of Fluid Dynamics, a Fellow of the American Institute of Aeronautics and Astronautics (AIAA), recipient of the William F. Ballhaus Aeronautics Prize from Caltech, the 1938E Distinguished Achievement Award from the University of Michigan, and the George J. Huebner Research Excellence Award from the University of Michigan.

He is an author of over 200 refereed technical articles, conference papers, and technical publications, a holder of six U.S. and international patents, and has given over 260 technical presentations, including over 190 invited, plenary, and keynote lectures worldwide, on topics dealing with mechanical and aerospace engineering and defense science.

Previously he was the Chief Scientist of the U.S. Air Force in Headquarters Air Force, a three-star equivalent civilian position in the Pentagon as the direct science and technology advisor to the Secretary of the Air Force and the Air Force Chief of Staff. As the Chief Scientist he led development of "Technology Horizons", a major Headquarters-level document that identifies the key science and technology focus areas for the U.S. Air Force during 2010-2030.

He has served in numerous key technical advisory roles, including on the Air Force Scientific Advisory Board (SAB) since 2005 and as Chair of the Board from 2014-2017 and on the SAB Executive Committee since 2018, and on numerous task forces of the Defense Science Board. He has also served in other senior technical advisory roles, including for Lawrence Livermore National Laboratory and NASA, and in many technology reviews and assessments.

The Air Force awarded him the Air Force Decoration for Exceptional Civilian Service – the highest honor it can bestow on a civilian Air Force employee – for his service as the Chief Scientist of the U.S. Air Force, and also awarded him the Secretary of the Air Force Distinguished Public Service Award – the highest honor it can bestow on a non-employee civilian – for his service with the U.S. Air Force Scientific Advisory Board.

He has also founded and served on the boards of two technology-oriented entrepreneurial companies, on technical advisory and organizational committees for numerous technical conferences, and as a consultant for industry.

Curriculum Vitae

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ASU Foundation Professor of Aerospace and Mechanical Engineering
Head, Laboratory for Turbulence, Combustion, and Propulsion (LTCP)
Founding Director and Chief Scientist, ASU Security & Defense Systems Initiative
Arizona State University
Tempe, AZ 85287-5604

and

Professor Emeritus of Aerospace Engineering
The University of Michigan
Ann Arbor, MI 48103-2135

Personal: Born 1957, U.S. citizen.

Education: Ph.D., Aeronautics, California Institute of Technology, June 1985.
M.S., Mechanical Engineering, University of Tennessee, March 1981.
B.S.E., Mechanical Engineering, University of Alabama in Huntsville, November 1978.

Honors: AIAA Fluid Dynamics Best Paper Award (AIAA-2023-2485), 2023.
ASU Foundation Professor, Arizona State University, 2010-present.
Secretary of the Air Force Distinguished Public Service Award, 2018.
Chair, U.S. Air Force Scientific Advisory Board, 2014-2017.
Chief Scientist of the U.S. Air Force, Pentagon, Washington, D.C., 2008-2010.
U.S. Air Force Decoration for Exceptional Civilian Service, 2010.
U.S. Air Force Meritorious Civilian Service Award, 2008.
Fellow – American Institute of Aeronautics & Astronautics, 2005.
Fellow – American Physical Society, 1998.
George J. Huebner Research Excellence Award, The University of Michigan, 2005.
1938E Distinguished Achievement Award, The University of Michigan, 1991.
Alumni of Achievement Award, University of Alabama in Huntsville, 2009.
Top 5% Faculty Award, ASU Fulton Schools of Engineering (7 years in 2014-2023).
Aerospace Department Teaching Award (multiple), Combined Research & Teaching Award, Department of Aerospace Engineering, The University of Michigan, 1999.
William F. Ballhaus Aeronautics Prize, California Institute of Technology, 1985.
Donald Wills Douglas Prize Fellowship, California Institute of Technology, 1981-83.
Achievement Rewards for College Scientists (ARCS) Fellowship, California Institute of Technology, 1983.

Professional Experience:

ASU Foundation Professor, Aerospace & Mechanical Engineering, Arizona State University (ASU), Tempe, AZ

- October 2010 – present.

Professor Emeritus of Aerospace Engineering, University of Michigan College of Engineering, Ann Arbor, MI.

- October 2010 – present.

Faculty Member; Department of Aerospace Engineering, University of Michigan, Ann Arbor, MI.

- Emeritus Professor, October 2010 – present.
- Professor, May 1997 – October 2010
- Associate Professor, May 1991 – May 1997.
- Assistant Professor, June 1985 - May 1991.

Founding Director and Chief Scientist, Security & Defense Systems Initiative, Arizona State University, Tempe, AZ.

- October 2010 – present.

Executive Committee, U.S. Air Force Scientific Advisory Board, Headquarters Air Force, Air Force Pentagon, Washington, D.C.

- October 2018 – 2021.

U.S. Air Force Scientific Advisory Board (SAB), Headquarters Air Force, Air Force Pentagon, Washington, D.C.

- Chair of the Board, October 2014 – October 2017.
- Board Member, 2005-2021.

Lawrence Livermore National Laboratory, Weapons and Complex Integration (WCI) Directorate Review Committee, Livermore, CA.

- Chair, February 2020 – 2022.
- Member, October 2015 – 2022.

Lawrence Livermore National Laboratory, WCI Weapon Physics and Design Program, Designer Training Program Advisory Board, Livermore, CA.

- Member, February 2021 – 2023.

Member, Executive Committee, Technology Research Advisory Committee (TRAC), The Aerospace Corporation, El Segundo, CA

- Member, June 2021 – present.

Member, Intelligence Science and Technology Experts Group (ISTEG), National Academies of Sciences, Engineering, and Medicine, Washington, DC.

- August 2015 – present.

Member, Independent Review Team, Space Dynamics Laboratory (Missile Defense Agency), Utah State University, Logan, UT.

- August 2021.

Member, National Research Council (NRC) Space Technology Industry-Government-University Roundtable (STIGUR), Washington, DC.

- August 2014 – August 2017.

Chief Technical Officer, ASU Research Enterprise (ASURE), Scottsdale, AZ.

- January 2014 – June 2015.

Founding President and CEO, ASU Research Enterprise (ASURE), Scottsdale, AZ.

- June 2012 – January 2014.

Chief Scientist of the U.S. Air Force (AF/ST), Office of the Secretary of the Air Force and Air Force Chief of Staff, Air Force Pentagon, Washington, D.C.

- October 2008 – October 2010.

Editorial Advisory Board Member, Journal of Propulsion and Power, American Institute of Aeronautics and Astronautics, Washington, D.C.

- July 2018 – present.

Member, Combustion, Fuels & Emissions Committee, International Gas Turbine Institute (IGTI), American Society of Mechanical Engineers, Washington, D.C.

- July 2008 – present.

Former Member, Executive Committee, Division of Fluid Dynamics, American Physical Society (APS).

Former Chair, External Relations Committee, Division of Fluid Dynamics, American Physical Society (APS).

Former Member, Publications Committee, American Institute of Aeronautics and Astronautics (AIAA).

Former Associate Editor, AIAA Journal, American Institute of Aeronautics and Astronautics (AIAA).

Member, U.S. Air Force Scientific Advisory Board (SAB), Headquarters Air Force, Air Force Pentagon, Air Force Pentagon, Washington, D.C.

- Member, SAB Executive Committee, 2017-present.
- Member, "Technologies for Increasing Satellite Energy and Power", 2020.
- Member, "Future Vanguard Selection and Management Processes", 2020.
- Member, SAB/AFRL S&T Task Force, 2019.
- Member, "Fidelity of MS&A to Support USAF Decision Making", 2018.
- Vice Chair, "Maintaining Technology Superiority for the USAF", 2017.
- Board Chair, U.S. Air Force Scientific Advisory Board (SAB), 2014-2017.
- Member, S&T Review of AFRL Special Programs, 2016.
- Member, S&T Review of Air Force Office of Scientific Research, 2016.
- Member, S&T Review of AFRL Information Directorate, 2015.
- Member, S&T Review of AFRL Special Programs, 2014.
- Member, S&T Review of AFRL Sensors Directorate, 2014.
- Member, "Technology Readiness for Hypersonic Vehicles" Study, 2014.
- Chair, S&T Review of AFRL Munitions Directorate, 2013.

- Vice Chair, S&T Review of AFRL Directed Energy Directorate, 2013.
- Chair, "Cyber Situational Awareness" Study, 2011-2012.
- Chair, Review of Air Force Office of Scientific Research, 2012.
- Member, S&T Review of AFRL Munitions Directorate, 2011.
- Member, S&T Review of AFRL Air Vehicles Directorate, 2011.
- Member, "Munitions for the 2025+ Environment" Study, 2011.
- Member, SAB Steering Committee, 2008-2010.
- Member, SAB Senior Review Group, 2008-2010.
- Chair, "Implications of Spectrum Management" Study, 2008.
- Chair, S&T Review of AFRL Air Vehicles Directorate, 2007.
- Member, S&T Review of Air Force Office of Scientific Research, 2007.
- Chair, "Thermal Management Technology Solutions" Study, 2007.
- Chair, S&T Review of AFRL Propulsion Directorate, 2006.
- Member, "System-Level Experimentation" Study, 2006.
- Member, "Improved Air Vehicle Fuel Efficiency" Study, 2005-2006.
- Member, S&T Review of AFRL Air Vehicles Directorate, 2005.

Chair, After-Action Review for DARPA High-Frequency Research (DHFR) Serial #1 Spacecraft, Space Dynamics Laboratory (SDL), Utah State University, 2018.

Chair, Business Modernization Workshop, Air Force S&T Strategy 2030, Air Force Research Laboratory (AFRL), Arizona State University, 2018.

Consultant; Defense Science Board (DSB), Office of the Undersecretary of Defense (Acquisition, Technology & Logistics), Defense Pentagon, Washington, D.C.

- 21st Century Defense Technology Task Force, 1999.
- Joint Operations Superiority in the 21st Century Task Force, 1998.
- Joint Advanced Strike Technology (JAST) Task Force, 1994.
- Tactical Air Warfare (TAW) Task Force, 1993.

Member; Defense Science Study Group (DSSG), Institute for Defense Analyses (IDA), Alexandria, VA. 1989-1991.

Consultant; Lawrence Livermore National Laboratory, Livermore, CA, 2016 – 2023.

Consultant; Institute for Defense Analyses, Alexandria, VA, 1989 – 2010.

Consultant; Advanced Projects Research, Inc., La Verne, CA, 2005 – 2008.

Consultant; Southwest Sciences, Inc., Santa Fe, NM, 2001 – 2008.

Consultant; Praxair Inc., Tonawanda, NY and Indianapolis, IN, 1994 – 2018.

Consultant; Powerix Technologies, Ann Arbor, MI, 2004 – 2005.

Consultant; NGB Technologies, Inc., Ann Arbor, MI, 1993 – 2004.

Consultant; Williams International, Walled Lake, MI, 2001 – 2003.

Consultant; John Zink Company, Tulsa, OK, 1997 – 1999.

Consultant; North American Mfg. Co., Cleveland, OH, 1996 – 1998.

Consultant; Energy & Environ. Research Corp. (EERC), Irvine, CA, 1991 – 1993.

Research Engineer, Calspan Corporation and ARO Inc., Propulsion Wind Tunnel Facility (PWT), USAF Arnold Engineering Development Center (AEDC), Tullahoma, TN, January 1980 - May 1981.

Research/Teaching Assistant, Aeronautics Department, California Institute of Technology, Pasadena, CA, September 1981 - May 1985.

Research Assistant, University of Tennessee Space Institute / USAF Arnold Engineering Development Center (AEDC), Propulsion Wind Tunnel Facility (PWT), Tullahoma, TN, January 1979 - December 1979.

Research Assistant, US Army Redstone Arsenal / University of Alabama in Huntsville, Huntsville, AL, September 1977 - November 1978.

RESEARCH

Publications:

- **Papers in Journals (Peer-Reviewed)**

1. Broadwell, J.E., Mungal, M.G. and Dahm, W.J.A. (1984) Blowout of turbulent diffusion flames. Proceedings of the Combustion Institute, Vol. 20, pp. 303 - 310.

2. Dahm, W.J.A. and Dimotakis, P.E. (1987) Measurements of entrainment and mixing in turbulent jets. AIAA Journal., Vol. 25, No. 9, pp. 1216 - 1223.

3. Dahm, W.J.A. and Dibble, R.W. (1988) Coflowing turbulent jet diffusion flame blowout. Proceedings of the Combustion Institute, Vol. 22, pp. 801 - 808.

4. Dahm, W.J.A., Scheil, C.M. and Tryggvason, G. (1989) Dynamics of vortex interaction with a density interface. Journal of Fluid Mechanics, Vol. 205, pp. 1 - 43.

5. Dahm, W.J.A. and Buch, K.A. (1989) Lognormality of the scalar dissipation pdf in turbulent flows. Physics of Fluids A, Vol. 1, No. 7, pp. 1290 - 1293.

6. Dahm, W.J.A. and Mayman, A.G. (1990) Blowout limits of turbulent jet diffusion flames with arbitrary source conditions. AIAA Journal, Vol. 28, No. 7, pp. 1157 - 1162.

7. Dahm, W.J.A. and Dimotakis, P.E. (1990) Mixing at large Schmidt number in the self-similar far field of turbulent jets. Journal of Fluid Mechanics, Vol. 217, pp. 299 - 330.

8. Tryggvason, G., Dahm, W.J.A. and Sbeih, K. (1990) Fine structure of vortex sheet rollup by viscous and inviscid simulation. ASME of Journal of Fluids Engineering, Vol. 113, pp. 31 - 36.

9. Tryggvason, G. and Dahm, W.J.A. (1990) An integral method for mixing, chemical reactions, and extinction in unsteady strained diffusion layers. Combustion and Flame, Vol. 83, pp. 207 - 220.

10. Dahm, W.J.A., Southerland, K.B. and Buch, K.A. (1991) Direct, high resolution, four-dimensional measurements of the fine scale structure of $Sc \gg 1$ molecular mixing in turbulent flows. Physics of Fluids A, Vol. 3, pp. 1115 - 1127.

11. Chang, C.H.H., Dahm, W.J.A. and Tryggvason, G. (1991) Lagrangian model simulations

of molecular mixing, including finite rate chemical reactions, in a temporally developing shear layer. Physics of Fluids A, Vol. 3, pp. 1300 - 1311.

12. Southerland, K.B., Porter, J.R., Dahm, W.J.A. and Buch, K.A. (1991) An experimental study of the molecular mixing process in an axisymmetric laminar vortex ring. Physics of Fluids A, Vol. 3, pp. 1385 - 1392.

13. Dahm, W.J.A., Frieler, C.E. and Tryggvason, G. (1992) Vortex structure and dynamics in the near field of a coaxial jet. Journal of Fluid Mechanics, Vol. 241, pp. 371 - 402.

14. Dahm, W.J.A., Su, L.K. and Southerland, K.B. (1992) A scalar imaging velocimetry technique for four-dimensional velocity field measurements in turbulent flows. Physics of Fluids A, Vol. 4, pp. 2191 - 2206.

15. Buch, K.A., Dahm, W.J.A., Dibble, R.W. and Barlow, R.S. (1992) Equilibrium structure of reaction rate fields in turbulent diffusion flames. Proceedings of the Combustion Institute, Vol. 24, pp. 295 - 301.

16. Southerland, K.B., Frederiksen, R.D., Dahm, W.J.A. and Dowling, D.R. (1994) Comparisons of mixing in chaotic and turbulent flows. Chaos, Solitons & Fractals, Vol. 4, No. 6, pp. 1057 - 1089.

17. Bish, E.S. and Dahm, W.J.A. (1995) Strained dissipation and reaction layer analyses of nonequilibrium chemistry in turbulent reacting flows. Combustion and Flame, Vol. 100, pp. 457 - 464.

18. Everest, D., Driscoll, J.F., Dahm, W.J.A. and Feikema, D. (1995) Images of the 2D temperature field and temperature gradients to quantify thermal mixing rates within a non-premixed turbulent jet flame. Combustion and Flame, Vol. 101, pp. 58 - 68.

19. Dahm, W.J.A., Tryggvason, G. and Zhuang, M.M. (1995) Integral method solution of time-dependent strained diffusion-reaction equations with multi-step kinetics. SIAM Journal on Applied Mathematics, Vol. 56, No. 4, pp. 1039 - 1059.

20. Su, L.K. and Dahm, W.J.A. (1996) Scalar imaging velocimetry measurements of the velocity gradient tensor field at the dissipative scales of turbulent flows. Part I: Assessment of errors. Physics of Fluids Vol. 8, No. 7, pp. 1869 - 1882.

21. Su, L.K. and Dahm, W.J.A. (1996) Scalar imaging velocimetry measurements of the velocity gradient tensor field at the dissipative scales of turbulent flows. Part II: Experimental results. Physics of Fluids Vol. 8, No. 7, pp. 1883 - 1906.

22. Frederiksen, R.D., Dahm, W.J.A. and Dowling, D.R. (1996) Experimental assessment of fractal scale similarity in turbulent flows. Part 1: One-dimensional intersections. Journal of Fluid Mechanics, Vol. 327, pp. 35 - 72.

23. Buch, K.A. and Dahm, W.J.A. (1996) Experimental study of the fine-scale structure of conserved scalar mixing in turbulent flows. Part 1. *Sc* » 1. Journal of Fluid Mechanics, Vol. 317, pp. 21 - 71.

24. Dahm, W.J.A. and Southerland, K.B. (1997) Experimental assessment of Taylor's Hypothesis and its applicability to dissipation estimates in turbulent flows. Physics of Fluids Vol. 9, pp. 2101 - 2107.

25. Frederiksen, R.D., Dahm, W.J.A. and Dowling, D.R. (1997) Experimental assessment of fractal scale similarity in turbulent flows. Part 2: Higher dimensional intersections and

nonfractal inclusions. Journal of Fluid Mechanics, Vol. 338, pp. 89 - 126.

26. Frederiksen, R.D., Dahm, W.J.A. and Dowling, D.R. (1997) Experimental assessment of fractal scale similarity in turbulent flows. Part 3: Multifractal scaling. Journal of Fluid Mechanics, Vol. 338, pp. 127 - 155.

27. Frederiksen, R.D., Dahm, W.J.A. and Dowling, D.R. (1998) Experimental assessment of fractal scale similarity in turbulent flows. Part 4: Effects of Reynolds and Schmidt numbers. Journal of Fluid Mechanics Vol. 377, pp. 169 - 187.

28. Buch, K.A. and Dahm, W.J.A. (1998) Experimental study of the fine-scale structure of conserved scalar mixing in turbulent flows. Part 2. $Sc \approx 1$. Journal of Fluid Mechanics, Vol. 364, pp. 1 - 29.

29. Hsieh, A., Dahm, W.J.A. and Driscoll, J.F. (1998) Scaling laws for NOx emissions performance of burners and furnaces from 30 kW to 12 MW. Combustion and Flame Vol. 114, pp. 54 - 80.

30. Chen, S.-J. and Dahm, W.J.A. (1998) Diffusion flame structure of a vortex ring under microgravity conditions. Proceedings of the Combustion Institute, Vol. 27, 2579-2586.

31. Tacina, K.M. and Dahm, W.J.A. (2000) Effects of heat release on turbulent shear flows. Part 1. A general equivalence principle for nonbuoyant flows and its application to turbulent jet flames. Journal of Fluid Mechanics, Vol. 415, pp. 23 - 44.

32. Chen, S.-J., Dahm, W.J.A. and Tryggvason, G. (2000) Effects of heat release in a reacting vortex ring. Proceedings of the Combustion Institute, Vol. 28, pp. 515-520.

33. Dahm, W.J.A., Chen, S.-J., Silver, J.A., Mullin, J.A. and Piltch, N.D. (2002) Mixture fraction measurements via WMS-ITAC in a microgravity vortex ring diffusion flame. Proceedings of the Combustion Institute, Vol. 29, pp. 2519-2526.

34. Chen, S.-J., Silver, J.A., Dahm, W.J.A. and Piltch, N.D. (2002) Mixture fraction measurements via WMS-ITAC in a laminar diffusion flame. Proceedings of the Combustion Institute, Vol. 29, pp. 2679-2685.

35. Diez, F.J. and Dahm, W.J.A. (2003) Electrokinetic microactuator arrays and system architecture for active sublayer control of turbulent boundary layers. AIAA Journal, Vol. 41, No. 10, pp. 1906-1915.

36. Diez, F.J. and Dahm, W.J.A. (2004) Design and fabrication of unsteady electrokinetic microactuator arrays for turbulent boundary layer control. Journal of Micromechanics and Microengineering, Vol. 14, pp. 1307-1320.

37. Nakagawa, M. and Dahm, W.J.A. (2005) The virtual origin of incompressible and supersonic turbulent bluff-body wakes. AIAA Journal Vol. 43, No. 3, pp. 697-700.

38. Mullin, J.A. and Dahm, W.J.A. (2005) Dual-plane stereo particle image velocimetry (DSPIV) for measuring velocity gradient fields at intermediate and small scales of turbulent flows. Experiments in Fluids, Vol. 38, pp. 185-196.

39. Dahm, W.J.A. (2005) Effects of heat release on turbulent shear flows. Part 2. Turbulent mixing layers and the equivalence principle. Journal of Fluid Mechanics, Vol. 540, pp. 1-19.

40. Burton, G.C. and Dahm, W.J.A. (2005) Multifractal subgrid-scale modeling for large-

eddy simulation. Part 1. Model development and *a priori* testing. Physics of Fluids Vol. 17 (7): Art. No. 075111, July 2005.

41. Burton, G.C. and Dahm, W.J.A. (2005) Multifractal subgrid-scale modeling for large-eddy simulation. Part 2. Backscatter limiting and *a posteriori* evaluation. Physics of Fluids Vol. 17 (7): Art. No. 075112, July 2005.

42. Mullin, J.A. & Dahm, W.J.A. (2006) Dual-plane stereo particle image velocimetry measurements of velocity gradient tensor fields in turbulent shear flow. Part 1: Accuracy assessments. Physics of Fluids Vol. 18 (3): Art. No. 035101, March 2006.

43. Mullin, J.A. & Dahm, W.J.A. (2006) Dual-plane stereo particle image velocimetry measurements of velocity gradient tensor fields in turbulent shear flow. Part 2: Experimental results. Physics of Fluids Vol. 18 (3): Art. No. 035102, March 2006.

44. W.J.A. Dahm, P.R. Patel and B.H. Lerg (2006) Experimental visualizations of liquid breakup regimes in fuel slinger atomization. Atomization and Sprays Vol. 16, No. 8, pp. 933-944.

45. W.J.A. Dahm, P.R. Patel and B.H. Lerg (2006) Analyses of liquid breakup regimes in fuel slinger atomization. Atomization and Sprays Vol. 16, No. 8, pp. 945-962.

46. Nakagawa, M. and Dahm, W.J.A. (2006) Scaling properties and wave interactions in confined supersonic turbulent bluff-body wakes. AIAA Journal Vol. 44, No. 6, pp. 1299-1309.

47. Diez-Garias, F.J. and Dahm, W.J.A. (2007) Effects of heat release on turbulent shear flows. Part 3. Buoyancy effects due to heat release in jets and plumes. Journal of Fluid Mechanics Vol. 575, pp. 221-255.

48. Qiao, L., Gu, Y., Oran, E.S., Dahm, W.J.A. and Faeth, G.M. (2007) Near-limit laminar burning velocities of microgravity premixed hydrogen flames with various chemically passive fire suppressants. Proceedings of the Combustion Institute Vol. 31, pp. 2701-2709.

49. Qiao, L., Gu, Y., Oran, E.S., Dahm, W.J.A. and Faeth, G.M. (2007) A study of the effects of chemically passive fire suppressants on near-limit H_2-air in microgravity at normal and reduced pressures. Combustion and Flame Vol. 151, pp. 196-208.

50. Hamlington, P.E., Schumacher, J. and Dahm, W.J.A. (2008) Local and nonlocal strain rate fields and vorticity alignment in turbulent flows. Physical Review E, Vol. 77, 026303 (8 pages).

51. Stock, M.J., Dahm, W.J.A. and Tryggvason, G. (2008) Impact of a vortex ring on a density interface using a regularized inviscid vortex sheet method. Journal of Computational Physics, Vol. 227 (21), pp. 9021-9043.

52. Lapsa, A.P. and Dahm, W.J.A. (2007) Hyperacceleration effects on turbulent combustion in premixed step-stabilized flames. Proceedings of the Combustion Institute, Vol. 32, pp. 1731-1738.

53. Hamlington, P.E. and Dahm, W.J.A. (2008) Reynolds stress closure for nonequilibrium effects in turbulent flows. Physics of Fluids, Vol. 20, 115101 (18 pages).

54. Hamlington, P.E., Schumacher, J. and Dahm, W.J.A. (2008) Vorticity alignment with local and nonlocal strain rates in turbulent flows. Physics of Fluids, Vol. 20, 111703 (4

pages).

55. Hamlington, P.E. and Dahm, W.J.A. (2009) Frequency response of periodically-sheared homogeneous turbulence. Physics of Fluids, Vol. 21, 055107 (11 pages).

56. Hamlington, P.E. and Dahm, W.J.A. (2009) Nonlocal form of the rapid pressure-strain correlation in turbulent flows. Physical Review E, Vol. 80 (4), 046311 (10 pages).

57. Qiao, L., Gan, Y., Nishiie, T., Dahm, W.J.A. and Oran, E.S. (2010) Extinction of premixed methane/air flames in microgravity by diluents: Effects of radiation and Lewis number. Combustion and Flame, Vol. 157, pp. 1446–1455.

58. Lapsa, A.P. and Dahm, W.J.A. (2010) Stereo particle image velocimetry of nonequilibrium turbulence relaxation in a supersonic turbulent boundary layer. Experiments in Fluids, 00348-010-0897 (20 pages).

59. King, R.N., Hamlington, P.E. and Dahm, W.J.A. (2015) Autonomic closure for turbulence simulations. Physical Review E, Vol. 93, No.3; 031301 (6 pages). DOI: 10.1103/PhysRevE.93.031301.

- **Articles in Edited Books**

1. Dahm, W.J.A. and Buch, K.A. (1991) High resolution, three-dimensional (256^3), spatio-temporal measurements of the conserved scalar field in turbulent shear flows. Turbulent Shear Flows 7, pp. 17 - 26, (W.C. Reynolds, Ed.) Springer Verlag.

2. Dahm, W.J.A., Southerland, K.B. and Buch, K.A. (1991) Four-dimensional laser induced fluorescence measurements of conserved scalar mixing in turbulent flows. Applications of Laser Techniques to Fluid Mechanics, pp. 3 - 18, (R. Adrian, Ed.) Springer Verlag.

3. Dahm, W.J.A. and Southerland, K.B. (1992) Quantitative, four-dimensional, laser induced fluorescence imaging studies of scalar mixing in turbulent flows. Flow Visualization 6, pp. 243 - 247, (Y. Tanida & H. Miyashiro, Eds.) Springer-Verlag.

4. Dahm, W.J.A. and Bish (1993) High resolution measurements of molecular transport and reaction processes in turbulent combustion. Turbulence and Molecular Processes in Combustion, pp. 287 - 302, (T. Takeno, Ed.) Elsevier Science Publ. B.V.

5. Southerland, K.B., Frederiksen, R.D, Dahm, W.J.A. and Dowling, D.R. (1995) Comparisons of mixing in chaotic and turbulent flows. Chaos Applied to Fluid Mixing, pp. 313 - 345, (H. Aref & M.S. El Naschie, Eds.) Pergamon Press.

6. Dahm, W.J.A. (1998) Fine structure characteristics of large Schmidt number molecular mixing in turbulent flows. Physical Processes and Chemical Reactions in Turbulent Liquids, pp. 39 - 56, (F.R. Rys & A. Gyr, Eds.), A.A. Balkema Pub.

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94. Stallcup, E.W. and Dahm, W.J.A. (2021) Adaptive scale-similar closure for large eddy

simulations. Part 2: Subgrid scalar flux closure. AIAA Paper 2022-0596, 2022 AIAA Aerospace Sciences Meeting, AIAA SciTech Forum, 3-7 January 2022, DOI: 10.2514/6.2022-0596.

95. Torres, E.E and Dahm, W.J.A. (2022) Rational Boolean stabilization of subgrid models for large eddy simulations. AIAA Paper 2023-2485, 2023 AIAA Aerospace Sciences Meeting, AIAA SciTech Forum, 23-27 January 2023, DOI: 10.2514/6.2023-2485 (2023 AIAA Fluid Dynamics Best Paper Award).

- **Invited Presentations**

1. A General Solution for Wind Tunnel Boundary Induced Interference in Two-Dimensional Subsonic Flow - University Seminar, University of Tennessee Space Institute, Tullahoma, TN, May 1981.

2. Experiments on Entrainment, Mixing, and Chemical Reactions in Turbulent Jets at Large Schmidt Number - Aeronautics Seminar, California Institute of Technology, Pasadena, CA, May 1985.

3. Entrainment, Mixing, and Chemical Reactions in Turbulent Jets at Large Schmidt Number - Aerospace Engineering Department Seminar, The University of Michigan, Ann Arbor, MI, March 1985.

4. Laboratory Uses of Computers - Invited Presentation, National Advisory Committee Meeting, University of Michigan, Ann Arbor, MI, June 1988.

5. Computational Modeling of Gas Combustion in Turbulent Flows - Invited Presentation, Atlantic Gas Research Exchange (AGRE) Conference on Numerical Simulation of Combustion, Solihull, England, May 1989.

6. Mixing in Turbulent Shear Flows - Mechanical Engineering Seminar, University of Michigan, Ann Arbor, MI, September 1989.

7. Turbulent Mixing: From Da Vinci Onward - University Seminar Series, University of Michigan, Ann Arbor, MI, September 1989.

8. Fine Scale Structure of $Sc \gg 1$ and $Sc \approx 1$ Conserved Scalar Mixing in Turbulent Flows - Invited Seminar, Aeronuatics Department, California Institute of Technology, Pasadena, CA, February 1990.

9. Fully Resolved Multi-Dimensional Measurements of $Sc \gg 1$ and $Sc \approx 1$ Conserved Scalar Mixing in Turbulent Shear Flows -Invited Seminar, Mechanical Engineering Department, Michigan State University, Lansing, MI, March 1990.

10. Fine Structure of Molecular Mixing in Turbulent Flows - Invited Seminar, Center for Fire Research, National Institute of Standards and Technology, Gaithersburg, MD, May 1990.

11. Fully Resolved Multi-Dimensional Measurements of Scalar Mixing in Turbulent Flows - Invited Presentation, ONR/NASA Workshop on Quantitative Flow Visualization, Arlington, VA, May 1990.

12. Laboratory Studies of Fine Structure in Vorticity-Dominated Flows - Invited Lecture, AMS/SIAM Seminar on Vortex Dynamics and Vortex Methods, University of Washington, Seattle, WA, June 1990.

13. High Resolution Measurements of Conserved Scalar Mixing in Turbulent Flows - Invited Seminar, Combustion Research Facility, Sandia National Laboratories, Livermore, CA, June 1990.

14. Four-Dimensional Laser Induced Fluorescence Measurements of Conserved Scalar Mixing in Turbulent Flows – Plenary Lecture, 5th International Symposium on Applications of Laser Techniques to Fluid Mechanics, Instituto Superior Técnico, Lisbon, Portugal, July 1990.

15. Direct, High Resolution, Four-Dimensional Measurements of the Fine Scale Structure of $Sc \gg 1$ Molecular Mixing in Turbulent Flows - Invited Lecture, IUTAM Symposium on Fluid Mechanics of Stirring and Mixing, La Jolla, CA, August 1990.

16. Potential Terrorist Use of Stinger-Class Man-Portable Surface-to-Air Guided Missiles: Threat Assessment and Possible Countermeasures - The Rand Corporation, Santa Monica, CA, September 1990.

17. Vortex Sheet Tailoring for Aircraft Wake Signature Reduction - Institute for Defense Analyses, Alexandria, VA, November 1990.

18. The AS-IS Concept: Deterrence and Containment of High-Threat Tactical Weapons with Applications Ranging from Terrorist Threats to Carrier Group Vulnerability - Institute for Defense Analyses, Alexandria, VA, November 1990.

19. Fine Structure Measurements of Molecular Mixing in Turbulent Flows - Invited Lecture, 16th Meeting of the Sandia Technical Group on Aerothermochemistry of Reacting Flows, Cornell, NY, November 1990.

20. A Review of Diagnostics Requirements in Turbulent Flows with Recent Results from Four-Dimensional LIF Measurements - Invited Lecture, Ninth International Congress on Applications of Lasers and Electro-Optics, Boston, MA, November 1990.

21. High Resolution, Multi-Dimensional Measurements of $Sc \gg 1$ and $Sc \approx 1$ Mixing in Turbulent Flows - Invited Lecture, ETH-Zürich, Zürich, Switzerland, February 1991.

22. Fine Structure of Molecular Mixing in Turbulent Flows - Invited Seminar, Department of Mechanical and Aerospace Engineering, Princeton University, Princeton, NJ, February 1991.

23. Fine Structure Characteristics of Large Schmidt Number Molecular Mixing in Turbulent Flows – Invited Lecture, ERCOFTAC International Workshop on Chemical Reactions in Turbulent Liquids, ETH-Lausanne, Lausanne, Switzerland, April 1991.

24. AS-IS: Containment and Deterrence of High Threat Tactical Weapons – Defense Advanced Research Projects Agency (DARPA), Washington, DC, June 1991.

25. AS-IS: Containment and Deterrence of High Threat Tactical Weapons – Defense Policy Board (DPB), Washington, DC, July 1991.

26. Micromeasurements of Fine Scale Structure in Turbulent Flows - What We Can Do, What We Can't Do, What We May Be Able to Do – Invited Lecture, AFOSR Workshop on Microflows and Microdiagnostics, Illinois Institute of Technology, Chicago, IL, August 1991.

27. Fully-Resolved, Four-Dimensional, Laboratory Measurements of the Fine Scale

Structure of Turbulent Flows – Invited Seminar, Mechanical Engineering Department, Purdue University, West Lafayette, IN, September 1991.

28. Mixing and Chemical Reactions at Continuum Scales – Invited Lecture Series (8 lectures), Mechanical Engineering Department, University of California (Berkeley), Berkeley, CA, January - April 1992.

29. Fully-Resolved, Four-Dimensional, Laboratory Measurements of the Fine Scale Structure of Mixing in Turbulent Flows – Invited Seminar, Mechanical Engineering Department, University of California (Davis), Davis, CA, February 1992.

30. Experimental Studies of the Fine Structure of Mixing in Turbulent Flows – Invited Seminar, Mechanical Aerospace & Nuclear Engineering Department, University of California (Los Angeles), March 1992.

31. Small Scale Structure of Turbulent Diffusion Flames – Invited Lecture, 19th Meeting of the Sandia Technical Group on Aerothermochemistry of Reacting Flows, Lawrence Berkeley Laboratories, CA, April 1992.

32. Structure of Mixing and Reactions in Turbulent Flows – Invited Seminar, High Temperature Gas Dynamics Laboratories, Mechanical Engineering Department, Stanford University, Stanford, CA, April 1992.

33. Experimental Studies of the Fine Scale Structure of Mixing in Turbulent Flows – Invited Lecture, Thirteenth Symposium on Turbulence, Rolla, MO, September 1992.

34. High Resolution Measurements of Molecular Transport Processes in Turbulent Combustion – Invited Lecture, 6th Toyota Conference: Turbulence and Molecular Processes in Combustion, Nagoya, Japan, October 1992.

35. Modeling NOx in Turbulent Diffusion Flames – Invited Presentation, 2nd International Workshop on NOx in Natural Gas Flames, Orlando, FL, November 1992.

36. Laboratory Studies of the Fine Scale Structure of Turbulent Flows: $Sc \gg 1$, $Sc \approx 1$, and Implications for Reacting Flows – Invited Seminar, Theoretical Fluid Dynamics Division (T-3), Los Alamos National Laboratories, December 1992.

37. NOx Trends in the 30kW Version of a 12 MW Natural Gas Burner – Invited Presentation, 7th International Topics Oriented Technical Meeting (TOTeM 7) on Scaling and Mathematical Modeling of Combustion Systems, Chicago, IL, April 1993.

38. Microstructure of Turbulence and Turbulent Reacting Flows – Invited Seminar, Mechanical Engineering Department, University of Washington, Seattle, WA, April 1993.

39. Conserved Scalar Imaging in Turbulent Diffusion Flames – Invited Presentation, 22nd Meeting of the Sandia Technical Group on Aerothermochemistry of Reacting Flows, Sandia National Laboratories, Livermore, CA, October 1993.

40. Micromeasurements of Fluid Turbulence – Invited Plenary Lecture, 46th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Tempe, AZ, November 1993.

41. Advanced Subsonic Combustor Simulations with Realistic Chemistry/Soot Mechanisms – Invited Presentation, NASA Lewis Research Center, Internal Fluid Mechanics Division, November 1994.

42. Scalar Imaging Velocimetry Measurements of Small Scale Structure and Dynamics in Fluid Turbulence – Invited Seminar, Mathematics Department, University of California (Los Angeles), January 1995.

43. Overview of Research on Turbulent Mixing and Combustion at Michigan – Invited Seminar, Applications Research & Development Division, Praxair, Inc, Tarrytown, NY, March 1995.

44. Experimental assessment of Taylor's hypothesis and its applicability to dissipation estimates in turbulent flows – Plenary Presentation, Tenth Symposium on Turbulent Shear Flows, Penn State University, August 1995.

45. Current Research in Turbulent Flows for Aerospace Engineering Applications – Invited Presentation, Aerospace Engineering 380, Department of Aerospace Engineering, The University of Michigan, September 1995.

46. Fully-Resolved Four-Dimensional Measurements of the Fine Scale Structure of Turbulent Flows – Invited Seminar, Department of Mechanical & Aerospace Engineering, Princeton University, September 1995.

47. Fully-Resolved Four-Dimensional Measurements of the Fine Scale Structure of Turbulent Flows – Invited Seminar, Department of Mechanical Engineering, Yale University, September 1995.

48. Molecular Mixing and Reactions in Turbulent Flows – Invited Plenary Lecture, Eastern States Section Meeting of the Combustion Institute, Worcester, MA, October 1995.

49. Fully-Resolved Four-Dimensional Measurements of the Fine Scale Structure of Turbulent Flows – Invited Seminar, Department of Mechanical Engineering, University of California (Berkeley), October 1995.

50. Fully-Resolved Four-Dimensional Spatio-Temporal Micromeasurements of the Fine Scale Structure and Dynamics of Mixing in Turbulent Flows – Invited Presentation, Alpha Chi Sigma Honorary Symposium, AIChE Annual Meeting, Miami, FL, November 1995.

51. Direct Experimental Studies of the Fine Structure and Dynamics of Turbulent Flows – Invited Seminar, Institute for Fluid Dynamics, Department of Mechanical and Process Engineering, ETH-Zürich, Zürich, Switzerland, January 1996.

52. Four-Dimensional Measurements of Vector Fields in Turbulent Flows – Invited Presentation, Session FD-10 (Quantitative Flow Imaging), AIAA Fluid Dynamics Conference, New Orleans, LA, June 1996.

53. Shear Layer Mixing Processes – Invited Presentation, IHPTET Symposium Workshop on Advanced Combustion Processes, Wright-Patterson AFB, Dayton, OH, September 1996.

54. Simulation of Turbulent Flow and Complex Chemistry by Local Integral Moment (LIM) Modeling – Invited Presentation, Fuels & Lubrication Division, Aero Propulsion and Power Directorate, Wright-Patterson AFB, Dayton, OH, October 1996.

55. Heat Release Effects on Turbulent Shear Flows – Invited Seminar, Department of Aerospace Engineering & Engineering Mechanics, Univeristy of Texas (Austin), Austin, TX, December 1996.

56. Vortex Ring / Diffusion Flame Interactions in Microgravity Conditions – Invited Seminar, Microgravity Combustion Science Division, NASA Lewis Research Center (LeRC), Cleveland, OH, February 1997.

57. From Scalar Measurements to Combustion Modeling in Turbulent Flows – Invited Presentation, Gordon Conference on Physics and Chemistry of Laser Diagnostics in Combustion, Plymouth State College, Plymouth, NH, July 1997.

58. Structure in Mixing and Diffusion – Invited Lecturer (4 one-hour lectures), Short Course on Structure in Fluid Flow: Visualization and Measurement, Institut für Hydrodynamik und Wasserwirtschaft (IHW), Swiss Federal Institute of Technology (ETH), Zürich, Switzerland, September 8-11, 1997.

59. Local Integral Moment (LIM) Simulations of Turbulent Combustion – Invited Seminar, Chevron Petroleum Technology Company, La Jolla, CA, January 1998.

60. Fractal Facts and Fallacies of Fluid Turbulence – Invited Colloquium Speaker, Cornell Mechanical and Aerospace Engineering Colloquium Series, Cornell University, Ithaca, NY, November, 1997.

61. Global Measurements of Scalar Fields and Whole-Field Scalar Image Velocimetry in Turbulent Flows – Invited Lecture, 13th U.S. National Congress of Applied Mechanics (USNCAM), Gainesville, FL, June 21-26, 1998.

62. The Scale-Invariant Structure of Turbulent Scalar Fields – Invited Presentation, Special Session on Fundamental Research in Fluid Mechanics: Turbulent Flows, AIChE National Meeting, Miami Beach, FL, November 1998.

63. Fluid Microactuators Based on the Electrokinetic Principle – Invited Presentation, Electronics Technology Office, Defense Advanced Research Projects Agency (DARPA), Washington, D.C., August 1997.

64. Entrainment Patterns, Wall Effects, Mutual Interference, and Flame Lengths in Combustion Flows – Invited Presentation, Praxair, Inc., Tarrytown, NY, September 1997.

65. Visualization and Measurement of Structure in Fluid Flow – Invited Lecturer, Short Course on Structure in Fluid Flow: Visualization and Measurement, Institut für Hydromechanik und Wasserwirtschaft (IHW), Swiss Federal Institute of Technology (ETH-Zürich), Switzerland, September 1997.

66. Local Integral Moment (LIM) Simulations of Flow, Mixing, and Detailed Chemistry in Industrial Applications – Invited Presentation, Chevron Petroleum Technology Company, La Jolla, CA, January 1998.

67. Advanced Simulation of Flow, Mixing, and Combustion in Industrial Applications – Invited Presentation, John Zink Company, Tulsa, OK, March 1998.

68. Outer Flow Scalings, Entrainment Rates, Mixing Rates, and Flame Lengths for Buoyany Jets – Invited Presentation, Praxair, Inc., Tarrytown, NY, March 1998.

69. Buoyancy Effects and Jet Flame Interactions in Turbulent Combustion – Invited Presentation, John Zink Company, Tulsa, OK, September 1999.

70. Effects of Heat Release and Compressibility on Entrainment and Mixing in Turbulent

Shear Flows – Invited Seminar, Propulsion Directorate, Wright-Patterson AFB, Dayton, OH, December 1999.

71. Electrokinetic Microactuator Arrays for Control of Vehicles – Invited Presentation, DARPA/MTO/MEMS DoD-Wide Meeting, Atlanta, GA, January 2000.

72. Buoyancy Effects and Jet Flame Interactions in Turbulent Combustion – Invited Presentation, Praxair, Inc., Tarrytown, NY, March 2000.

73. Electrokinetic Microactuator Arrays for Sublayer Control in Turbulent Boundary Layers – Invited Presentation, 2nd Symposium on Smart Control of Turbulence, Tokyo, Japan, March, 2001.

74. Electrokinetic Microactuator Arrays for Active Sublayer Conrol – Invited Seminar, Aeronautical & Astronautical Engineering Seminar Series, University of Illinois (Urbana), Champaign, IL, April 2001.

75. Fundamental Analysis of Liquid Atomization by Fuel Slingers in Small Gas Turbines – Williams International, Walled Lake, MI, September 2001.

76. Reacting Species Concentration Measurements via DLS/ITAC in a Vortex-Ring Diffusion Flame – Invited Presentation, NASA Glenn Research Center, Microgravity Combustion Science Branch, (Cleveland, OH), September 28, 2001.

77. Electrokinetic Microactuator Arrays for Active Sublayer Conrol – Invited Seminar, Mechanical Engineering Seminar Series, Worcester Polytechnic Institute, Worcester, MA, January 2002.

78. Electrokinetic Microactuator Arrays for Active Sublayer Conrol – Invited Seminar, Mechanical Engineering Seminar Series, California Institute of Technology, Pasadena, CA, March 2002.

79. Micro Internal Combustion Swing Engine (MICSE) for Portable Power Generation Systems – Invited Presentation, Aerovironment Corporation, Simi Valley CA, March 2002.

80. Electrokinetic Microactuator Arrays for Active Sublayer Conrol – Invited Seminar, Mechanical and Aerospace Engineering Seminar Series, Notre Dame University, South Bend, IN, April 2002.

81. Microengines and the Micro Internal Combustion Swing Engine (MICSE) for Portable Power Genneration – Invited Presentation, JASONs Summer Study, La Jolla, CA, July 2002.

82. Electrokinetic Microactuator Arrays for Active Sublayer Conrol – Invited Presentation, Japan Society for Aeronautical and Space Sciences (JSASS), Nagoya University, Nagoya, Japan, July 2002.

83. Micro Internal Combustion Swing Engine (MICSE) for Portable Power Generation Systems – Invited Presentation, Toyota Central Research & Development Labs (Toyota CRDL), Nagoya, Japan, July 2002.

84. Electrokinetic Microactuator Arrays and System Architectures for Active Sublayer Control in Turbulent Boundary Layers – Invited Seminar, Institut für Aerodynamik, Technical University (TU) Berlin, Berlin, Germany, October 2002.

85. Microactuators and Control Architectures for Active Sublayer Control – Invited Presentation, Minisymposium on Flow Control, 55th Annual Meeting, Division of Fluid Dynamics, American Physical Society (APS), November 2002.

86. Microsystems for Drag Reduction and Portable Power – Invited Seminar, Department of Mechanical Engineering, Vanderbilt University, Nashville, TN, December 2002.

87. True Turbulence: Towards a Physically-Based Model of Turbulent Flows from Laboratory to Interstellar Scales – Invited Seminar, Space Science Seminar Series, Department of Atmospheric, Oceanic, and Space Science, The University of Michigan, Ann Arbor, MI, January 2003.

88. True Turbulence: Towards Physically-Based Multifractal Modeling of Turbulent Flows – Invited Seminar, Environmental and Water Resources Seminar Series, Department of Civil and Environmental Engineering, The University of Michigan, Ann Arbor, MI, April 2003.

89. Electrokinetic Microactuator Arrays and System Architectures for Active Sublayer Control of Turbulent Boundary Layers – Invited Seminar, Department of Mechanical & Aerospace Engineering, University of California at Los Angeles (UCLA), Los Angeles, CA, May 2003.

90. True Turbulence: Multifractal Subgrid-Scale Modeling of Turbulent Flows – Invited Seminar, Applied Mechanics Colloquium, Division of Engineering & Applied Sciences (DEAS), Harvard University, Cambridge, MA, November 2003.

91. True Turbulence: Multifractal Subgrid-Scale Modeling of Turbulent Flows – Invited Seminar, Fluid Mechanics Seminar Series, Department of Mechanical Engineering, Massachusetts Institute of Technology (MIT), Cambridge, MA, November 2003.

92. Micro Internal Combustion Swing Engine (MICSE) for Portable Power Generation Systems – Invited Presentation, Aerovironment Corporation, Simi Valley CA, January 2004.

93. Visualization and Fundamental Analysis of Liquid Atomization by Fuel Slingers for Small Gas Turbines – Williams International, Walled Lake, MI, January 2004.

94. True Turbulence: Towards a Multifractal Subgrid-Scale Model of Turbulent Flows – Invited Seminar, Center for Environmental and Atmospheric Fluid Mechanics, Johns Hopkins University, Baltimore, MD, September 2004.

95. High-Resolution Multi-Dimensional Imaging Methods for Direct Experimental Measurements (DEM) of Shear Flow Turbulence – Keynote Lecture, 6th World Conference on Experimental Heat Transfer, Fluid Mechanics, and Thermodynamics (ExHFT-6), Matsushima, Japan, April 2005.

96. Validation and Initial Results From Direct Experimental Measurements (DEM) of Turbulent Shear Flows – Invited Lecture, International Workshop on Measurement and Diagnosis of Heat Transfer and Fluid Flow Systems, 21st Century COE Program of Flow Dynamics, Tohoku University, April 2005.

97. High-Resolution Multi-Dimensional Imaging Measurements of Turbulence in Shear Flows – Invited Seminar, Complex Systems Group, Physics Department, Philipps-Universität, Marburg, Germany, July 2005.

98. Improved Prediction of Buoyancy Effects on Flame Length and Combustion Properties

of Flares – Invited Seminar, Technology & Commercial Development Group, John Zink Co., Tulsa, OK, October 2005.

99. True Turbulence: Towards a Multifractal Subgrid-Scale Model of Turbulent Flows – Invited Seminar, Department of Mechanical Engineering, Clemson University, Clemson, SC, October 2005.

100. Towards True Turbulence – Invited Seminar, Department of Mechanical Engineering, Michigan State University, Lansing, MI, December 2005.

101. Development of the Mesoscale Internal Combustion Swing Engine (MICSE) for Portable Power Generation – Invited Seminar, Minta Martin Lecture Series, Department of Aerospace Engineering, University of Maryland, College Park, MD, January 2006.

102. Jet Physics and Theory for Combustion Applications Involving Free or Confined Jet Flames – Invited Short Course, Combustion Applications R&D Group, Praxair, Tonawanda, NY, May 2006.

103. Thermal Management Technology Solutions – Invited Briefing, HQ Air Force Research Laboratory (AFRL), Wright-Patterson AFB, OH, August 2007.

104. A Measured Approach to Turbulence – Invited Seminar, Texas A&M University, College Park, MD, October 2007.

105. Thermal Management Technology Solutions – Invited Briefing, Office of the Deputy Under Secretary of Defense for Science & Technology (ODUSD S&T), Defense Pentagon, VA, November 2007.

106. Thermal Management Technology Solutions – Invited Briefing, Secretary of the Air Force (SecAF) and Air Force Chief of Staff (CSAF), AF Pentagon, VA, November 2007.

107. Space System Thermal Management – Invited Lecture, Space System Design Course, Department of Aerospace Engineering, The University of Michigan, Ann Arbor, MI, January 2008.

108. Tackling True Turbulence – Invited Seminar, Science Seminar Series, New College of Florida, Sarasota, FL, February 2008.

109. Thermal Management Technology Solutions – Invited Briefing, Thermal Transport & Control Workshop; Energy and Power Technology Initiative (EPTI), Deputy Under Secretary of Defense (Science & Technology), Arlington, VA, March 2008.

110. Role of the Chief Scientist in the Air Force Science and Technology Enterprise – Invited Presentation, Fall Board Meeting, Air Force Scientific Advisory Board (SAB), Arlington, VA, October 2008.

111. Towards True Turbulence – Invited Seminar, Department of Mechanical and Aerospace Engineering, University of Florida, Gainesville, FL, February 2009.

112. Key Air Force Research Priorities: Science and Technology at the Leading Edge – Invited Lecture, Ohanian Lecture Series, College of Engineering, University of Florida, Gainesville, FL, February 2009.

113. Air Force Science and Technology: The View From Inside the Pentagon – Keynote Presentation, Senior Leader Offsite, Air Force Research Laboratories, Dayton, OH, February 2009.

114. Key Air Force Research Priorities: Science and Technology at the Leading Edge – Invited Lecture, Colleges of Science and Engineering, University of Alabama in Huntsville, Huntsville, AL, April 2009.

115. Opportunities in the Air Force Science and Technology Enterprise – Keynote Lecture, American Institute of Aeronautics & Astronautics (AIAA) Student Conference, Region II, U.S. Space and Rocket Center, Huntsville, AL, April 2009.

116. Overview of the Air Force Science & Technology Enterprise – Invited Presentation, National Defense Education Program (NDEP), Director Defense Research & Engineering (DDR&E), Washington, DC, June 2009.

117. Leveraging Science & Technology Investment to Recapture Acquisition Excellence – Invited Presentation, Air Force Acquisition Industry CEO Roundtable, Annapolis, MD, July 2009.

118. Innovation in Aeronautical and Exo-Atmospheric Propulsion – Keynote Presentation, Joint Propulsion Conference, American Institute of Aeronautics & Astronautics (AIAA), Denver, CO, August 2009.

119. Science, Technology, Engneering & Mathematics (STEM) Needs of the Air Force – Panel Presentation, Air Force STEM Conference, U.S. Air Force Academy, Colorado Springs, CO, September 2009.

120. Future Test and Evaluation Needs – Keynote Presentation, 2009 Annual International Test and Evaluation Symposium, International Test & Evaluation Association (ITEA), Baltimore, MD, September 2009.

121. Key Needs in the Air Force Science and Technology Enterprise – Invited Presentation, Fall Board Meeting, Air Force Scientific Advisory Board (SAB), Arlington, VA, October 2009.

122. Overview of the Air Force Science and Technology Enterprise: Research and Development at the Leading Edge – Invited Seminar, Distinguished Lecture Series, School of Engineering and Management, Air Force Institute of Technology, Wright-Patterson AFB, OH, November 2009.

123. Key Air Force Research Priorities: Science and Technology at the Leading Edge – Invited Lecture, Distinguished Lecture Series, Aerospace Division, Honeywell International Corporation, Tempe, AZ, December 2009.

124. Technology Horizons and Capability Implications for the Air Force – Invited Presentation, Air Force Studies Board (AFSB) of the National Academies, Washington, DC, December 2009.

125. Data From Michigan-AFRL Measurements of Shock-Boundary Layer Interactions – Invited Presentation, AFRL SBLI Computational Challenge Workshop, AIAA Aerospace Sciences Meeting, Orlando, FL, January 2010.

126. Devising an Acquisition Strategy to Develop, Build, and Maintain USAF Force Structure – Invited Presentation, IFPA-Fletcher Conference on National Security Strategy and Policy, Washington, DC, January 2010.

127. Exploiting Unmanned Aircraft Systems: Their Role in Future Military Operations and the Emergent Technologies That Will Shape This Development – Keynote Lecture, New

Challenges in Aerospace Technology & Maintenance Conference 2010 (NCATMC 2010), Singapore Institute of Aerospace Engineers (SIAE) and Republic of Singapore Air Force (RSAF), Singapore Airshow 2010, February 2010.

128. Defense Science Advice for SecAF and CSAF – Invited Presentation, Defense Science Study Group (DSSG), Institute for Defense Analyses (IDA), Alexandria, VA, March 2010.

129. Key Air Force Research Priorities: Science and Technology at the Leading Edge – Invited Corporate Seminar, Blue Origin, LLC, Kent, WA, April 2010.

130. Exploiting Unmanned Aircraft Systems: Their Role in Future Military Operations and the Emergent Technologies That Will Shape This Development – Plenary Lecture, American Institute of Aeronautics & Astronautics (AIAA) Information Technologies Conference (Infotech@Aerospace), Atlanta, GA, April 2010.

131. Key Air Force Research Priorities: Science and Technology at the Leading Edge – Invited Presentation, AIAA Industry Partnerships Series, Washington, DC, May 2010.

132. Future Unmanned Aircraft Systems: Their Role in Military Operations and the Emergent Technologies That Will Shape Their Development, ONR Distinguished Lecture, Office of Maval Research, Washington, DC, May 2010.

133. Emerging Defense Technologies – Invited Presentation, Aerospace Industries Association (AIA) Summer 2010 Supplier Management Council Meeting, Baltimore, MD, June 2010.

134. Technology Horizons: Key Air Force Research Priorities – Invited Presentation, U.S. Air Force Scientific Advisory Board (SAB) Summer Session, Newport Beach, CA, June 2010.

135. Key Air Force Research Priorities: Science and Technology at the Leading Edge – Keynote Presentation, American Institute of Aeronautics & Astronautics (AIAA) Summer Meeting, Chicago, IL, June 2010.

136. Key Air Force Research Priorities: Science and Technology at the Leading Edge – Invited Presentation, Ira A. Fulton Schools of Engineering, Arizona State University, Tempe, AZ, June 2010.

137. Technology Horizons: A Vision for Air Force Science and Technology During 2010-2030 – Invited Presentation, Information Directorate, Air Force Research Laboratory, Rome, NY, July 2010.

138. Technology Horizons: Key Air Force Research Priorities – Invited Awards Luncheon Presentation, 46th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and 8th International Energy Conversion Engineering Conference, Nashville, TN, July 2010.

139. U.S. Air Force "Technology Horizons" – Invited Presentation, Air Force Association (AFA) Technology Symposium, Wright-Patterson Air Force Base, OH, August 2010.

140. Technology Horizons: Building Future Air Force Capabilities – Invited Presentation, 2010 Air Force Association Conference & Technology Symposium, U.S. National Convention Center, Washington, DC, September 2010.

141. Technology Horizons: Key Air Force Research Priorities – Invited Presentation, National Security Scholars Conference, Tufts University, Boston, MA, September 2010.

142. Insights into Autonomous Systems and Processes from Air Force "Technology Horizons" – Invited Presentation, Defense Science Board Task Force on the Role of Autonomy in DoD Systems, Washington, DC, September 2010.

143. Key Air Force Research Priorities: Science and Technology at the Leading Edge – Invited Seminar, Department of Aerospace Engineering, University of Michigan, Ann Arbor, MI, September 2010.

144. Measurement, Modeling, and Control of Shock-Boundary Layer Interactions – Distinguished Scholar Lecture, Mechanical & Aerospace Engineering; Ira A. Fulton Schools of Engineering, Arizona State University, Tempe, AZ, October 2010.

145. The Security & Defense Systems Initiative (SDSI) at ASU – Invited Presentation, East Valley Partnership Board, Mesa, AZ, January 2011.

146. Role of the ASU Security & Defense Initiative (SDSI) in Addressing Key National and Global Security Challenges – Invited Presentation, WISEGUISE, Scottsdale, AZ, January 2011.

147. Emerging Technologies for "Unmanned" Military Aircraft – Invited Presentation, Conference on Drones, Remote Targeting, and the Promise of Law, New America Foundation, Washington, DC, February 2011.

148. Role of the ASU Security & Defense Initiative (SDSI) in Addressing Key National and Global Security Challenges – Invited Presentation, Association of Former Intelligence Officers (AFIO), Scottsdale, AZ, April 2011.

149. The Security & Defense Systems Initiative (SDSI) at ASU – Invited Presentation, National Defense Industrial Association, Phoenix Chapter, Tempe, AZ, June 2011.

150. Technology Horizons: Vision for Air Force 2010-2030 Capabilities Enabled by Science & Technology – Invited Presentation, Air Force Association Southwest Region Conference, Phoenix, AZ, June 2011.

151. Integrated Systems Health Management: Applications and Challenges on the Horizon – Invited Keynote Presentation, Integrated Systems Health Management (ISHM) Conference, Boston, MA, July 2011.

152. Future Requirements for Thermal Management – Invited Keynote Presentation, Thermal Sciences & Materials Conference, Dayton, OH, August 2011.

153. Air Force S&T in a Resource Strained Environment – Invited Presentation, Air Force Association Annual Air & Space Conference, Washington, DC, September 2011.

154. Perspectives on Verification and Validation (V&V) in Complex Adaptive Systems – Invited Keynote Presentation, International Workshop on Verification & Validation in Computational Science, Notre Dame University, South Bend, IN, October 2011.

155. Implications of Spectrum Management for the Air Force – Invited Colloquium Presentation, Air Force Space Command (AFSPC), Peterson AFB, CO, January 2012.

156. The Security & Defense Systems Initiative (SDSI) at ASU – Invited Presentation, Arizona FBI Counterintelligence Working Group, Phoenix, AZ, January 2012.

157. Fault Management: Applications & Challenges on the Horizon – Invited Presentation,

2012 NASA Fault Management Workshop, New Orleans, LA, April 2012.

158. Establishing Certifiable Trust in Autonomy: V&V of Complex Adaptive Cyber-Physical Systems – Keynote Address, 2012 Safe & Secure Systems & Systems Symposium (S5), Fairborn, OH, June 2012.

159. Cyber Situational Awareness – Invited Briefing to SecAF, CSAF, and Air Staff, Headquarters U.S. Air Force, Pentagon, Washington, DC, September 2012.

160. Cyber Situational Awareness – Invited Presentation, RAND Cyber Summit Planning Group, Washington, DC, September 2012.

161. Defense Technology Development and Technology Entrepreneurship – Invited Presentation, Rapid Startup School Military, Defense, and Veterans Program, Arizona State University, Scottsdale, AZ, September 2012.

162. Cyber Situational Awareness – Invited Briefing to AFSPC/CC and Command Staff, Air Force Space Command Headquarters, Petersen AFB, CO, October 2012.

163. Cyber Situational Awareness – Invited Briefing to AFRL/CC and HQ Staff, Air Force Research Laboratory, Wright-Patterson AFB, OH, October 2012.

164. Cyber Situational Awareness – Invited Briefing to AFMC/CC and Command Staff, Air Force Materiel Command Headquarters, Wright-Patterson AFB, OH, Nov. 2012.

165. Cyber Situational Awareness – Invited Briefing to 24th AF/CC, Headquarters Staff, and AFISRA, Headquarters 24AF, Lackland AFB, TX, November 2012.

166. Cyber Situational Awareness – Invited Briefing to AMC/CC and Command Staff, Headquarters Air Mobility Command, Scott AFB, IL, December 2012.

167. Establishing Trust in Autonomous Aerosystems: V&V of Complex Adaptive Cyber-Physical Systems – Invited Plenary Presentation, 51st AIAA Aerospace Sciences Meeting, Grapevine, TX, January 2013.

168. Cyber Situational Awareness – Invited Briefing to U.S. Pacific Command (PACOM) and Pacific Air Forces (PACAF) Command Staffs, Headquarters PACOM, Joint Base Hickham, Honolulu, HI, January 2013.

169. Cyber Situational Awareness – Invited Briefing to Air Force Research Laboratory (AFRL) Research Council, Air Force Research Laboratory, Wright-Patterson AFB, OH, January 2013.

170. Cyber Situational Awareness – Invited Briefing to AF/A3/5 and HQ Staff, AF/A2, AF/A9 & AF OSI, Headquarters USAF, Pentagon, Washington, DC, February 2013.

171. Importance and Relevance of Policy to UAS Utilization – Invited Presentation to State of Arizona UAS Research Consortium, Science Foundation Arizona, March 2013.

172. Cyber Situational Awareness – Invited Briefing to AFGSC/CC and HQ Staff, Air Force Global Strike Command, Barksdale AFB, OH, April 2013.

173. Technology Horizons: U.S. Air Force Headquarters-Level Science and Technology Vision for 2010-2030 – Invited Presentation, SPIE Defense, Security & Sensing Conference, Boston, MA, May 2013.

174. Cyber Situational Awareness – Invited Briefing to U.S. Army Network Enterprise Technology Command (NETCOM) / 9th Signal Command HQ Staff, Ft Huachuca, AZ, May 2013.

175. Establishing Trust in Autonomous Aerosystems: Control of Complex Adaptive Cyber-Physical Systems – Opening Plenary Lecture, AIAA Guidance, Navigation & Control Conference, American Institute of Aeronautics & Astronautics (AIAA), Boston, MA, August 2013.

176. Key Policy Issues Associated with Current and Emerging Unmanned Aircraft Systems – Invited Panel Presentation, Aviation/Aeronautics/Aerospace International Research Conference (A^3IR Conference), Litchfield Park, AZ, January 2014.

177. Technology and Its Relation to the Future of War – Invited Presentation, Future of War Seminar Series (P. Bergen & D. Rothenberg, Eds.), Arizona State University, February 2015.

178. Emerging National Defense Capabilities from Science and Technology Investments – Invited Presentation, Future of War Conference (P. Bergen & D. Rothenberg, Eds.), New America Foundation, Washington, D.C., February 2015.

179. Autonomic Closure for Turbulence Simulations – Invited Seminar Presentation, Lawrence Livermore National Laboratory, Livermore, CA, October 2015.

180. Overview of the U.S. Air Force Scientific Advisory Board – Invited Presentation, Defense Science Study Group (DSSG), Institute for Defense Analyses (IDA), Alexandria, VA, October 2015.

181. Technology and its Relation to the Future of War – Invited Presentation, 25th Cadet Wing, Air Force ROTC Detachment, Tempe, AZ, October 2015.

182. Role of Academia in National Security – Invited Presentation, 30th Anniversary Symposium of the Defense Science Study Group, Institute for Defense Analyses, Washington, D.C., March 2016.

183. Autonomic Closure for Turbulence Simulations – Invited Seminar, University of California – Irvine, Irvine, CA, April 2016.

184. Science and Technology: Its Relation to Strategic Thinking About Future Air Force Capabilities – Invited Seminar, Air Command and Staff College, Air University, Maxwell Air Force Base, AL, May 2016.

185. Science and Technology: Its Relation to Strategic Thinking About Future Air Force Capabilities – Invited Seminar, Squadron Officer School, Air University, Maxwell Air Force Base, AL, May 2016.

186. Science and Technology: Its Relation to Strategic Thinking About Future Air Force Capabilities – Invited Seminar, School for Advanced Aerospace Studies, Air University, Maxwell Air Force Base, AL, May 2016.

187. Science and Technology: Its Relation to Strategic Thinking About Future Air Force Capabilities – Invited Seminar, Air War College, Air University, Maxwell Air Force Base, AL, May 2016.

188. Role of Science and Technology in Strategic Thinking About Future Air Force Capabilities – Invited Seminar, Air War College, Air University, Maxwell Air Force

Base, AL, May 2017.

189. Role of Science and Technology in Strategic Thinking About Future Air Force Capabilities – Invited Seminar, Squadron Officer School, Air University, Maxwell Air Force Base, AL, May 2017.

190. Role of Science and Technology in Strategic Thinking About Future Air Force Capabilities – Invited Roundtable, School for Advanced Aerospace Studies, Air University, Maxwell Air Force Base, AL, May 2017.

191. Autonomic Closure for Large Eddy Simulations of Turbulence – Invited Seminar, Los Alamos National Laboratory, Los Alamos, NM, July 2017.

192. Autonomic Closure for Large Eddy Simulation of Turbulent Flows and Transport Processes – Invited Seminar, Pacific Northwest National Laboratory, Richland, WA, February 2018.

193. Autonomic Closure for Large Eddy Simulation of Turbulent Flows and Transport Processes – Invited Seminar, Department of Mechanical Engineering, University of Colorado, Boulder, CO, February 2018.

194. Including Full Chemistry in Simulations of Turbulent Reacting Flow: Flow-Chemistry Coupling via Flamelet Libraries Based on the Elemental Mixture Fraction – Invited Seminar, Department of Mechanical Engineering, University of Colorado, Boulder, CO, April 2018.

195. The Equivalence Principle and its Application to Scaling Laws for Reacting Flows: What the "Real World" Combustion Industry Wants – Invited Seminar, Department of Mechanical Engineering, University of Colorado, Boulder, CO, April 2018.

196. The Equivalence Principle and its Application to Scaling Laws for Reacting Flows: What the "Real World" Combustion Industry Wants – Invited Seminar, Department of Mechanical Engineering, University of California Irvine, Irvine, CA, May 2018.

197. Maintaining Technology Superiority for the U.S. Air Force – Invited Briefing to Secretary of the Air Force and Air Force Chief of Staff, Headquarters Air Force, Pentagon, Washington, DC, August 2018.

198. Maintaining Technology Superiority for the U.S. Air Force – Invited Briefing to Air Combat Command (ACC) Commander and HQ Command Staff, Joint Base Langley, VA, April 2019.

199. Maintaining Technology Superiority for the U.S. Air Force – Invited Briefing to Air Mobility Command (AMC) Commander and HQ Command Staff, Scott AFB, IL, August 2019.

200. Adaptive Scale-Similar Closure With Rational Boolean Stabilization: Towards an Accurate, Stable, and General Subgrid Modeling Methodology – Invited Seminar, Mechanical and Aerospace Engineering Department, University of Sourthern California, Los Angeles, CA, September 2022.

201. Adaptive Scale-Similar Closure With Rational Boolean Stabilization: Towards an Accurate, Stable, and General Subgrid Modeling Methodology – Invited Presentation, Symposium in Honor of Professor Said Elghobashi, University of California Irvine, Irvine, CA, September 2022.

- **Conference Presentations**

1. Three-Component Velocity Measurements Using a Static Pipe of Elliptic Cross Section - ASME/AIAA Aerospace Conference, San Francisco, CA, August 1980.

2. Non-Premixed Turbulent Jet Flames - 22nd Aerospace Sciences Meeting, American Institute of Aeronautics and Astronautics, Reno, NV, January 1984.

3. Measurements of Entrainment and Mixing in Turbulent Jets - 23rd Aerospace Sciences Meeting, American Institute of Aeronautics and Astronautics, Reno, NV, January 1985.

4. Laser Induced Fluorescence Measurements of Concentration in Turbulent Jets - 38th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Tucson, AZ, November 1985; abstract in Bull. Am. Phys. Soc., Vol. 30, 1752.

5. Vortex Dynamics and Mixing in the Near Field of a Coaxial Jet - 39th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Columbus, OH, November 1986; abstract in Bull. Am. Phys. Soc., Vol. 31, 1690.

6. Dynamics of Vortex Ring Interaction with a Density Interface - 40th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Eugene, OR, November 1987; abstract in Bull. Am. Phys. Soc., Vol. 32, 2038.

7. Combustion Stability Limits of Coflowing Turbulent Jet Diffusion Flames - 36th Aerospace Sciences Meeting, American Institute of Aeronautics and Astronautics, Reno, NV, January 1988.

8. Dynamics of Vortex Interaction with a Density Interface - SIAM Workshop on Mathematical Aspects of Vortex Dynamics, Leesburg, VA, April 1988.

9. Coflowing Turbulent Jet Diffusion Flame Blowout - 22nd (International) Symposium on Combustion, Seattle, WA, August 1988.

10. Chemical Reactions and Topology of Scalar Interfaces in a Turbulent Flow - 41st Annual Meeting, Division of Fluid Dynamics, American Physical Society, Buffalo, NY, November 1988; abstract in Bull. Am. Phys. Soc., Vol. 33, 2223.

11. High Resolution, Three-Dimensional (256^3), Spatio-Temporal Measurements of the Conserved Scalar Field in Turbulent Shear Flows - Seventh Symposium on Turbulent Shear Flows, Stanford, CA, August 1989.

12. Structure of the Scalar Dissipation Field for Mixing of a $Sc \approx 1$ Conserved Scalar in a Turbulent Shear Flow - 42nd Annual Meeting, Division of Fluid Dynamics, American Physical Society, Palo Alto, CA, November 1989; abstract in Bull. Am. Phys. Soc., Vol. 34, 2264.

13. Four-Dimensional Laser Imaging Diagnostics for Fine Structure Measurements in Turbulent Flows - AFOSR/ONR Workshop on Future Direction for Diagnostics in Turbulent Reacting Flows, Atlanta, GA, June 1990.

14. Four-Dimensional Laser Induced Fluorescence Measurements of Conserved Scalar Mixing in Turbulent Flows - 5th International Symposium on Applications of Laser in Fluid Mechanics, Lisbon, Portugal, July 1990.

15. Time-Local Optimal Control of Fluid Mixing - 43rd Annual Meeting, Division of Fluid

Dynamics, American Physical Society, Ithaca, NY, November 1990; abstract in Bull. Am. Phys. Soc., Vol. 35, 2287.

16. Scalar Imaging Velocimetry Studies of Turbulent Flow Field Structure and Dynamics – 44th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Scottsdale, AZ, November 1991; abstract in Bull. Am. Phys. Soc., Vol. 36, 2674.

17. Local Integral Model Simulations of Chemically Reacting Flows – 44th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Scottsdale, AZ, November 1991; abstract in Bull. Am. Phys. Soc., Vol. 36, 2679.

18. Equilibrium Structure of Chemical Reaction Rate Fields in Turbulent Diffusion Flames – 24th (International) Symposiumn on Combustion, The University of Sydney, Sydney, Australia, June 1992.

19. Fully Resolved Four-Dimensional Scalar Imaging Velocimetry (SIV) Measurements of Approach and Relaxation Characteristics of Nonequilibrium Turbulence – ONR Nonequilibrium Turbulence Meeting: State-of-the-Art Workshop, Tempe, AZ, March 1993.

20. A Strained Dissipation and Reaction Layer Formulation for Turbulent Diffusion Flames – Paper No. 93-063, 1993 Fall Meeting of the Western States Section of the Combustion Institute, Menlo Park, CA, October 1993.

21. Striation Thickness Distributions in Turbulent Flows – 46th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Albequerque, NM, November 1993; abstract in Bull. Am. Phys. Soc, Vol. 38, No. 12, 2205.

22. Scalar Imaging Velocimetry Measurements of the Dissipative Scales of Turbulent Flows – 46th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Albequerque, NM, November 1993; abstract in Bull. Am. Phys. Soc, Vol. 38, No. 12, 2286.

23. A Strained Dissipation and Reaction Layer Formulation for Turbulent Reactive Flows – 46th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Albequerque, NM, November 1993; abstract in Bull. Am. Phys. Soc, Vol. 38, No. 12, 2269.

24. Comparison of Fractal Properties in Chaotically Advected and Turbulent Flows – 46th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Albequerque, NM, November 1993; abstract in Bull. Am. Phys. Soc, Vol. 38, No. 12, 2194.

25. Four-Dimensional Laser Induced Fluorescence Study of the Structure of Molecular Mixing in Turbulent Flows – Session FD-24, 32nd AIAA Aerospace Sciences Mtg, January 1994, Reno, NV.

26. Scalar Imaging Velocimetry Study of the Dissipative Scales of Motion in Turbulent Flows – Session FD-10, 32nd AIAA Aerospace Sciences Mtg, January 1994, Reno, NV.

27. Non-Equilibrium Structure of H_2-Air Combustion in Turbulent Jets – Session PC-1, 32nd AIAA Aerospace Sciences Mtg, January 1994, Reno, NV.

28. LIM Computations of Chemical Reactions in Spatially and Temporally Developing Shear Flows – Session PC-6, 32nd AIAA Aerospace Sciences Mtg, January 1994, Reno, NV.

29. Experimental Results for the High Wavenumber Spectral Structure of Scalar Mixing in Turbulent Shear Flows – 10th Symposium on Turbulent Shear Flows, August 1995, University Park, PA.

30. A Local Integral Moment (LIM) Model for Simulating Flow and Chemistry in Industrial Combustion Processes – 1995 AFRC International Symposium on "Combustion Research and Industrial Practice: From Equations to Equipment", October 1995, Monterey, CA.

31. SIV Results for the Structure and Dynamics of $\tilde{\mathbf{N}}\mathbf{u}(\mathbf{x},t)$ in Turbulent Flows – 48th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Irvine, CA, November 1995; Bull. Am. Phys. Soc, Vol. 40, No. 12, 1945.

32. Scaling Laws for NOx Emissions Performance of Burners and Furnaces from 30 kW to 12 MW – 1996 AFRC International Symposium, American Flame Research Committee (AFRC), September 30 – October 2, 1996, Baltimore, MD.

33. LIM Simulations of Mixing and Chemical Reaction in Gas Reburning Applications – 1996 AFRC International Symposium, American Flame Research Committee (AFRC), September 30 – October 2, 1996, Baltimore, MD.

34. Fundamental Scaling of NOx Emissions from Burners and Furnaces – 49th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Syracuse, NY, November 1996; abstract in Bull. Am. Phys. Soc, Vol. 41, No. 9, 1828.

35. Heat Release Effects on Scaling Laws for Turbulent Shear Flows – 49th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Syracuse, NY, November 1996; abstract in Bull. Am. Phys. Soc, Vol. 41, No. 9, 1814.

36. Experimental Results for the Applicability of Multifractal Scaling in Turbulent Flows – 49th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Syracuse, NY, November 1996; abstract in Bull. Am. Phys. Soc, Vol. 41, No. 9, 1782.

37. Diffusion Flame Structure of a Vortex Ring Under μg Conditions – 49th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Syracuse, NY, November 1996; abstract in Bull. Am. Phys. Soc, Vol. 41, No. 9, 1726.

38. Fluid Microactuators Based on the Electrokinetic Principle – 50th Annual Meeting, Division of Fluid Dynamics, American Physical Society, San Francisco, CA, November 1997; abstract in Bull. Am. Phys. Soc, Vol. 42, No. 11, 2247.

39. LIM simulations of gas injection and reburning in two utility boilers – 1997 AFRC International Symposium, American Flame Research Committee (AFRC), Chicago, IL, October 1997.

40. Diffusion flame structure of a vortex ring under microgravity conditions – 27th Symposium (International) on Combustion, Boulder, CO, Aug 2-7, 1998.

41. Universal scaling of buoyant turbulent jet diffusion flames – 51st Annual Meeting, Division of Fluid Dynamics (DFD), American Physical Society (APS), November 22-24, 1998, Philadelphia, PA; abstract in Bull. Am. Phys. Soc.

42. A vortex method for simulations of three-dimensional jets – 51st Annual Meeting, Division of Fluid Dynamics (DFD), American Physical Society (APS), November 22-24, 1998, Philadelphia, PA; abstract in Bull. Am. Phys. Soc.

43. An equivalence principle for heat release effects in nonbuoyant turbulent shear flows and its application to turbulent jet flames – 1999 Joint Technical Meeting of the U.S. Sections of the Combustion Institute, Washington, D.C., March 14-17, 1999.

44. The interaction of a vortex ring with a diffusion flame under microgravity conditions – Fifth International Microgravity Combustion Workshop, Cleveland, OH, May 1999; paper in Proc. Fifth International Microgravity Combustion Workshop, NASA CP-208917, pp. 271-274.

45. Entrainment and mixing in supersonic planar turbulent wakes – 52nd Annual Meeting, Division of Fluid Dynamics, American Physical Society; abstract in Bull. Am. Phys. Soc. 44 (8), 171.

46. Effects of heat release at the small scales of turbulent shear flows – 52nd Annual Meeting, Division of Fluid Dynamics, American Physical Society; abstract in Bull. Am. Phys. Soc. 44 (8), 92.

47. The role of combustion in diffusion flame-vortex ring interaction – 52nd Annual Meeting, Division of Fluid Dynamics, American Physical Society; abstract in Bull. Am. Phys. Soc. 44 (8), 91.

48. Multifractal scale-similarity in subgrid-scale turbulence modeling – EUROMECH 8th European Turbulence Conference (ETC8), June 27-30, 2000, Barcelona, Spain.

49. Electrokinetic microactuator arrays for sublayer control of turbulent boundary layers – EUROMECH Colloquium 415 “Shear Flow Control”, July 24 - 26, 2000, TU Berlin, Germany.

50. Control of entrainment and mixing in supersonic turbulent shear flows by expansion wave interactions – EUROMECH Colloquium 415 “Shear Flow Control”, July 24 - 26, 2000, TU Berlin, Germany.

51. Turbulent flame processes via diffusion flame - vortex ring interactions – Sixth International Microgravity Combustion Workshop, Cleveland, OH, May, 2001; paper in *NASA CP-2001-210826*, pp. 65-68.

52. Improved prediction of flame properties in air-fuel and oxy-fuel combustion systems – 2001 Joint AFRC/JFRC/IEA International Combustion Symposium, September, 2001, Kauai, Hawaii.

53. Micro internal combustion swing engine (MICSE) for portable power generation systems – 40th AIAA Aerospace Sciences Meeting, January, 2002, Reno, NV.

54. High Reynolds number assessment of a multifractal subgrid scale model – 32nd AIAA Fluid Dynamics Conference, June 24-27, 2002, St. Louis, MO.

55. Visualization and fundamental analysis of liquid atomization by fuel slingers in small gas turbines – 32nd AIAA Fluid Dynamics Conference, June 24-27, 2002, St. Louis, MO.

56. Subgrid scale modeling based on multifractal structure of the subgrid vorticity field – EUROMECH 9th European Turbulence Conference (ETC-9), July 2-5, 2002, Southampton, England.

57. Mixture fraction measurements via WMS/ITAC in a microgravity vortex-ring diffusion flame – 29th International Symposium on Combustion, July 21-26, 2002, Sapporo,

Japan.

58. Microactuators and control architectures for active sublayer control – Minisymposium on Flow Control, 55th Annual Meeting, Division of Fluid Dynamics, American Physical Society (APS), Dallas, TX; in Bull. Am. Phys. Soc. 47 (10), 134 (2002) (abstract only).

59. Dual-plane stereo PIV (DSPIV) measurements of the velocity gradient tensor field at the small scales of turbulent flows – Third International Symposium on Turbulence and Shear Flow Phenomena (TSFP-3), Sendai, Japan, June 2003.

60. Visualizations of liquid breakup by fuel slingers – 9th International Conference on Liquid Atomization and Spray Systems (ICLASS 2003), Sorrento, Italy, July 2003.

61. Beam steering in exothermic turbulent reacting flow. 56th Annual Meeting, Division of Fluid Dynamics, American Physical Society (APS), Meadowlands, NJ; in Bull. Am. Phys. Soc. 48 (10), 204 (abstract only).

62. Optimized combustion in a mesoscale system by numerical simulation – SIAM 10th International Conference on Numerical Combustion, 9-12 May 2004, Sedona, AZ.

63. Evaluation of multifractal subgrid-scale modeling in large-eddy simulations of homogeneous, isotropic turbulence –10th European Turbulence Conference (ETC-10), 29 June - 2 July, 2004, Trondheim, Norway.

64. Direct assessments of multifractal scale-similarity in true dissipation and enstrophy fields from dual-plane stereo PIV (DSPIV) – 10th European Turbulence Conference (ETC-10), 29 June - 2 July, 2004, Trondheim, Norway.

65. Direct experimental measurements of velocity gradient fields in turbulent flows via high-resolution frequency-based dual-plane stereo PIV (DSPIV) – 12th International Symposium on Applications of Laser Techniques to Fluid Mechanics, July 12-14, 2004, Lisbon, Portugal.

66. Improved prediction of buoyancy effects on flame length and combustion properties of flares – AFRC-JFRC 2004 Joint International Combustion Symposium, 10-13 October 2004, Maui, HI.

67. DSPIV measurements of velocity gradient tensor fields in turbulent flows – 57th Annual Meeting, Division of Fluid Dynamics (DFD), American Physical Society (APS), Seattle, WA, 21-23 November 2004; abstract in Bull. Am. Phys. Soc. Vol. 49, No. 9, p. 80.

68. DSPIV results for structure, statistics, similarity and scaling of shear flow turbulence – 57th Annual Meeting, Division of Fluid Dynamics (DFD), American Physical Society (APS), Seattle, WA, 21-23 November 2004; abstract in Bull. Am. Phys. Soc. Vol. 49, No. 9, p. 69.

69. Scale-by-scale assessments of the approach to isotropy – ITI Conference on Turbulence, 25-28 September 2005, Bad Zwischenahn, Germany.

70. Scale-by-scale approach to isotropy in homogeneous turbulent flows – 58th Annual Meeting, Division of Fluid Dynamics (DFD), American Physical Society (APS), Chicago, IL, 20-22 November 2005; abstract in Bull. Am. Phys. Soc. Vol. 50, No. 9, p. 53.

71. Scale by scale assessment of the approach to isotropy in a turbulent shear flow – 58th Annual Meeting, Division of Fluid Dynamics (DFD), American Physical Society (APS),

Chicago, IL, 20-22 November 2005; abstract in Bull. Am. Phys. Soc. Vol. 50, No. 9, p. 80.

72. Inside-out rotary ramjet turbogenerator – Session EC-12 (Brayton Cycle II), AIAA 4th International Energy Conversion Engineering Conference, 26-29 June 2006, San Diego, CA.

73. Evidence for Small Scale Grid-Induced Anisotropy – 59th Annual Meeting, Division of Fluid Dynamics (DFD), American Physical Society (APS), Tampa Bay, FL, 19-21 November 2006; abstract in Bull. Am. Phys. Soc. Vol. 51, No. 9, p. 244.

74. Scaling relations for flare interactions, flame lengths, and crosslightling requirements in large flare fields – 2007 Joint American-Japanese Flame Research Committee International Symposium, 22-24 October 2007, Waikoloa, HI.

75. Inner Scale Effects of Heat Release in Reacting Turbulent Shear Flows – 60th Annual Meeting, Division of Fluid Dynamics (DFD), American Physical Society (APS), Salt Lake City, UT, 18-20 November 2007; abstract in Bull. Am. Phys. Soc. Vol. 52, No. 9.

76. Vorticity alignment with local and nonlocal strain rate eigenvectors in turbulent flows – 61st Annual Meeting, Division of Fluid Dynamics (DFD), American Physical Society (APS), San Antonia, TX, 23-25 November 2008; abstract in Bull. Am. Phys. Soc. Vol. 53, No. 9.

77. High-resolution PIV measurements of heat release effects at the inner scales of turbulent flows – 14th International Symposium on Applications of Laser Techniques to Fluid Mechanics, July 7-10, 2008, Lisbon, Portugal.

78. Autonomic closure for large-eddy simulations – 67th Annual Meeting Division of Fluid Dynamics (DFD), American Physical Society (APS), San Francisco, CA, 23-25 November 2014; abstract in Bull. Am. Phys. Soc.

79. An autonomic approach for closure for turbulence simulations. 15th European Turbulence Conference (ETC-15), 25-28 August, 2015, Delft, Netherlands.

80. Autonomic closure for large-eddy simulations – 68th Annual Meeting Division of Fluid Dynamics (DFD), American Physical Society (APS), Boston, MA, 22-24 November 2015; abstract in Bull. Am. Phys. Soc.

81. Autonomic closure for turbulent flows using approximate Bayesian computation. 70th Annual Meeting Division of Fluid Dynamics (DFD), American Physical Society (APS), Denver, CO, August 2017; abstract in Bull. Am. Phys. Soc.

82. Balancing accuracy and efficiency in the autonomic closure methodology for large eddy simulations. AIAA SciTech Forum 2021, Virtual Forum, January 2021.

83. Adaptive scale-similar closure of the subgrid stress and subgrid scalar flux in large eddy simulations - 74th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Phoenix, AZ, November 2021; abstract in Bull. Am. Phys. Soc.

84. Adaptive scale-similar closure for large eddy simulations. Part 1: Subgrid stress closure. 2022 AIAA Aerospace Sciences Meeting, AIAA SciTech Forum, 3-7 January 2022, San Diego, CA.

85. Adaptive scale-similar closure for large eddy simulations. Part 2: Subgrid scalar flux closure. 2022 AIAA Aerospace Sciences Meeting, AIAA SciTech Forum, 3-7 January

2022, San Diego, CA.

86. Rational Boolean stabilization of subgrid models for large eddy simulations. 2023 AIAA Aerospace Sciences Meeting, AIAA SciTech Forum, 23-27 January 2023, National Harbor, MD.

- **Conference Poster Presentations**

1. Laser Induced Fluorescence Measurements of Concentration in Turbulent Jets - 38th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Tucson, AZ, November 1985.

2. Vortex Dynamics and Mixing in the Near Field of a Coaxial Jet - 39th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Columbus, OH, November 1986.

3. Dynamics of Vortex Ring Interaction with a Density Interface - 40th Annual Meeting, Division of Fluid Dynamics, American Physical Society, Eugene, OR, November 1987.

4. High Resolution, Three-Dimensional, Spatio-Temporal Measurements of the Conserved Scalar Field in Turbulent Shear Flows - 41st Annual Meeting, Division of Fluid Dynamics, American Physical Society, Buffalo, NY, November 1988.

5. Structure of the Scalar Dissipation Field for Mixing of $Sc \approx 1$ and $Sc \gg 1$ Conserved Scalar Fields in Turbulent Shear Flows: Stretching and Folding of Molecular Diffusion Layers - 42nd Annual Meeting, Division of Fluid Dynamics, American Physical Society, Palo Alto, CA, November 1989.

6. High-Resolution Three-Dimensional (2563) Spatio-Temporal Measurements of the Conserved Scalar Field in Turbulent Shear Flows – 7th Symposium on Turbulent Shear Flows, Stanford, CA, August 1989.

7. Study of the Fractal Scaling Properties of Turbulent Flows – 10th Symposium on Turbulent Shear Flows, University Park, PA, August 1995 (won best poster award).

8. Structure of the Reaction Zone within Intensely Turbulent Nonpremixed Flames – Poster #W2E04, 27th Symposium (International) on Combustion, Boulder, CO, Aug 2-7, 1998.

9. An Equivalence Principle for Heat Release Effects in Nonbuoyant Turbulent Shear Flows and its Application to Turbulent Jet Flames – Poster No. 86, First Joint Meeting of the U.S. Sections of the Combustion Institute, March 14-17, Washington, D.C.

10. The Regime of Intensely Wrinkled Nonpremixed Flames - Images of the CH-OH Reaction Zones and Velocity Fields – Poster No. 91, First Joint Meeting of the U.S. Sections of the Combustion Institute, March 14-17, Washington, D.C.

11. Effects of Chemically-Passive Suppressants on Extinction of Laminar Nonpremixed Hydrocarbon Flames – 31st International Symposium on Combustion, 6-11 August, 2006, Heidelberg, Germany.

12. Autonomic Machine Learning Closure for Turbulence Simulations – Workshop on Physics Informed Machine Learning, Center for Nonlinear Studies, 19-22 January, 2016, Los Alamos, NM.

- **Government, University and Industry Reports**

1. Lo, C.F. and Dahm, W.J.A. (1980) Evaluation of residual interference for adaptive wall wind tunnels, AEDC-PWT-LR-80-2, Arnold Engineering Development Center, Tullahoma, TN.

2. Fox, J.H. and Dahm, W.J.A. (1980) Analysis of separation phenomena associated with the AMRAAM missile at high angle of attack, AEDC-TMR-G-18, Arnold Engineering Development Center, Tullahoma, TN.

3. Dahm, W.J.A. (1981) A general solution for wind tunnel boundary induced interference in two-dimensional subsonic flow, M.S. Thesis, University of Tennessee Space Institute, Tullahoma, TN.

4. Dahm, W.J.A. (1985) Experiments on entrainment, mixing, and chemical reactions in turbulent jets at large Schmidt number, Ph.D. Dissertation, California Institute of Technology, Pasadena, CA.

5. Driscoll, J.F. and Dahm, W.J.A. (1988) Flame stability and characterization of swirl-stabilized flames, Technical Report No. GRI-88/0101, Gas Research Institute (GRI), Chicago, IL.

6. Driscoll, J.F. and Dahm, W.J.A. (1989) Flame stability and characterization of swirl-stabilized flames, Technical Report No. GRI-89/0104, Gas Research Institute (GRI), Chicago, IL.

7. Dahm, W.J.A., Tryggvason, G. and Krasny, R. (1990) A basic research model of gas combustion in turbulent flow, Technical Report No. GRI-90/0116, GRI, Chicago, IL.

8. Driscoll, J.F. and Dahm, W.J.A. (1990) Flame stability and characterization of swirl-stabilized flames, Final Report No. GRI-90/0115, GRI, Chicago, IL.

9. Dahm, W.J.A., Tryggvason, G. and Krasny, R. (1990) A basic research model of gas combustion in turbulent flow, Final Report No. GRI-90/0116, Gas Research Institute (GRI), Chicago, IL.

10. Dahm, W.J.A. (1990) High resolution measurements of strained diffusion layer structure and extinction in turbulent flows, AFOSR-TR-91-0111, Air Force Office of Scientific Research (AFOSR), Bolling AFB, D.C.

11. Dahm, W.J.A. (1990) Vortex sheet tailoring for aircraft wake signature reduction, DSSG Interim Report 90-9, Institute for Defense Analyses, Alexandria, VA.

12. Nosenchuck, D., Dahm, W.J.A. and Prince, T.A. (1990) The AS-IS concept: Deterrence and containment of high-threat tactical weapons with applications ranging from terrorists threats to carrier group vulnerability, DSSG Interim Report 90-5, Institute for Defense Analyses, Alexandria, VA.

13. Dahm, W.J.A. & Driscoll, J.F. (1991) Diffusion and reaction layer structure and NOx reduction in turbulent gas flames, Report No. 5087-260-1443, GRI, Chicago, IL.

14. Buch, K.A. & Dahm, W.J.A. (1991) Fine scale structure of conserved scalar mixing in turbulent shear flows: $Sc \gg 1$, $Sc \approx 1$ and Implications for Reacting Flows, Report No. 026779-5, The University of Michgian.

15. Dahm, W.J.A. (1991) High resolution measurements of strained diffusion layer structure

and extinction in turbulent flows, Final Report AFOSR-89-0541, Air Force Office of Scientific Research (AFOSR), Bolling AFB, D.C.

16. Nosenchuck, D.M. & Dahm, W.J.A. (1992) AS-IS: A satellite-based remote continuing authorization concept with application to control of naval strategic nuclear missiles and tactical weapons, IDA Report P-2783, Institute for Defense Analyses, Alexandria, VA.

17. Dahm, W.J.A. (1992) Micro-measurements of the structure and dynamics of high Reynolds number turbulence, Proceedings of the AFOSR Workshop on Microflows and Microdiagnostics, AFOSR, Bolling AFB, D.C.

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44. Dahm, W.J.A. (2011) Technology Horizons: A Vision for Air Force Science and Technology 2010-30. ISBN 978-1-58566-217-3, Air University Press, Air Force Research Institute, Maxwell AFB, AL, 209 pages.

45. Dahm, W., Butler, R., Cooke, N., Dominguez, C., Fall, K., Foster, R., Ghosh, A., Graybill, R., Harrison, G., Lardieri, P., Linderman, R., Muellner, G., Raparla, S., Schmidt, D. & Wallach, D. (2012) Cyber Situational Awareness. Vol. 1: Main Report, SAB-TR-12-01, USAF Scientific Advisory Board, Air Force Pentagon, D.C., 106 pp.

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53. Dixon, W., Mitzel, G., Dahm, W.J.A., Szymanski, J., Zacharius, S., Davis, C., Hoffman, D., How, J., Mavris, D., Melvin, W., Messner, W., Miles, R. & Solomon, M. (2016) Air Force Office of Scientific Research (AFOSR) Reivew, Air Force Scientific Advisory Board, Air Force Pentagon, D.C., 18 pages.

54. Muellner, G., Dahm, W.J.A., Stadter, P., Bear, M., Olson, K., Carlson, B., Rejto, S., McQueeney, D., McGinn, D., Gabreski, T., et al (2018) Maintaining Technology Superiority for the U.S. Air Force, SAB-TR-18-12, USAF Air Force Scientific Advisory Board, Air Force Pentagon, Washington, D.C., 214 pp. plus TS/SCI/SAP/SAR annexes.

55. Dahm, W.J.A., Muellner, G., Hoffman, D., Poste, G., Lewis, M., et al (2018) Business Modernization of the Air Force's Science and Technology Enterprise, Final Report to the Air Force Research Laboratory as part of the Air Force Science and Technology Strategy 2030, 39 pages.

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57. Choi, M., Simer, G., Dahm, W.J.A., Lyles, L., Tompkins, S., et al (2020) Future Air Force Vanguard Selection and Management Processes. SAB-TR-20-01, USAF Scientific Advisory Board, Air Force Pentagon, Washington, D.C., 78 pp.

Externally Sponsored Research Support:

1.	Flame Stability and Characterization of Swirl-Stabilized Flames (Co-Principal Investigator), Gas Research Institute (GRI), Contract No. 5087-260-1443, January 1986 – December 1989.	$492,580
2.	A Basic Research Model of Gas Combustion in Turbulent Flow - Phase I (Project Director and Co-Principal Investigator), Gas Research Institute (GRI), Contract No. 5088-260-1692, August 1988 – July 1990.	$244,988
3.	High Resolution Measurements of Strained Diffusion Layer Structure and Extinction in Turbulent Flows (Project Director and Principal Investigator), Air Force Office of Scientific Research (AFOSR), Grant No. 89-0541, September 1989 – August 1991.	$266,509
4.	Diffusion and Reaction Layer Structure and NOx Reduction in Turbulent Gas Flames (Project Director and Co-Principal Investigator), Gas Research Institute (GRI), Contract No. 5087-260-1443, January 1990 – December 1992.	$566,651
5.	A Basic Research Model of Gas Combustion in Turbulent Flow - Phase II (Project Director and Co-Principal Investigator), Gas Research Institute (GRI), Contract No. 5088-260-1692, August 1990 – July 1993.	$392,112
6.	A Basic Research Model of Gas Combustion in Turbulent Flow - Phase II Extension (Project Director and Co-Principal Investigator), Gas Research Institute (GRI), Contract No. 5088-260-1692, August 1993 – December 1995.	$ 68,816
7.	Fine Scale Structure of Vorticity and Scalar Fields in Turbulent Shear Flows (Co-Principal Investigator), Air Force Office of Scientific Research	$269,577

(AFOSR), August 1991 – September 1994.

8. Scalar Imaging Velocimetry Studies of Turbulent Flow Structure and Dynamics (Project Director and Principal Investigator), Air Force Office of Scientific Research (AFOSR) Grant No. 91-2953, October 1991 – September 1993. $153,264

9. High Resolution Measurements of Mixing and Reaction Processes in Turbulent Flows (Project Director and Principal Investigator), Air Force Office of Scientific Research (AFOSR) Grant No. 89-0541, October 1991 – September 1994. $227,079

10. Scaling of Burner Aerodynamics and Low NOx Properties over the Thermal Input Range from 30 kW to 12 MW; (Co-Principal Investigator), Gas Research Institute (GRI), January 1991 – June 1994. $175,549

11. Flame Structure and NOx Reduction Strategies for Natural Gas Burners (Project Director and Co-Principal Investigator), Gas Research Institute (GRI), August 1993 – July 1996. $697,399

12. A Real-Time Processor and Diagnostic Equipment for Closed Loop Control Experiment (Co-Principal Investigator), National Science Foundation (NSF), August 1993 – July 1994. $ 40,792

13. Flame-Vortex Interactions Imaged in Microgravity (Co-Principal Investigator), National Aeronautics and Space Administration (NASA), March 1994 – February 1997. $554,700

14. High Resolution Measurements of Mixing and Combustion in Supersonic Coflowing Turbulent Jets (Project Director and 75% Co-Principal Investigator), Air Force Office of Scientific Research (AFOSR) Grant No. F49620-95-1-0115, January 1995 – December 1997. $285,966

15. Flame Structure Measurements and Modeling: Developing Tools From Basic Research to Meet Gas Industry Needs (Project Director and Co-Principal Investigator), Gas Research Institute (GRI), January 1997 – December 1999 $580,138

16. High Resolution Measurements of Supersonic Shear Flow Mixing and Combustion (Project Director and Co-Principal Investigator), Air Force Office of Scientific Research (AFOSR), October 1997 – September 2000. $338,309

17. A High-Resolution Four-Dimensional Imaging Measurement System to Investigate Molecular Mixing in Gaseous Turbulent Shear Flows (Project Director and Principal Investigator), Defense University Research Instrumentation Program (DURIP), Air Force Office of Scientific Research (AFOSR) Equipment Grant, June 1997 – November 1997. $352,400

18. Electrokinetic Fluid Microactuators for Control of Vehicles (Project Director and 50% Co-Principal Investigator), Defense Advanced Research Projects Agency DARPA Contract No. F30602-98-2-0228, July 1998 – June 2001. $972,752

19. Advanced Modeling of Multiphase Flow Problems: Phase I (Co-Principal Investigator) Chevron Petroleum Technology Corp., January 2000 – December 2000. $99,814

20. Advanced Modeling of Multiphase Flow Problems: Phase IIa (Principal Investigator) Chevron Petroleum Technology Corp., January 2001 – December 2001. $49,791

21. Turbulent Flame Processes via Vortex Ring Interactions with a Diffusion Flame (Project Director and Principal Investigator), National Aeronautics and Space Administration (NASA), October 1998 – September 2002. $386,184

22. Obtaining Species Concentration Measurements Using Diode Laser Spectroscopy in a Reacting Vortex Ring by the Novel ITAC Method (Project Director and Principal Investigator), National Aeronautics and Space Administration (NASA), GSRP, July 2001 – June 2004. $70,000

23. Micro Internal Combustion Swing Engine (MICSE) for Portable Power Generation (Project Director and 50% Principal Investigator), Defense Advanced Research Projects Agency (DARPA) Defense Sciences Office (DSO) Award No. MDA972-01-1-0031, June 2001 – August 2004. $3,336,716

24. Advanced Modeling of Multiphase Flow Problems: Phase IIb (Principal Investigator) Chevron Petroleum Technology Corp., January 2002 – December 2002. $64,865

25. Fuel Processors for Polymer Electrolyte Membrane (PEM) Fuel Cells (15% Co-Principal Investigator), Department of Energy (DOE), November 2001 – December 2005. $5,937,184

26. Third Generation Reusable Space Vehicle (10% Co-Principal Investigator), National Aeronautics and Space Administration (NASA), September 1, 2002 – August 31, 2007. $8,315,284

27. Chemically-Passive Suppression of Premixed Flames in Spacecraft Environments at Microgravity (Project Director and Principal Investigator), National Aeronautics and Space Administration (NASA) Grant No. NNC04GA08G, November 2003 – September 2007. $369,994

28. Chemically-Passive Suppression of Nonpremixed Flames in Spacecraft Environments at Microgravity (Project Director and Principal Investigator), National Aeronautics and Space Administration (NASA) Grant No. NAG3041878, March 2004 – November 2007. $448,830

29. Improved Modeling of Oblique Shock Boundary Layer Interaction (15% Co-Principal Investigator), U.S. Air Force Research Laboratories (AFRL) Award No. FA8650-06-2-3625, April 2006 – April 2010. $2,250,000

30. PLIF Experiments on Entrainment and Mixing Processes in PAC Mixing Chambers (Project Director and Principal Investigator), Praxair Corporation, Research Agreement DRDA 07-4679, May 2007 – August 2008 $96,889

31. A Novel High-Resolution Particle Image Velocimetry Measurement Database for Shock-Boundary Layer Interaction (SBLI), (Project Director and Principal Investigator), U.S. Air Force Research Laboratories (AFRL) Award No. FA8650-06-2-3625, May 2007 – February 2008. $198,680

32. Fully-Characterized Experimental Database at the Injector Unit Physics $340,000

Level. Part B: Flow Field Measurements. (Project Director and Principal Investigator) National Aeronautics and Space Administration (NASA), October 2007 – September 2010.

33. Aerospace and Defense Research Collaboratory (ADRC), (Co-Director), Science Foundation Arizona (SFAz), January 2011 – December 2011. $1,000,000

34. Pracademic Center of Excellence for Technology Transition (PACE/T2), (Co-Principal Investigator) Assistant Secretary of Defense (Research & Engineering) ASD(R&E), Pentagon, January 2014 – April 2016. $1,600,000

35. Air Force S&T Strategy 2030 (Principal Investigator) Air Force Defense Research Sciences Conference and Workshop Support, Air Force Office of Scientific Research Award No. FA9550-18-1-0164, April-August 2018. $62,550

Research Supervision:

- **Post-Doctoral Research Supervision**

1. Zhuang, M., Post-Doctoral Associate, University of Michigan, August 1990 - August 1992, Topic: "Modeling of NOx Formation in Turbulent Gas Flames."

2. Buch, K.A., Post-Doctoral Associate, University of Michigan, August 1991 - December 1991, Topic: "Reacting Flow Measurements of Conserved Scalars."

3. Southerland, K.B., Post-Doctoral Associate, University of Michigan, June 1994 – August 1994, Topic: "Experimental Assessment of Taylor's Hypothesis and its Applicability to Dissipation Estimates in Turbulent Flows."

4. Su, L., Post-Doctoral Associate, University of Michigan, January 1995 – present, Topic: "Scalar Imaging Velocimetry Measurements of Dissipative Scale Structure in Turbulent Flows."

5. Brusstar, M., Post-Doctoral Associate, University of Michigan, June 1995 – present, Topic: "Imaging Measurements of Dissipative Scale Structure in Gaseous Turbulent Flows."

6. Frederiksen, R.., Post-Doctoral Associate, University of Michigan, May 1996 – November 1996, Topic: "Multifractal Scale Similarity in Turbulent Flows."

7. Saeed, M., Post-Doctoral Associate, University of Michigan,Co-Supervised with G. Tryggvason, September 1996 – 1999, Topic: "Three-Dimensional Extension of the LIM Code."

8. Hsieh, A., Post-Doctoral Associate, University of Michigan, January 1997 – August 1997, Topic: "Experiments on Compressibility Effects in Turbulent Combustion."

9. Saeed, M., Post-Doctoral Associate, University of Michigan,Co-Supervised with G. Tryggvason, September 1996 – December 1999, Topic: "Three-Dimensional Extension of the LIM Code."

10. Chen, S.-J., Post-Doctoral Associate, University of Michigan, August 2000 – May 2001, Topic: "DLS and LII Measurements in Vortex Ring-Diffusion Flame Interaction."

11. Mayor, J.R., Post-Doctoral Associate, University of Michigan, Co-Supervised with J. Ni,

September 2001 – February 2004, Topic: “Micro Internal Combustion Swing Engine.”

12. Sangras, R., Post-Doctoral Associate, University of Michigan, July 2002 – June 2003, Topic: “Microcombustors and Microvaporizers.”

13. Burton, G.C., Post-Doctoral Associate, University of Michigan, May 2003 – August 2003, Topic: “Subgrid Scale Modeling of Turbulent Flows.”

14. Diez-Garias, F.J., Post-Doctoral Associate, University of Michigan, May 2002 – May 2005, Topic: “Buoyancy Effects in Exothermic Reacting Turbulent Jets and Plumes.”

15. Lee, K., Post-Doctoral Associate, University of Michigan, January 2005 – August 2005, Topic: “Heavy-Gas Effects in Droplet Breakup via SF6 Shock Tube Experiments.”

16. Shebl, K.M.., Visiting Scholar, University of Michigan, January 2005 – December 2005, Topic: “Experiments Study of Suppressant Effects on Critical Strain Rates in Strained Laminar Diffusion Flames.”

17. Mullin, J.A., Post-Doctoral Associate, University of Michigan, March 2004 – August 2004, Topic: “Analyses of DSPIV Data from a Turbulent Shear Flow.”

18. Qiao, L., Post-Doctoral Associate, University of Michigan, March 2007 – May 2007, Topic: “Further Experiments on Near-Limit Propagation of Spherical Premixed Flames.”

19. Nagel, Z., Post-Doctoral Associate, University of Michigan, October 2007 – February 2008, Topic: “Supersonic PIV Measurements of Shock-Boundary Layer Interactions.”

20. Kshitij, A., Post-Doctoral Associate, Arizona State University, April 2019 – May 2020, Topic: “A Priori Testing Autonomic Closure in Near-Wall Turbulence.”

- **Doctoral Degree Research Supervision**

1. Buch, K.A., June 1987 - August 1991, Topic: “Fine Scale Structure of $Sc \gg 1$ and $Sc \approx 1$ Molecular Mixing in Turbulent Flows.” Ph.D. degree awarded August 1991; Chair.

2. Chang, C.H.H., September 1988 - February 1993, Topic: “Lagrangian Model Simulation of Mixing and Chemical Reactions in Turbulent Flows.” Ph.D. degree awarded May 1993; Co-chair.

3. Southerland, K.B., January 1989 - June 1994, Topic: “Four-Dimensional Measurements of Conserved Scalar Mixing in Turbulent Shear Flows.” Ph.D. degree awarded May 1994; Chair.

4. Su, L.K., June 1990 - January 1995, Topic: “Scalar Imaging Velocimetry: Development and Application to Measurements of Fine Structure in Turbulent Flows.” Ph.D. degree awarded May 1995; Chair.

5. Bish, E.S., September 1991 – June 1996, Topic: “A New Model for Nonequilibrium Mixing-Chemistry Coupling in Non-Premixed and Partially Premixed Turbulent Combustion.” Ph.D. degree awarded May 1996; Chair.

6. Frederiksen, R.D., September 1991 – June 1996, Topic: “Experimental Assessment of Fractal and Multifractal Scale Similarity in Turbulent Flows.” Ph.D. degree awarded May 1996; Co-chair.

7. Suresh, N.C., August 1992 – present, Topic: "Local Integral Method Simulations of Reacting Flows in Axisymmetric and Swirling Flows." Ph.D. degree awarded December 1996; Co-chair.

8. Hsieh, A., April 1993 – May 1997, Topic: "Aerodynamics and NOx Emissions Scaling in Natural Gas Burners from 30 kW to 12 MW." Ph.D. degree awarded May 1997; Co-chair.

9. Sbeih, K., May 1987–September 1990; January 1998 - May 2000, Topic: "Vortex Sheet Modeling of High Reynolds Number Shear Layers." Ph.D. degree awarded May 2000; Co-chair.

10. Chen, S.-J., September 1995 – May 2000, Topic: "Microgravity Combustion in a Vortex-Diffusion Flame", Ph.D. degree awarded May 2000; Chair.

11. Tacina, K., September 1995 – August 2000, Topic: "Development and Application of Whole-Field Scalar Imaging Velocimetry in Turbulent Flows", Ph.D. degree awarded August 2000; Chair..

12. Nakagawa, M., September 1996 – December 2000, Topic: "Effects of Compressibility on Turbulent Combustion", Ph.D. degree awarded May 2001; Chair.

13. Diez-Garias, J., September 1997 – December 2002, Topic: "Electrokinetic Microactuator Arrays for Active Sublayer Control of Turbulent Boundary Layers", Ph.D. degree awarded May 2002; Chair.

14. Burton, G., August 1999 – May 2003, Topic: "A Multifractal Subgrid Scale Model for Large-Eddy Simulation of Turbulent Flows", Ph.D. degree awarded May 2003; Chair. (This dissertation was awarded the Rackham Distinguished Dissertation Award.)

15. Mullin, J.A., January 1999 – March 2004, Topic: "An Experimental Study of Velocity-Gradient Fields at Quasi-Universal Intermediate and Small Scales of Turbulent Flows Using Frequency-Based Dual-Plane Stereo Particle Image Velocimetry", Ph.D. degree awarded May 2004; Chair.

16. Gu, Y., September 2001 – December 2005, Topic: "Gasdynamic Simulations and Optimization of a Rotary Oscillating Inductive Generator for Micro Air Vehicle Power Systems", Ph.D. Committee Chair.

17. Stock, M.J., September 2000 – April 2006, Topic: "Vortex Sheet Modeling of Multiphase Flows", Ph.D. Committee Chair.

18. Kaganovskiy, L. September 2000 – April 2006, Topic: "Vortex Blob Modeling of Fluid Flows" (Applied & Interdisciplinary Mathematics Program), Ph.D. Committee Co-Chair (with Professor R. Krasny, Mathematics Department).

19. Szwalek, J., January 2005 – December 2006, Topic: "Scale-by-Scale Analyses of Approach to Isotropy in DSPIV Data from Turbulent Shear Flows", Ph.D. Committee, Chair.

20. Qiao, L., Janaury 2005 – March 2007, Topic: "Effects of Chemically-Passive Fire Suppressants on Premixed Flames in Normal and Microgravity", Ph.D. degree awarded May 2007; Chair.

21. Benjamin, A.G., September 2001 – December 2009, Topic: "Electromagnetic Simulations and Optimization of a Rotary Oscillating Inductive Generator for Micro Air

Vehicle Power Systems", Ph.D. Committee Chair.

22. Nagel, Z., September 2002 – October 2007, Topic: "PIV Measurements of Mixing-Chemistry Coupling in Turbulent Reacting Flows", Ph.D. degree awarded October 2007; Chair.

23. Lapsa, A., September 2003 – February 2009, Topic: "Experimental Study of Passive Ramps for Control of Shock-Boundary Layer Interactions", Ph.D. degree awarded February 2009; Chair.

24. Hamlington, P.E., September 2004 – July 2009, Topic: "Physics-Based Turbulence Anisotropy Closure Including Nonlocal and Nonequilibrium Effects in Turbulent Flows", Ph.D. degree awarded July 2009; Chair.

25. Moradi, A., May 2014 – December 2015, Topic: "Scaling Laws for Reacting Rayleigh-Taylor Driven Turbulence", Ph.D Committee, Chair.

26. Kshitij, A., May 2015 – April 2019, Topic: "Accurate and Efficient Autonomic Closure for Turbulence Simulations", Ph.D Committee, Chair.

27. Stallcup, E., August 2016 – December 2020, Topic: "Accuracy and Computational Stability of Tensorally-Correct Subgrid Stress and Scalar Flux Representations in Autonomic Closure of LES", Ph.D Committee, Chair.

28. Torres, E., August 2017 – May 2022, Topic: "Rational Boolean Stabilization of Subgrid Models in Large Eddy Simulations", Ph.D. Committee Chair.

- **Doctoral Dissertation Committees**

1. Woodruff, S., "A Singular Perturbation Analysis of the Weakly Nonlinear Evolution of Long and Short Water Waves and Waves in Boundary Layers," Ph.D. Thesis, 1987, Professor A.F. Messiter, Chairman.

2. Chen, R.-H., "Swirl-Stabilized Flames: Fluid Dynamics, Mixing, and Flame Stability Limits," Ph.D. Thesis, 1988, Professor J.F. Driscoll, Chairman.

3. Yang, M.-H., "Unsteady Group Behavior of Droplet Clouds in Swirling Flows," Ph.D. Thesis, 1989, Professor M. Sichel, Chairman.

4. Rao, A.R., "A Taxonomy for Texture Description and Identification," Ph.D. Thesis, 1989, Professor R.C. Jain, Chairman.

5. Feikema, D.A., "Combustion Stability Limits and Planar Imaging of Swirl-Stabilized Flames," Ph.D. Thesis, 1990, Professor J.F. Driscoll, Chairman.

6. Hwang, J.-L., "Experimental Study of Turbulent Pipe Flow when Subjected to Forced Transients," Ph.D. Thesis, 1992, Professor G. Brereton, Chairman.

7. Buch, K., "Fine Scale Structure of Conserved Scalar Mixing in Turbulent Shear Flows: $Sc \gg 1$ and $Sc \approx 1$," Ph.D. Thesis, 1991, Professor W. Dahm, Chairman.

8. Roberts, W., "A Premixed Laminar Flame Interacting with a Vortex Resulting in Flame Stretch and Quenching," Ph.D. Thesis, 1992, Professor J.F. Driscoll, Chairman.

9. Nitsche, M., "Axisymmetric Vortex Dynamics Calculations," Ph.D. Thesis, 1992,

Professor R. Krasny, Chairman.

10. Chang, C.H.H., "Lagrangian Model Simulation of Mixing and Chemical Reactions in Turbulent Flows," Ph.D. Thesis, 1993, Professor W. Dahm, Co-Chairman.

11. Ansari, A., "Intermittent Fine Scale Structure of Vorticity and Dissipation Fields in Turbulent Shear Flows," Ph.D. Thesis, 1993, Professor R. Akhavan, Chairman.

12. Yoon, Y., "Nitric Oxide Levels and Stability Limits of Subsonic and Supersonic Jet Diffusion Flames," Ph.D. Thesis, 1993, Professor J.F. Driscoll, Chairman.

13. Chen, Chao-Yi, "Interaction Between Free-Surface and Turbulence," Ph.D. Thesis, July 1994, Professor L. Bernal, Chairman.

14. Everest, D., "Temperature Imaging in a Turbulent Diffusion Flame," Ph.D.Thesis, August 1994, Professor J. Driscoll, Chairman.

15. Southerland, K., "Four-Dimensional Measurements of Conserved Scalar Mixing in Turbulent Shear Flows," Ph.D. Thesis, December 1994, Professor W. Dahm, Chairman.

16. Dai, Z.-T., "Experiments on Similarity Structure of Turbulent Buoyant Plumes," Ph.D. Thesis, January 1995, Professor G. Faeth, Chairman.

17. Su, L., "Scalar Imaging Velocimetry: Development and Application to Measurements of the Structure and Dynamics of Turbulent Flow," Ph.D. Thesis, January 1995, Professor W. Dahm, Chairman.

18. Scherer, J., "Whole Field Velocimetry in a Turbulent Free Surface Jet," Ph.D. Thesis, April 1995, Professor L. Bernal, Chairman.

19. Bish, E.S., "A New Model for Nonequilibrium Mixing-Chemistry Coupling in Non-Premixed and Partially Premixed Turbulent Combustion," Ph.D. Thesis, May 1996, Professor W. Dahm, Chairman.

20. Frederiksen, R.D., "Experimental Assessment of Fractal and Multifractal Scale Similarity in Turbulent Flows," Ph.D. Thesis, May 1996, Professor W. Dahm, Co-Chairman.

21. Hsieh, A., "A New Scaling Methodology for NOx Emissions Performance of Gas Burners and Furnaces," Ph.D. Thesis, May 1996, Professor W. Dahm, Co-Chairman.

22. Suresh, N.C., "A Local Integral Moment Method to Simulate Flow, Mixing, and Chemistry in Complex Flows" Ph.D. Thesis, May 1996, Professor W. Dahm, Co-Chairman.

23. Mueller, C.J., "Generation and Attenuation of Vorticity During Premixed Flame-Vortex Interaction," Ph.D. Thesis, 1996, Professor J. Driscoll, Chairman.

24. Juric, D., "Computations of Phase Change," Ph.D. Thesis, 1996, Professor G. Tryggvason, Chairman.

25. Huh, H., "Shock Wave Enhancement of the Mixing and Stability Limits of Supersonic Hydrogen-Air Flames," Ph.D. Thesis, 1996, Professor J. Driscoll, Chairman.

26. Han, J., "Numerical Studies of Drop Motion in Axisymmetric Geometry" Ph.D. Thesis, 1997, Professor G. Tryggvason, Chairman.

27. Maksimovic, P., "Vortex Ring Interactions with Contact Surfaces Between Immiscible Fluids," Ph.D. Thesis, 1997, Professor L. Bernal, Chairman.

28. Bryant, R.., "Planar Laser Induced Fluorescence Images of Fuel Mixing and Reaction Zones in a Supersonic Combustor," Ph.D. Thesis, 1998, Professor J. Driscoll, Chairman.

29. Myhr, F., "Nitric Oxide Production Rate Measurements in Flames by Simultaneous Optical Measurement of Temperature and Oxygen Atom Concentration," Ph.D. Thesis, 1998, Professor J. Driscoll, Chairman.

30. Donbar, J., "Reaction Zone Structure and Velocity Measurements in Turbulent Nonpremixed Jet Flames," Ph.D. Thesis, 1998, Professor J. Driscoll, Chairman.

31. Yonak, S., "Characterization and Matched-Field Processing Localization of Photoacoustic Signals," Ph.D. Thesis, 1999, Professor D. Dowling, Chairman.

32. Sbeih, K., "Vortex Sheet Modeling of High Reynolds Number Shear Layers", Ph.D. Thesis, 2000, Professors W. Dahm and G. Tryggvason, Co-Chairman.

33. Chen, S.J., "Experimental and Computational Study of the Coupling Bteween Fluid Dynamics and Combustion in a Diffusion Flame Vortex Ring Interaction," Ph.D. Thesis, 2000, Professor W. Dahm, Chairman.

34. Mijit, K. "Design, Analysis and Experimentation of a Micro Internal Combustion Swing Engine" Ph.D. Thesis, 2000, Professor J. Ni, Chairman.

35. Ratner, A. "Highly Turbulent Combustion: A Study of Lifted and Shredded Flames" Ph.D. Thesis, 2001, Professor J. Driscoll, Chairman.

36. Tacina, K., "Development and Application of Whole-Field Scalar Imaging Velocimetry in Turbulent Flows" Ph.D. Thesis, 2001, Professor W. Dahm, Chairman.

37. Nakagawa, M., "Effects of Compressibility on Turbulent Combustion" Ph.D. Thesis, 2001, Professor W. Dahm, Chairman.

38. Diez-Garias, J., "Electrokinetic Fluid Microactuators for Controlling the Viscous Sublayer of Turbulent Boundary Layers" Ph.D. Thesis, 2002, Professor W. Dahm, Chairman.

39. Aalborg, C., "Numerical Simulations of Primary Breakup of Liquid Jets in Crossflow" Ph.D. Thesis, 2002, Professors G. Faeth and B. van Leer, Co-Chairmen.

40. Tauber, W., "High Reynolds Number Measurements of Separated Flows" Ph.D. Thesis, 2002, Professors G. Tryggvason and S. Ceccio, Co-Chairmen.

41. Stojkovich, B. "Development and Application of a Time and Space Resolved Optical Diagnostic for Soot Temperature and Concentration in a Spark-Ignited Direct-Injection Engine" Ph.D. Thesis (Mechanical Engineering), 2003, Professor V. Sick, Chairman.

42. Burton, G., "A Multifractal Subgrid Scale Model for Large-Eddy Simulation of Turbulent Flows" Ph.D. Thesis, 2003, Professor W. Dahm, Chairman.

43. Bourgoyne, D.A. "PIV Measurements of High-Reynolds Number Turbulent Boundary Layers" Ph.D. Thesis (Mechanical Engineering), 2003, Professor. S. Ceccio, Chairman.

44. Mullin, J.A., ""An Experimental Study of Velocity-Gradient Fields at Quasi-Universal

Intermediate and Small Scales of Turbulent Flows Using Frequency-Based Dual-Plane Stereo Particle Image Velocimetry" Ph.D. Thesis (Aerospace Engineering), 2004, Professor W. Dahm, Chairman.

45. Sanders, W., "Bubble Drag Reduction in a Flat Plate Boundary Layer at High Reynolds Number and Large Scales" Ph.D. Thesis, 2004, Professors S. Ceccio and D. Dowling, Co-Chairmen.

46. Funk, C., "PIV Measurements of In-Cylinder Turbulence in an Internal Combustion Engine" Ph.D. Thesis, 2005, Professor V. Sick, Chairman.

47. Sutton, J., "Combined Acetone and NO PLIF for Quantitative Measurement of Temperature and Scalar in a Turbulent Diffusion Flame", Ph.D. Thesis (Aerospace Engineering), Professor J. Driscoll, Chairman.

48. Lee, H.-S. "Computational and Rheological Studies of Organic Deposition in Off-Shore Pipelines", Ph.D. Thesis (Chemical Engineering), in progress, Professor S. Fogler, Chairman.

49. Tadd, A. "Catalysts for AutoThermal Reformers in Fuel Cell Fuel Processors" Ph.D. Thesis (Chemical Engineering), 2005, Professor J. Schwank, Chairman.

50. Gu, Y. "Gasdynamic Modeling and Optimization of a Mesoscale Internal Combustion Swing Engine/Generator System", Ph.D. Thesis (Aerospace Engineering), 2005, Professor W.J.A. Dahm, Chairman.

51. Stock, M.J. "A Regularized Inviscid Vortex Sheet Method for Three Dimensional Flows with Density Interfaces", Ph.D. Thesis (Aerospace Engineering), 2006, Professor W.J.A. Dahm, Chairman.

52. Rasmussen, C. "Experimental Investigation of Cavity-Stabilization of Premixed Combustion". Ph.D. Thesis (Aerospace Engineering), 2006, Professor J.F. Driscoll, Chairman.

53. Kaganovskiy, L. "Vortex Blob Modeling of Fluid Flows" Ph.D. Thesis (Applied & Interdisciplinary Mathematics Program), 2006, Professor W.J.A. Dahm, Co-Chairman (with Professor R. Krasny, Mathematics Department).

54. Szwalek, J., "Scale-by-Scale Analyses of Approach to Isotropy in DSPIV Data from Turbulent Shear Flows", Ph.D. Thesis (Naval Architecture and Marine Engineering), 2006, Professor W.J.A. Dahm, Co-Chairman (with Professor Robert Beck, Naval Architecture and Marine Engineering Department).

55. Hamosfakidis, V. "Effect of Gas Exchange Processes and Mixing on Homogeneous Charge Compression Ignition" Ph.D. Thesis, 2006, Professor D. Assanis, Chairman.

56. Qiao, L. "Effects of Chemically-Passive Fire Suppressants on Premixed Flames in Normal and Microgravity", Ph.D. Thesis (Aerospace Engineering), 2007, Professor W.J.A. Dahm, Co-Chairman (with Dr. Elaine Oran, Naval Research Laboratory).

57. Feng, H. "Vortex Sheet Simulations of 3D Flows Using an Adaptive Triangular Panel/Particle Method", Ph.D. Thesis (Applied Mathematics), 2007, Professor R. Krasny, Chairman.

58. Nagel, Z., "PIV Measurements of Mixing-Chemistry Coupling in Turbulent Reacting Flows", Ph.D. Thesis (Aerospace Engineering), 2007, Professor W.J.A. Dahm,

Chairman.

59. Zhu, H., “Design, Modeling and Control of Micro Internal Combustion Swing Engine (MICSE)-Based Hybrid Power System”, Ph.D. Thesis (Mechanical Engineering), 2007, Professor J. Ni, Chairman.

60. Fajardo, C., “In-Cylinder PIV Measurements in a Port-Injected IC Engine”, Ph.D. Thesis (Mechanical Engineering), 2007, Professor V. Sick, Chairman.

61. Peterson, B. “Development and Validatation of an Ignition Model for a Spray-Guided Direct-Injection Spark-Ignition Engine under Stratified Operation”, Ph.D. Thesis (Mechanical Engineering), 2008, Professor V. Sick, Chairman.

62. Steinberg, A.M., “The Dynamics of Turbulent Premixed Flames: Mechanisms and Models for Turbulence-Flame Interaction”, Ph.D. Thesis (Aerospace Engineering) 2009, Professors J.F. Driscoll and S. L. Ceccio, Co-Chairmen.

63. Benjamin, A.G., “Electromagnetic Simulations and Optimization of a Rotary Oscillating Inductive Generator for Micro Air Vehicle Power Systems”, Ph.D. Thesis (Aerospace Engineering), Professor W.J.A. Dahm, Chairman.

64. Lapsa, A., ““Experimental Study of Passive Ramps for Control of Shock-Boundary Layer Interactions”, Ph.D. Thesis (Aerospace Engineering), 2009, Professor W.J.A. Dahm, Chairman.

65. Hamlington, P.E., “DNS Analyses of Nonequilibrium Vorticity Dynamics and Implications for Reynolds Stress Modeling in Turbulent Shear Flows”, Ph.D. Thesis (Aerospace Engineering), 2009, Professor W.J.A. Dahm, Chairman.

66. Harding, E.C., “Observations of Shear Flows in High-Energy Density Plasmas” Ph.D. Thesis (Applied Physics), 2010, Professor R.P. Drake, Chairman.

67. Khoshlessan, M., “Numerical Simulation of Flow in a Solar Receiver” Ph.D. Thesis (Mechanical Engineering), in progress, Professor Y. Peet, Chairman.

68. Cherukuru, N., “Doppler LIDAR Measurements of Atmospheric Turbulence” Ph.D. Thesis (Mechanical Engineering), 2017, Professor R. Calhoun, Chairman.

69. Bhaskaran, S., “Utilization of Subgrid Models for Enhanced Measurements of Atmospheric Turbulence Using LIDAR” Ph.D. Thesis (Mechanical Engineering), 2018, Professor R. Calhoun, Chairman.

70. Kshitij, A., “Accurate and Efficient Autonomic Clousre for Turbulence Simulations” Ph.D. Thesis (Mechanical Engineering), 2019, Professor W.J.A. Dahm, Chairman.

71. An, K., “Innovative Approach to Spray Atomization Measurements” Ph.D. Thesis (Mechanical Engineering), in progress, Professor T. Lee, Chairman.

72. Khoshlessan, M., “Machine Learning Algorithms to Detect Slow Degrees of Freedom in Molecular Dynamics Simulations”, in progress, Professor O. Beckstein, Chairman.

73. Kedelty, D., “A Dual-Scale Subgrid Closure for LES of Phase Interfaces in Turbulent Flows”, in progress, Professor M. Herrmann, Chairman.

74. Goodrich, A., “A Dual Scale Approach to Modeling Hydrodynamic Instabilities on a

Phase Interface", 2023, Professor M. Herrmann, Chairman.

75. Stallcup, E., "Accuracy and Computational Stability of Tensorally-Correct Subgrid Stress and Scalar Flux Representations in Autonomic Closure of LES", Ph.D. Thesis, 2020, Professor W.J.A. Dahm, Chairman.

76. Torres, E. "Rational Boolean Stabilization of Subgrid Models in Large Eddy Simulations", Ph.D. Thesis, 2022, Professor W.J.A. Dahm, Chairman.

77. Rajagopalan, S., "Theoretical Investigation of Gas Flow Hollow Cathode Sputtering for Integrated Circuit Deposition", in progress, Professor P. Mikellidis, Chairman.

78. Dave, H., "Volume-Filtered Framework for Immersed Boundaries and Two-Phase Flows", in progress, Professor M. Kasbaoui, Chairman.

79. Greenlee, B. "Primary Atomization Modeling and Generalization of Atomization Criteria via Integral Formulation for Drop Size and Viscous Dissipation Effect", in progress, Professor T. Lee, Chairman.

80. Ratnayake, S. "New Approaches to Direct Wing Shape Synthesis using Potential Flow Solvers", in progress, Professor T. Takahashi, Chairman.

81. Kompally, K. "PLIF and PIV Measurements of Particle-Laden Jet Mixing", in progress, Professor G. Pathikonda, Chairman.

- **Master of Science Research Supervision**

1. Scheil, C.M., June 1986 - December 1988, Topic: "Dynamics of Vortex Interaction with a Density Interface," published in J. Fluid Mech., Vol. 205, pp. 1 - 43, 1989. Degree awarded August 1991.

2. Mayman, A.G., April 1986 - December 1987, Topic: "Blowout Limits of Turbulent Jet Diffusion Flames for Arbitrary Source Conditions," published in AIAA J, Vol. 28, No. 7, pp. 1157 - 1162, 1990. Degree awarded December 1987.

3. Praiss, O., June 1986 - September 1987, Topic: "Design and Construction of a Gravity Driven Bernoulli Tunnel." Degree awarded September 1987.

4. Tangri, R.K., August 1988 - December 1989, Topic: "Mixing and Chemical Reaction Experiments in an Axisymmetric Coflowing Turbulent Jet." Degree awarded December 1989.

5. Younis, H., August 1988 - June 1989, Topic: "Modeling of Vorticity and Species in Reacting Turbulent Flows." Degree awarded December 1989.

6. Da Costa, C., May 1990 - August 1991, Topic: "Three-Dimensional Graphics Visualization of Imaging Data from Turbulent Flows." Degree awarded August 1991.

7. Taeibi-Rahni, M., May 1990 - August 1991, Topic: "Time-Local Optimal Control of Mixing in Complex Flows," presented at 1990 APS Fluid Dynamics Meeting. Degree awarded August 1991.

8. Eriksen, R., September 1991 – August 1993, Topic: "Fully-Resolved Four-Dimensional Imaging Measurements of Sc » 1 Conserved Scalar Fields in Turbulent Flows." Degree awarded August 1991. Degree awarded December 1992.

9. Frank, B., September 1993 – December 1994, Topic: "Rayleigh Scattering Measurements of Gas-Phase Mixing in Turbulent Flows." Degree awarded December 1994.

10. Anderson, S., January 1995 – September 1995, Topic: "Experimental Study of Vortex – Diffusion Flame Interactions in Microgravity." Degree awarded December 1995.

11. Yagoda, E., Januar 1995– August 1996, Topic: "Compressibility Effects on Turbulent Reacting Shear Flows." Degree awarded August 1996.

12. Lee, C., November 1996 – May 1998, Topic: "Laboratory Experiments on a Reacting Flow with pH-Sensitive Laser Induced Fluorescence".

13. Murray, J.C. "RANS-Based Modeling of High-Speed Propulsion Systems" September 2003 – May 2004, co-advised with Prof. Powell.

14. Dhanuka, S., September 2003 – December 2004, Topic: "Microcombustors and Microvaporizers for Fuel Cell Gasoline Fuel Processors".

15. Jewell, J., September 2004 – May 2005, Topic: "Drop Size Measurements and Atomization Performance of High-Speed Rotary Centrifugal Atomizers".

16. Abdilghanie, A., January 2005 – December 2005, Topic: "OPPDIF Calculations of Chemically-Passive Fire Suppressant Effects on Opposed-Flow Diffusion Flames."

17. Lapsa, A., September 2004 – December 2005, Topic: "Integrated Flash-Based Microcombustors and Microvaporizers for Fuel Cell Gasoline Fuel Processors".

18. Hamlington, P., September 2004 – December 2005, Topic: "Scale-by-Scale Analyses of Approach to Isotropy in DSPIV Data from Turbulent Shear Flows".

19. Marr, K.C., September 2005 – April 2006, Topic: "Radical Species Profiles of Selected Chemical Agents in an Opposed-Flow Diffusion Flame".

20. Hanke, J., August 2006 – April 2007, Topic: "Improved RANS Modeling of Oblique Shock Interaction with a Turbulent Boundary Layer".

21. Lydecker, J.D., September 2007 – December 2007, Topic: "PLIF Visualizations of Flow and Mixing Processes in a PAC Mixing Chamber."

22. Soimakallio, A., January 2008 – May 2008, Topic: "Scalings Laws for Turbulent Jets in Crossflow."

23. Xue, N., May 2008 – August 2008, Topic: "Experimental Simulations of Flow and Mixing Processes in a PAC Mixing Chamber."

24. Dahm, W.K., January 2013 – May 2014, Topic: "Experimental Assessment of a Novel Approach for Helicopter Blade-Vortex Interaction Noise Reduction."

25. Sun, B., January 2013 – May 2014, Topic: "Understanding Origins of Helicopter Blade-Vortex Interaction Noise."

26. Martinjako, J., January 2014 – April 2014, Topic: "Low-Cost Gas Turbine Off-Design Prediction Technique."

27. Testerman, K., February 2014 – December 2014, Topic: “Acoustic Measurements of Blade-Vortex Interactions from Helicopter Rotors.”

28. Cook, R., January 2015 – December 2015, Topic: “Functional Modeling of Advanced Gas Turbine Propulsion Systems”.

29. Ahlf, R., August 2015 – April 2016, Topic: “High-Sensitivity Measurements of Blade-Vortex Interactions from Helicopter Rotors”, ASU Barrett Honors thesis.

30. Sonneveldt, B., August 2015 – May 2016, Topic: “High-Fidelity Modeling of Acoustic Resonances in Ducts.” MS degree awarded; Chair.

31. Vorsanger, C., May 2016 – December 2016, Topic: “Understanding the Dynamics of Aliasing, De-Aliasing, and Backscatter Limiting in Large Eddy Simulations.” MS degree awarded; Chair.

32. Narayana Perumal, S., May 2016 – December 2016, Topic: “Comparing Self-Similar Profiles of First- and Second-Order Turbulence Statistics in Turbulent Shear Flows.” MS degree awarded; Chair.

33. Ramesh, R., May 2016 – December 2016, Topic: “Accurate Determination of Scaling Constants in Similarity Scaling Laws for Turbulent Shear Flows.” MS degree awarded; Chair.

34. Nagarajan, V., March 2016 – December 2016, Topic: “Simulating Flow and Combustion in Hybrid Rocket Engines.” MS degree awarded; Chair.

35. Bernaud, R., August 2016 – April 2017, Topic: “Monatomic Gas Effects on Brayton Cycle Propulsion and Power Systems.” MS degree awarded; Chair.

36. Sivakumar, S., June 2017 – May 2018, Topic: “A Critical Examination of the Bardina Scale-Similarity Model for Large Eddy Simulations”; MS degree awarded; Chair.

37. Chengalrayan, S., August 2018 – April 2019, Topic: “Assessing the Accuracy of the Patched Conics Approximation in Orbital Dynamics”, MS degree awarded; Chair.

38. Thompson, E., August 2018 – April 2019, Topic: “Equilibrium Chemistry Calculations to Evaluate Effects of Monatomic Propellant Additives on Rocket Engine Performance”, MS degree awarded; Chair.

39. Jariwala, A., January 2019 – April 2019, Topic: “Quantifying Effects of Monatomic Propellant Additives on Rocket Engine Performance”, MS degree awarded; Chair.

40. Khalid, A., May 2019 – June 2019, Topic: “Low Temperature Soot Regime of Propane in a Micro Flow Reactor with Controlled Temperature Profile”, MS degree awarded August 2019; Committee Member.

41. Meiers, M., May 2019 – Dec 2020, Topic: “A Physics-Based Model for Temperature Dependent Specific Heat of Any Gas”, MS degree awarded December 2020; Chair.

42. White, D., September 2019 – May 2020, Topic: “Analyzing the Effects of Monatomic Gas Addition in the Brayton Cycle”, MS degree awarded May 2020; Chair.

43. Chaudhari, B., September 2020 – present, Topic: “Assessing Flight Performance of a Supersonic Airliner with Swing Wing Capabilities Using Energy Maneuverability Theory”, MS degree awarded May 2021, Committee Member.

44. Souders, T., September 2020 – May 2021, Topic: “Technological Improvement and Applications of VORLAX”, MS degree awarded May 2021, Committee Member.

45. Griffin, J., May 2021 – April 2022, Topic: “Improved Method for Supersonic Drag Prediction”, MS degree awarded May 2022, Committee Member.

46. Hatch, T., January 2022 – December 2022, Topic: “Developing and Assessing a Non-Isentropic Compressible Nozzle Flow Theory”, MS degree awarded Dec 2022, Chair.

47. Hoopes, C., September 2022 – April 2023, Topic: “Increasing General Lateral-Directional Controllability and Investigation Elevator-Body Flap Interaction for Shuttle Orbiter”, MS degree awarded May 2023, Committee Member.

48. Walther, C., January 2023 – May 2023, Topic: “5-DOF Simulations for Parametric Assessment of Missile Engagement Limits”, MS degree awarded May 2023, Chair.

49. Durbin, M., January 2023 – May 2023, Topic: “Determining Isentropic Efficiency for Highly Over-Expanded Nozzle Flows”, MS degree awarded May 2023, Chair.

50. Rickard, M., September 2023 – May 2023, Topic: “Implicit Filter Estimation for Large Eddy Simulations”, MS degree awarded May 2023, Chair.

51. Mazza, S., January 2023 – May 2023, Topic: “Assessing Benefits of Monatomic Gas Injection for Brayton Cycle Systems”, MS degree awarded May 2023, Chair.

52. Logsdon, A., January 2023 – May 2023, Topic: “Parametric Study of a Generic Scramjet Isolator”, MS degree awarded May 2023, Chair.

53. Suddreth, J., January 2023 – May 2023, Topic: “Parametric Study of a Generic Scramjet Cavity Combustor”, MS degree awarded May 2023, Chair.

54. Heinz, J., September 2022 – August 2023, Topic: “Attainable Moment Sets – Approaches to Understanding Trim Capability in Conceptual Design”, MS degree awarded August 2023, Committee Member.

55. Taylor, Z., June 2023 – December 2023, Topic: “Computational Simulation of an Integrated Scramjet Isolator and Combustor”, Chair.

56. Ferenczhalmy, D., January 2024 – May 2024, Topic: “Aerodynamic Simulations of an Antenna Section for 586th FLTS T-38C Aircraft”, Chair.

57. Trenter, J., January 2024 – December 2024, Topic: “Optimizing the Level Set Method for Simulating Propellant Surface Regression in Solid Rocket Motors”, Chair.

- **Undergraduate Special Research Supervision**

1. Rulison, A., June 1986 - May 1987, Topic: “Feedback Control of a Gravity Driven Bernoulli Tunnel.”

2. Horng, H. and Warczecha, M., Sept. 1989 - Dec. 1992, Topic: “Computational and Experimental Analysis of Trailing Vortex Sheet Evolution for Infrared Signature Reduction,” published as AIAA-92-0409, 1992 AIAA Aerospace Sciences Meeting.

3. Porter, J.R., January 1990 - January 1991, Topic; "An Experimental Study of the Molecular Mixing Process in an Axisymmetric Laminar Vortex Ring," published in Phys. Fluids A **3**, 1385-1392 (1992).

4. Gornowicz, G., Rose, J., Vink, J., September 1992 – May 1995, Topic: "SAE Aero Design Contest. Design, Construction, Testing, and Competition of a Heavy Lift RC Aircraft."

5. Durocher, C., May 1993 - September 1993, Topic: "Recommendation of a Modular Headliner for the 1997 Automotive America Streamline Sedan II."

6. Caldwell, D., February 1993 – February 1994, Topic: "Turbulent Boundary Layer Drag Reduction via Large Scale Dimple Arrangements."

7. Yagoda, E., June 1994 – December 1994, Topic: "Temperature Imaging Measurements in Turbulent Shear Flows."

8. Spannagel, M., January 1995 – May 1995, Topic: "Calculations with a Turbulence Modeling Software Package."

9. Malone, S., January 1996 – May 1996, Topic: "Subsonic Aerodynamic Performance Measurements of the Universal Fluid Dynamic Body (UFDB)."

10. Stock, M., January 1996 – May 1996, Topic: "Development of a Solid Rocket Test Stand with Optical Instrumentation."

11. Lee, C., December 1996 – May 1998, Topic: "Development of an LIF Water Flow Simulation for a DOC Combustor."

12. Dobrowitsky, J., Gaw, R., Hofer, R., Makins, B. and Nauss, M., January 1997 – April 1997, Topic: "Sub- and Supersonic Pressure Distributions via Pressure-Sensitive Paint on the Universal Fluid Dynamic Body (UFDB)."

13. Lee, C., Stuhr, C. and Wan, C., January 1997 – April 1997, Topic: "Cold-Flow Mixing Investigation by LIF Methods."

14. Haffner, R., Supple, M., & Lande, J., Topic: "Near Field Vortical Structure of Round and Slotted Jets using Planar Mie Scattering".

15. DeSnyder, C., Hedding, P. & Stephens, T., Topic: "Comparison of Velocity Decay and Entrainment Properties of Round and Slotted Jet Nozzles".

16. Pinderhughes, A., May 1998 - December 1998, Topic: "Laser Induced Fluorescence Studies of Mixing by a Jet in a Confined Crossflow", assisted in development of proposal for GE Faculty of the Future Program.

17. Lee, C., January 1999 – August 1999, Topic: "Experimental Study of Mixing Produced by a Jet in a Confined Crossflow".

18. Langham, E, January 2000 – May 2000, Topic: "Economic Impact Study of Drag Reducing Microactuator Technologies on the Commercial Airline Industry."

19. Morel, A., April 2001 – September 2001, Topic: "Experimental Investigation of Near-Field Mixing Enhancement by an Whistler Jet Nozzle."

20. Patel, P. and Giovanni, J., September 2001 – December 2001, Topic: "Experiments on Liquid Atomization by Fuel Slingers."

21. Fung, D., May 2001 – September 2001, Topic: "Fuel Delivery System for a Micro Internal Combustion Swing Engine."

22. Patel, P. and Lerg, B., January 2002 – December 2002, Topic: "Laser-Based Experiments on Liquid Atomization by Fuel Slingers."

23. Bocle, L., January 2006 – August 2006, Topic: "Improved Scaling of Crossflowing Turbulent Jets."

24. Xue, Nansi, September 2006 – December 2006. Topic: "Thermal Management Loads in Military and Commercial Aircraft Systems."

25. Ye, C. and Song, Z., September 2006 – April 2007. Topic: "Experimental Investigation of Supersonic Jet Coherence via Acoustic Scattering."

26. Xue, N., January 2007 – April 2007. Topic: "Assessment of Improved Romberg-Based Integration Methods."

27. Ye, C., September 2007 – December 2007. Topic: "PLIF Visualizations of Flow and Mixing Processes in a PAC Mixing Chamber."

28. Miranda, C., September – December 2007. Topic: "PIV Measurements of Shock-Boundary Layer Interactions."

29. Chen, O., September 2007 – December 2007. Topic: "Vorticity Alignment with Background Strain Eigenvectors in Turbulent Flows."

30. Hussein, M., August 2018 – April 2019, Topic: "Scaling Laws for Helicon Thrusters", FURI Project; Chair.

31. Pimlott, A., Barrett Honors Thesis, Professor T. Takahashi (Chair); defended December 2019, Committee Member.

32. De La Vara, J., May 2020 – August 2020. Topic: "Characteristic Trajectory Divergence of a Planetary System", Chair.

33. De La Vara, J., August 2020 – May 2021. Topic: "5-DOF Simulations for Parametric Assessment of Missile Engagement Limits", FURI Project; Chair.

34. Stauffer, M., March 2021 – May 2022. Topic: "Supersonic Inlets and Inlet-Engine Interactions", Barrett Honors Thesis, Second Advisor, Professor T. Takahashi (Chair).

35. Naguib, S., January 2022 – December 2022. Topic: "Lunar Dust Mitigation Application to Propulsive Landings", Barrett Honors Thesis, Second Advisor, Professor D. Bhate (Chair).

36. Seale, R., September 2022 – April 2023. Topic: "Energy Neutral Orbital Plane Change Maneuvers Through Use of Skyhooks and Momentum Exchange", Barrett Honors Thesis, Second Advisor, Professor M. Peet (Chair).

37. Herrington, K., August 2023 – present. Topic: "Fundamental Performance Optimization of Truncated Aerospike Nozzles", Barrett Honors Thesis, Chair.

38. Tokishi, S., September 2023 – present. Topic: "Study of NGAD Propulsion Performance",

Barrett Honors Thesis, Second Advisor, Professor V. Wells (Chair).

39. Podbielski, A., January 2024 – May 2024, Topic: "Level Set Simulations of Surface Regression in Solid Propellant Rocket Motors", Barrett Honors Thesis, Chair.

TEACHING

- **Courses Taught**

1. Arizona State University, MAE 575, Turbulent Flows, graduate course

• Spring 2015	28 students	Instructor 4.95/5.00	Course 4.73/5.00
• Spring 2016	9 students	Instructor 5.00/5.00	Course 5.00/5.00
• Spring 2017	9 students	Instructor 5.00/5.00	Course 4.93/5.00
• Spring 2019	28 students	Instructor 4.93/5.00	Course 4.73/5.00
• Spring 2020	44 students	Instructor 4.82/5.00	Course 4.80/5.00
• Spring 2021	47 students	Instructor 4.76/5.00	Course 4.66/5.00
• Spring 2022	51 students	Instructor 4.82/5.00	Course 4.64/5.00
• Spring 2023	37 students	Instructor 4.93/5.00	Course 4.73/5.00

2. Arizona State University, MAE 463/563, Airbreathing Propulsion, undergrad/grad course

• Fall 2012	52 students	Instructor 4.75/5.00	Course 4.25/5.00
• Fall 2013	75 students	Instructor 4.92/5.00	Course 4.67/5.00
• Fall 2014	77 students	Instructor 4.80/5.00	Course 4.54/5.00
• Fall 2015	77 students	Instructor 4.85/5.00	Course 4.50/5.00
• Fall 2016	82 students	Instructor 4.95/5.00	Course 4.78/5.00
• Fall 2017	82 students	Instructor 4.92/5.00	Course 4.78/5.00
• Fall 2018	88 students	Instructor 4.85/5.00	Course 4.81/5.00
• Fall 2019	74 students	Instructor 4.85/5.00	Course 4.71/5.00
• Fall 2020	89 students	Instructor 4.80/5.00	Course 4.47/5.00
• Fall 2021	90 students	Instructor 4.95/5.00	Course 4.85/5.00
• Fall 2022	94 students	Instructor 4.90/5.00	Course 4.77/5.00
• Fall 2023	87 students	Instructor 4.88/5.00	Course 4.68/5.00

3. Arizona State University, MAE 465/565, Rocket Propulsion, undergrad/grad course

• Fall 2018	53 students	Instructor 4.96/5.00	Course 4.80/5.00
• Fall 2019	63 students	Instructor 4.94/5.00	Course 4.87/5.00
• Fall 2020	74 students	Instructor 4.87/5.00	Course 4.75/5.00
• Fall 2021	94 students	Instructor 4.80/5.00	Course 4.72/5.00
• Fall 2022	102 students	Instructor 4.90/5.00	Course 4.85/5.00
• Fall 2023	110 students	Instructor 4.90/5.00	Course 4.67/5.00

4. Arizona State University, ASU 101, The ASU Experience, freshman course

• Fall 2014	20 students	Instructor 4.30/5.00	Course 4.46/5.00
• Fall 2015	20 students	Instructor 4.72/5.00	Course 4.80/5.00
• Fall 2016	23 students	Instructor 4.58/5.00	Course 3.91/5.00
• Fall 2017	23 students	Instructor 4.32/5.00	Course 4.67/5.00
• Fall 2018	19 students	Instructor 4.28/5.00	Course 3.52/5.00

- Fall 2019 19 students Instructor 4.96/5.00 Course 4.93/5.00
- Fall 2021 19 students Instructor 4.87/5.00 Course 4.64/5.00
- Fall 2022 19 students Instructor 4.58/5.00 Course 4.67/5.00
- Fall 2023 19 students Instructor 4.75/5.00 Course 4.63/5.00

5. University of Michigan, Aero 620/625, Advanced Turbulent Flows, graduate course

- Winter 1987 18 students Instructor 4.81/5.00 Course 4.58/5.00
- Winter 1988 18 students Instructor 4.67/5.00 Course 4.67/5.00
- Winter 1989 27 students Instructor 4.54/5.00 Course 4.61/5.00
- Winter 1991 13 students Instructor 4.86/5.00 Course 4.60/5.00
- Winter 1993 13 students Instructor 4.67/5.00 Course 4.67/5.00
- Fall 1995 12 students Instructor 4.70/5.00 Course 4.30/5.00
- Fall 1997 15 students Instructor 5.00/5.00 Course 5.00/5.00
- Fall 1999 12 students Instructor 5.00/5.00 Course 4.75/5.00
- Fall 2002 13 students Instructor 5.00/5.00 Course 4.92/5.00
- Fall 2004 9 students Instructor 4.80/5.00 Course 4.63/5.00
- Fall 2007 12 students Instructor 4.30/5.00 Course 4.30/5.00

6. University of Michigan, Aero 525, Introduction to Turbulent Flows, graduate course

- Fall 1991 12 students Instructor 4.56/5.00 Course 4.05/5.00
- Fall 1992 34 students Instructor 4.43/5.00 Course 4.50/5.00
- Fall 1993 21 students Instructor 4.06/5.00 Course 4.21/5.00
- Winter 1997 19 students Instructor 4.67/5.00 Course 4.00/5.00
- Winter 1998 15 students Instructor 4.83/5.00 Course 4.25/5.00
- Winter 2000 23 students Instructor 4.71/5.00 Course 4.55/5.00
- Winter 2001 25 students Instructor 4.38/5.00 Course 4.05/5.00
- Winter 2002 32 students Instructor 4.50/5.00 Course 4.21/5.00
- Winter 2003 19 students Instructor 4.63/5.00 Course 4.44/5.00
- Winter 2004 28 students Instructor 4.84/5.00 Course 4.76/5.00
- Winter 2005 24 students Instructor 4.58/5.00 Course 4.58/5.00
- Winter 2006 32 students Instructor 4.78/5.00 Course 4.26/5.00
- Winter 2007 33 students Instructor 4.68/5.00 Course 4.54/5.00
- Winter 2008 30 students Instructor 4.86/5.00 Course 4.75/5.00

7. University of Michigan, Aero 522, Viscous Flows, graduate course

- Fall 2000 18 students Instructor 4.82/5.00 Course 4.56/5.00
- Fall 2001 22 students Instructor 4.89/5.00 Course 4.58/5.00

8. University of Michigan, Aero 335, Aerospace Propulsion, undergraduate course

- Fall 2006 60 students Instructor 4.85/5.00 Course 4.70/5.00
- Winter 2006 55 students Instructor 4.79/5.00 Course 4.60/5.00
- Fall 2007 75 students Instructor 4.86/5.00 Course 4.65/5.00

9. University of Michigan, Aero 430, Propulsion II, undergraduate course

- Fall 1990 71 students Instructor 3.92/5.00 Course 3.95/5.00

10. University of Michigan, Aero 420, Aerodynamics III, undergraduate course

- Fall 1985 48 students Instructor 4.50/5.00 Course 4.26/5.00
- Winter 1986 53 students Instructor 4.73/5.00 Course 4.38/5.00
- Fall 1986 57 students Instructor 4.93/5.00 Course 4.83/5.00

11. University of Michigan, Aero 330 - Aerodynamics II, undergraduate course

- Fall 1987 55 students Instructor 4.73/5.00 Course 4.54/5.00
- Winter 1988 64 students Instructor 4.46/5.00 Course 4.26/5.00
- Fall 1988 44 students, Instructor 4.84/5.00 Course 4.26/5.00
- Winter 1989 64 students Instructor 4.85/5.00 Course 4.25/5.00
- Fall 1989 37 students Instructor 4.92/5.00 Course 4.43/5.00
- Winter 1994 39 students Instructor 4.50/5.00 Course 4.13/5.00
- Fall 1998 36 students Instructor 4.54/5.00 Course 4.36/5.00

12. University of Michigan, Aero 302/306/405 - Laboratory II, undergraduate course

- Fall 1989 42 students Instructor 4.79/5.00 Course 4.19/5.00
- Fall 1994 27 students Instructor 4.06/5.00 Course 3.75/5.00
- Winter 1996 36 students Instructor 4.11/5.00 Course 4.00/5.00

13. University of Michigan, Aero 301/305 - Laboratory I, undergraduate course

- Winter 1995 36 students Instructor 4.25/5.00 Course 4.03/5.00
- Winter 1994 37 students Instructor 4.31/5.00 Course 4.03/5.00
- Fall 1996 20 students Instructor 4.68/5.00 Course 4.05/5.00

- **Courses Revised/Developed**

1. MAE 575 – Turbulence, complete revision of upper division graduate-level course, presented for first time in Spring 2015, 3 credits.

2. AEE 463/ MAE 563 – Airbreathing Propulsion, major revision of combined senior technical and first-year graduate course, presented for first time in Fall 2012, 3 credits.

3. AEE 465/ MAE 565 – Rocket Propulsion, major revision of combined senior technical and first-year graduate course, presented for first time in Fall 2018, 3 credits.

4. Aero 620/625 - Advanced Turbulent Flows, new upper division graduate course, permanent addition to graduate curriculum, 3 credits.

5. Aero 622/729 – Reacting Shear Flows, new upper division elective graduate course, presented for first time in Fall 2003, 3 credits.

6. Aero 525 – Introduction to Turbulent Flows, new graduate course required for doctoral examinations in gas dynamics, developed 580 page coursepack, permanent addition to graduate curriculum, 3 credits.

7. Aero 420 - Aerodynamics III, major revision of upper division undergraduate course, introduced new lecture material and graphics workstation software, 3 credits.

8. Aero 330 - Aerodynamics II, major revision of upper division undergraduate course, introduced new lecture material and graphics workstation software, 3 credits.

9. Aero 301/305 – Laboratory I, complete revision of upper division undergraduate

laboratory course sequence, developed entirely new course focus, new lecture material and new experimental laboratories, developed 118 page coursepack, 3 credits.

10. Aero 302/306/405 – Laboratory II, complete revision of upper division undergraduate laboratory course sequence, developed entirely new course focus, new lecture material and new experimental laboratories, developed 72 page coursepack, 3 credits.

SERVICE

- **Professional**

1. Executive Committee Member, U.S. Air Force Scientific Advisory Board (SAB), Headquarters Air Force, Pentagon, Washington, DC, 2017 – 2021.

2. Chair, U.S. Air Force Scientific Advisory Board (SAB), Headquarters Air Force, Pentagon, Washington, DC, 2014 – 2017.

3. Member, Search Committee for AFRL Chief Technologist, Air Force Research Laboratory (AFRL), Wright-Patterson AFB, OH, 2018.

4. Member and Chair, Lawrence Livermore National Laboratory, Weapons and Complex Integration (WCI) Directorate Review Committee, Livermore, CA, 2015 – 2021.

5. Member, Lawrence Livermore National Laboratory, Weapons Physics and Design, Designer Training Program Advisory Board, Livermore, CA, 2021.

6. Member, Hypersonics Research Review, Lawrence Livermore National Laboratory, Livermore, CA, 2018.

7. Organizer and Chair, Business Modernization Workshop, Air Force S&T Strategy 2030, Air Force Research Laboratory (AFRL), Arizona State University, 2018.

8. Member, Independent Research and Development (IR&D) Review Panel, L3 Technologies, Inc., Washington, D.C., 2018.

9. External Reviewer, Promotion and Tenure Casebook, Oregon Sate University, 2018.

10. Member, Intelligence Science and Technology Experts Group (ISTEG), National Academies of Sciences, Engineering, and Medicine, Washington, DC, 2015 – present.

11. Member, Science & Technology Industry-University-Government Roundtable (STIGUR), National Research Council, Washington, D.C., 2014 – 2017.

12. Chief Scientist of the U.S. Air Force (AF/ST), Office of the Secretary of the Air Force and Air Force Chief of Staff, Air Force Pentagon, Washington, D.C., 2008 – 2010.

13. Member, Organizing Committee, 2014 ACM Conference on Computer and Communications Security (CCS-14), Scottsdale, AZ, November 2014.

14. Member, Unmanned Aircraft Systems – Arizona Advisory Committee (UAS-AAC), Arizona Aerospace & Defense Commission (AADC), Phoenix, AZ, 2011– 2013.

15. Member, Senior Review Group and Steering Committee, Air Force Scientific Advisory Board, United States Air Force, Washington, D.C., 2008 – 2010.

16. Co-Chair, USAF/NASA Executive Research Committee (ERC) for Aeronautics, Washington, D.C., 2008 – 2010.

17. Member, Science, Technology, Engineering & Mathematics Advisory Committee (STEMAC), U.S. Air Force, Washington, D.C., September 2009 – 2010.

18. Member, Scientists & Engineers Advisory Council (SEAC), U.S. Air Force, Washington, D.C., September 2009 – 2010.

19. Member, Editorial Advisory Board, AIAA Journal of Propulsion and Power, American Institute of Aeronautics and Astronautics, Washington, D.C.

20. Associate Editor, AIAA Journal, American Institute of Aeronautics & Astronautics (AIAA), Washington, D.C.

21. Member, Combustion Fuels & Emissions Committee, International Gas Turbine Institute (IGTI), American Society of Mechanical Engineers (ASME), September 2009 – present.

22. Member, Gas Turbine Heat Transfer Committee (K-14), International Gas Turbine Institute (IGTI), American Society of Mechanical Engineers (ASME), December 2009 – present.

23. Member, AIAA Publications Committee, American Institute of Aeronautics & Astronautics, Washington, D.C. January 1995 – January 1999.

24. Member, Executive Committee, Division of Fluid Dynamics (DFD), American Physical Society (APS), November 2004 – November 2007.

25. Chair, External Affairs Committee, Division of Fluid Dynamics (DFD), American Physical Society (APS), November 2005 – November 2007.

26. Member, Fluid Dynamics Prize Selection Committee, Division of Fluid Dynamics (DFD), American Physical Society (APS), 1999 – 2001.

27. Chair, Air Force Research Laboratories Propulsion Directorate (PR) Science & Technology Review Committee, Air Force Scientific Advisory Board (AF SAB), 2006.

28. Member, Publications & Media Committee, Division of Fluid Dynamics (DFD), American Physical Society (APS), November 2004 – Decmber 2005.

29. Member, Air Force Research Laboratories Air Vehicles Directorate (VA) Science & Technology Review Committee, Air Force Scientific Advisory Board (AF SAB), October-November 2005.

30. Member, Air Force Scientific Advisory Board Study on "Improving Air Force Fuel Efficiency", Air Force Scientific Advisory Board (AF SAB), 2005-2006.

31. Member, Air Force Scientific Advisory Board Study on "System-Level Experimentation in Air Force S&T Programs", Air Force Scientific Advisory Board (AF SAB), 2006.

32. Chair, Air Force Scientific Advisory Board Study on "Thermal Management Technology Solutions", Air Force Scientific Advisory Board (AF SAB), 2007.

33. Member, Air Force Office of Scientific Research (AFOSR) Science & Technology Review Committee, Air Force Scientific Advisory Board (AF SAB), July-August 2007.

34. Chair, Air Force Research Laboratories Air Vehicles Directorate (VA) Science & Technology Review Committee, Air Force Scientific Advisory Board (AF SAB), December 2007.

35. Chair, Air Force Scientific Advisory Board Study on "Implications of Spectrum Management for the Air Force", Air Force Scientific Advisory Board (AF SAB), 2008.

36. Peer Reviewer for National Research Council Draft Report on "National Aerospace Initiative (AFSB-J-03-01-A) from *Committee on the National Aerospace Initiative* (NAI) of the National Research Council.

37. Member, Gas Turbine Combustion Committee, American Society of Mechanical Engineers (ASME), August 2009 – present.

38. Member, World Assembly of Conferences on Heat Transfer, Fluid Mechanics and Thermodynamics, 2001 – present.

39. Member, Lead Scientist Committee – Sixth World Conference on Experimental Heat Transfer, Fluid Mechanics and Thermodynamics (ExHFT-6), Matsushima, Japan, 2005.

40. Advisory Committee Member, Third International Symposium on Turbulence and Shear Flow Phenomena (TSFP-3), Sendai, Japan, 2003.

41. Member, Advisory Committee, Fourth International Symposium on Turbulence and Shear Flow Phenomena (TSFP-4), Williamsburg, VA, 2005.

42. Member, Advisory Committee, Fifth International Symposium on Turbulence and Shear Flow Phenomena (TSFP-5), Munich, Germany, 2007.

43. Member, Lead Scientist Committee, Seventh World Conference on Experimental Heat Transfer, Fluid Mechanics and Thermodynamics (ExHFT-7), 2009.

44. Organizer - AFOSR/ONR Workshop on Future Directions for Diagnostics in Turbulent Reacting Flows, Atlanta, GA, June 1990.

45. Session organizer and chair for 13th U.S. National Congress of Applied Mechanics, Gainesville, FL, June 21-26, 1998.

46. Advisory Committee Member – 7th, 8th, 9th, 10th, 11th, 12th International Symposia on Applications of Laser Techniques to Fluid Mechanics, Lisbon, Portugal.

47. Program Subcommittee Member - 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th, 31st, 32nd International Symposia on Combustion, The Combustion Institute.

48. Program Review Subcommittee Member – 8th International Symposium on Transport Phenomena in Combustion, San Francisco, July 1995.

49. Invited Member - 10th, 16th Meeting of Sandia Cooperative Group on Aerothermochemistry of Turbulent Reacting Flows, November 1987, 1990.

50. DOE/BES Review Panel Member, Reactive Flows Panel, Department of Energy, Gaithersburg, MD, December 1992.

51. Session Chairman - Two-Phase Flows, 5th International Symposium on Application of Laser Techniques to Fluid Mechanics, Lisbon, Portugal, July 1990.

52. Session Chairman - Jet Mixing, IUTAM Symposium on Fluid Mechanics of Stirring and Mixing, La Jolla, CA, August 1990.

53. Session Chairman - ERCOFTAC Symposium on Chemical Reactions and Physical Processes in Turbulent Liquids, Lausanne, Switzerland, April 1991.

54. Session Chairman - Premixed Flames, 24th International Symposium on Combustion, Sydney, Australia, July 1992.

55. Session Chairman - USNCAM 13 U.S. National Congress on Applied Mechanics, June 21-26, 1998, Gainesville, FL; Topical Symposium on Multidimensional Experimental Techniques.

56. Session Chairman - Invited Paper Session (100-FD-24) on Advanced Flow Measurements, AIAA 30th Fluid Dynamics Conference, June 28-July 1, 1999, Norfolk, VA.

57. Session Chairman - EUROMECH 8th European Turbulence Conference (ETC-8), June 26-30, 2000, Barcelona, Spain; Invited Lecture Session on Turbulent Transport and Mixing.

58. Session Chairman - EUROMECH Colloquium 415 on "Shear Flow Control", July 24-26, 2000, Berlin, Germany; Session on Active Control for Drag Reduction.

59. Session Chariman – 2001 AFRC/JFRC/IEA Combustion Symposium, September 2001, Kauai, Hawaii; Session on Combustion Modeling.

60. Session Chairman – 2003 3rd International Symposium on Turbulence and Shear Flow Processes (TSFP-3), Sendai, Japan.

61. Session Chairman (CP-3, Engines), SIAM 10th International Conference on Numerical Combustion, Sedona, AZ.

62. Session Chairman – (1G, Supersonic Combustion), 2006 31st International Symposium on Combustion, Heidelberg, Germany.

63. Session Co-Chairman – (Turbulence Measurements II), 2008 14th International Symposium on Applications of Laser Techniques to Fluid Mechanics, Lisbon, Portugal.

64. Session Chairman – (Hybrid LES and RANS Simulations), 2021 Annual Meeting, Division of Fluid Dynamics, American Physical Society, Phoenix, AZ.

65. Reviewer for:

    Cambridge University Press
    Journal of Fluid Mechanics
    Physics of Fluids
    Journal of Computational Physics
    Journal of Turbulence
    Experiments in Fluids
    Experimental Thermal and Fluid Science
    European Journal of Mechanics B/Fluids
    Journal of Aerospace Engineering
    Combustion and Flame
    Combustion Science and Technology

The Combustion Institute
Journal of Propulsion and Power
International Journal of Heat Transfer
AIAA Journal
Journal of Visualization
ASME Journal of Fluids Engineering
ASME Journal of Engineering for Gas Turbines and Power
ASME Turbo Expo
International Journal of Engine Research
Atomization and Sprays
AIChE Journal
Zeitschrift für angewandte Mathematik und Physik (ZAMP)
Army Research Office
National Science Foundation
Israel Science Foundation
National Research Council
Department of Energy
The Petroleum Research Fund
The University of Michigan Press
RAND Corporation
CRC Press
McGraw-Hill

66. Listed in Who's Who in America; Who's Who in Technology; Who's Who in Education; Who's Who in Engineering Education; Who's Who in the World.

- **University**

1. Chair – AE Faculty Search Committee, ASU School for Engineering of Matter, Transport and Energy, 2019-20.
2. Chair – AE Faculty Search Committee, ASU School for Engineering of Matter, Transport and Energy, 2016-17.
3. Member – Personnel Committee, ASU School for Engineering of Matter, Transport and Energy, 2013-16.
4. Chair – UM College of Engineering Research Strategy Committee, 2007.
5. Chair – UM Aerospace Department Future Vision Committee, 2007-2008.
6. Chair – UM Aerospace Engineering Department Internal Review Committee, 2004.
7. Co-Chair – AERO/AOSS Department Reorganization Committee, 2002.
8. Chair and Member – Numerous promotion and tenure committees, 1995 – present.
9. Chair and Member – Numerous faculty search committees, 1990 – present.
10. Member – Graduate Admissions Committee, 2002-present (Aero).
11. Organizer and Examiner - Aerospace Engineering Department Ph. D. Preliminary Examinations, 1985-present.
12. Member – Aerospace Engineering Space Allocation Committee, 2003-2005.

13. Organizer – Aerospace Engineering Department Seminar Series, 1985-90.
14. Member – 1988 Aerospace Engineering Department Review Committee (Aero).
15. Member – 1994 Aerospace Engineering Department Review Committee (Aero).
16. Chair – Aerospace Engineering Department Safety Committee (Aero).
17. College Representative - Engineering College Faculty Search Committees.
18. Mentor – University Mentorship Program (University), 1991-92, 1993-94.
19. Chair – Ad Hoc Committee on Undergraduate Laboratory Courses (Aero), 1992-1995.
20. Chair – Aerospace Engineering Department Awards Committee, 1992-1996.
21. Chair – College of Engineering Computer Aided Engineering Network (CAEN) Review Committee, 1992.
22. Chair – Aerospace Engineering Department External Relations Committee, 1996-1998.
23. Member – Department Administrator Search Committee, 1998.

- **Consulting**

1. Consultant; Lawrence Livermore National Laboratory, Livermore, CA, 2016 – present.
2. Consultant; Institute for Defense Analyses, Alexandria, VA, 1989 – 2010.
3. Consultant; Advanced Projects Research, Inc., La Verne, CA, 2005 – 2008.
4. Consultant; Southwest Sciences, Inc., Santa Fe, NM, 2001 – 2008.
5. Consultant; Praxair Inc., Tonawanda, NY and Indianapolis, IN, 1994 – 2018.
6. Consultant; Powerix Technologies, Ann Arbor, MI, 2004 – 2005.
7. Consultant; NGB Technologies, Inc., Ann Arbor, MI, 1993 – 2004.
8. Consultant; Williams International, Walled Lake, MI, 2001 – 2003.
9. Consultant; John Zink Company, Tulsa, OK, 1997 – 1999.
10. Consultant; North American Mfg. Co., Cleveland, OH, 1996 – 1998.
11. Consultant; Energy & Environ. Research Corp. (EERC), Irvine, CA, 1991 – 1993.

- **Patents**

1. U.S. Patent No. 5,583,789 titled “Local Integral Method for Computing Molecular Diffusion and Chemical Reaction” issued on 10 December 1996.
2. U.S. Patent No. 5,640,331 titled “Method and Apparatus for Obtaining Species Concentrations and Reaction Rates in a Turbulent Reacting Flow” issued on 17 June 1997.
3. U.S. Patent No. 7,685,824 titled “Rotary Ramjet Turbogenerator” issued on 30 March 2010.
4. U.S. Patent No. 8,528,601 titled “Passive Boundary Layer Control Elements” issued on 10 September 2013.
5. U.S. Patent No. 9,097,183 titled “Rayleigh-Taylor Assisted Combustion and Combustors Adapted to Exploit Rayleigh-Taylor Instability for Increasing Combustion Rates Therein” issued on 4 Aug 2015.

6. U.S. Patent No. 10,788,213 titled “Rayleigh-Taylor Assisted Combustion with Micro-Flameholders” issued on 29 Sep 2020.

Professional Affiliations

1. Member and Fellow, Division of Fluid Dynamics, American Physical Society (APS).
2. Member and Fellow – American Institute of Aeronautics & Astronautics (AIAA), Propellants and Combustion.
3. Member, American Society of Mechanical Engineers (ASME).
4. Member, Society of Automotive Engineers (SAE International).
5. Member, Air Force Association (AFA).
6. Member, Combustion Institute.