

PHILLIP M. LIGRANI

Eminent Scholar in Propulsion, Professor of Mechanical and Aerospace Engineering, Department of Mechanical and Aerospace Engineering, Propulsion Research Center, 5000 Technology Drive, University of Alabama at Huntsville, Huntsville, AL 35899 USA, PHONE:314-800-5382, E-MAIL: pml0006@uah.edu, p_ligrani@msn.com

PROFESSIONAL PREPARATION

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| University of Texas at Austin | Mechanical Engineering | Bachelor of Science, 1974 |
| Stanford University | Mechanical Engineering | Master of Science, 1975 |
| Stanford University | Mechanical Engineering | Doctor of Philosophy, 1980 |

APPOINTMENTS

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| 2014 – present | Eminent Scholar in Propulsion, Professor of Mechanical and Aerospace Engineering, Propulsion Research Center, Department of Mechanical and Aerospace Engineering, University of Alabama at Huntsville |
| 2010 – 2014 | Oliver L. Parks Endowed Chair, Professor of Aerospace and Mechanical Engineering, Parks College, Saint Louis University |
| 2010 – 2013 | Director of Graduate Programs, Parks College, Saint Louis University |
| 2006 – 2009 | Statutory Professor, Department of Engineering Science, University of Oxford, Donald Schultz Professor of Turbomachinery |
| 2006 – 2009 | Director, Rolls-Royce UTC (University Technology Centre) in Heat Transfer and Aerodynamics, University of Oxford |
| 1997 – 2006 | Professor, Department of Mechanical Engineering, University of Utah |
| 2002 – 2006 | Adjunct Professor, Department of Bioengineering, University of Utah |
| 1992 - 1997 | Associate Professor, Department of Mechanical Engineering, University of Utah |

RECENT PUBLICATIONS AND PRESENTATIONS.

As of January 2017, Dr. Ligrani is author or co-author of more than 173 publications in archival journals, including the International Journal of Heat and Mass Transfer, the ASME Transactions-Journal of Turbomachinery, the ASME Transactions-Journal of Heat Transfer, the ASME Transactions-Journal of Fluids Engineering, the Journal of Fluid Mechanics, the AIAA Journal, Experiments in Fluids, Physics of Fluids, the AIAA Journal of Heat Transfer and Thermophysics, the International Journal of Rotating Machinery, Separation Science and Technology, Sensors and Actuators A: Physical, Scientific Reports, and the Journal of Microcolumn Separations. He is also author of 9 book chapters, and about 123 conference presentations and publications. A number of these are invited conference presentations at international meetings, at locations which include Korea, France, the Ukraine, Croatia, Germany, England-United Kingdom, and Belgium. From 1994 to 2016, he has also presented approximately 168 lectures at different institutions and establishments, including many invited lectures. From 2010 to 2016, he presented 4 Invited Keynote Papers, 7 Invited Papers, and 4 Invited Plenary Keynote Papers at different international conferences. From 1998 to 2000, he also served as Guest Editor for a Special Topical Issue for Measurement Science and Technology. He has also served as Associate Editor for the ASME Transactions-Journal of Heat Transfer from 2003 to 2006, and from 2010 to 2014, and as Associate Editor for the ASME Transactions-Journal of Fluids Engineering from 2005 to 2008, and (since 2006) a Member of the Distinguished Editorial Review Board for the Advances in Transport Phenomena, Book Series with Springer Publishing Corporation.

RESEARCH FUNDING AWARDS

Dr. Ligrani has a strong past and present record of performing sponsored, fundamental and applied research for a variety of funding agencies, including ones in the USA and Europe. As such, he has successfully managed a wide variety of research programs, for different industrial, foundation, and government sponsors. **As of January 2017, research funding awards have been received from the following organizations:** Alabama State Innovation Program Fund, University of Alabama in Huntsville Endowment for Eminent Scholar in Propulsion, University of Alabama in Huntsville Start-Up Funds, AEDC – Arnold Engineering Development Center of Arnold Air Force Base, National Science Foundation, Honeywell Aerospace Corp., The Boeing Company, IHI Corporation, the Henry Luce Foundation, South Carolina Institute for Energy Studies (SCIES-AGTSR) of the Department of Energy, U. S. Army Aviation Research and Technology Activity-AVSCOM, NASA-Ames Research Center, NASA-Lewis Research Center, Hispanic Research Center-Arizona State University, Turbo and Power Machinery Research Center-Seoul National University, Solar Turbines Incorporated, UCON U.S.-Japan Center-Weber State University, General Electric Corporate Research and Development Center, Pratt & Whitney Corporation-Florida, the North Atlantic Treaty Organization (NATO), Pratt & Whitney Corporation-Canada Corp., the Gas Technology Institute, Intel Corporation, HEET-High Efficiency Engines and Turbines Program - South Carolina Energy Research and Development Center, Invesys Corp. - Foxboro Company, Ceramtec Advanced Materials and Electrochemical Technologies Corp., CISCO Systems Inc., SEEDA-South East England Development Agency, EPSRC – Engineering and Physical Sciences Research Council of Great Britain, ISIS Innovation, John Fell Fund, European Community Sixth Framework Programme, Korea Institute of Geoscience and Mineral Resources - KIGAM, Lockheed Martin UK, The Royal Academy of Engineering, Rolls Royce

PLC, Science and Engineering Research Council (SERC) Engineering Board of Great Britain, Office of Naval Research, Naval Postgraduate School Research Foundation, Aero-Propulsion Laboratory-Wright-Patterson Air Force Base, and Naval Postgraduate School Direct Funding.

CURRENT AND RECENT RESEARCH FUNDING AWARDS

The total amount of funding, including grants contracts, and donations, since arriving at the University of Alabama in Huntsville in September of 2014 is approximately \$3.22 million. Current research sponsors include: (1) Solar Turbines, Inc. of San Diego, California, USA, (2) IHI Corp. (Ishikawajima Harima Heavy Industries), of Tokyo, Japan (multiple research contracts), (3) National Science Foundation, CBET Thermal Transport Processes, Division of Chemical, Bioengineering, Environmental, and Transport (CBET) Systems, Arlington, Virginia, USA (multiple funding awards), (4) the Alabama Innovation Fund, Research Program, Montgomery, Alabama, USA, (5) Office of the Vice President for Research and Economic Development, University of Alabama in Huntsville, Huntsville, Alabama, USA, (6) AEDC – Arnold Engineering Development Center, Arnold Air Force Base, Tullahoma, Tennessee, USA.

RESEARCH AREAS AND EXPERTISE.

Dr. Ligrani has a strong past and present record of working with many different collaborators and co-workers, from many locations throughout the world.

(i) **Traditional Heat Transfer and Fluid Mechanics Investigations** involving electronics cooling, heat transfer augmentation, drag reduction, turbulent boundary layers, flows in channels with dimpled surfaces, flows in curved channels, elastic turbulence, slot impingement cooling, and macro-scale pumps and pump flows. Also included are **aerodynamics investigations with high-speed, compressible flows at transonic and supersonic Mach numbers**, including SWBLI – Shock Wave Boundary Layer Interactions. Related projects involve **transonic and supersonic experimental testing**. Research interests also include experimental diagnostics in high speed flows, and air breathing propulsion.

(ii) **Air Breathing Engines - Gas Turbine Heat Transfer, Cooling, and Aerodynamics Losses**, including internal cooling, film cooling, impingement cooling, cooling of extremities, aerodynamic performance including aerodynamic losses, and transonic turbine flows and heat transfer. This subject area includes the effects of uses of bio-fuels, synthetic fuels, and renewable energy sources in relation to gas turbines and gas turbine heat transfer and cooling technologies. Note that an important area of turbomachinery research interest involves heat transfer and aerodynamics investigations with *high-speed, compressible flows at transonic and supersonic Mach numbers*, including linear cascade studies.

(iii) **Micro-Fluidics and Millimeter-Scale-Fluidics**, including micro-pump flows, and the effects of slip phenomena on gas and liquid flows in micro-scale passage flows with and without surface roughness, including the effects of hydrophobic surfaces and elastic turbulence.

(iv) **Experimental Techniques**, including development of millimeter-scale multiple-hole pressure probes, subminiature hot-wire anemometry, and infrared thermography.

PATENTS

1. Rotary Centrifugal and Viscous Pumps. (D. B. Blanchard, P. M. Ligrani, B. Gale). U. S. Patent Number US 2007/0059156 A1. Date of Patent (Publication Date) March 15, 2007. World Patent Number WO2005024230 A2. Date of Patent (Publication Date) March 17, 2005. World Patent Number WO2005024230 A3. Date of Patent (Publication Date) July 28, 2005.

2. Aspherical Dimples For Heat Transfer Surfaces and Method. (T. Djeridane, T. Blaskovich, S. Sreekanth, R. Trindade, M. L. C. Papple, O. Bibor, L. Lebel, P. M. Ligrani). U. S. Patent Number US 2006/0099073 A1. Date of Patent (Publication Date) May 11, 2006. Canada Patent Number CA 2583126 A1. Date of Patent (Publication Date) May 11, 2006. World Patent Number WO2006047854 A1. Date of Patent (Publication Date) May 11, 2006.

3. Osmotically-Driven Dispense Pump and Related Components For Use in High Pressure Applications. (T. H. Deem, P. M. Ligrani, B. Hansen). U. S. Patent Number 9447781. Date of Patent (Publication Date) September 20, 2016. U. S. Patent Number US 20080269725 A1. Date of Patent (Publication Date) October 30, 2008. World Patent Number WO2007013957 A2. Date of Patent (Publication Date) February 1, 2007. World Patent Number WO2007013957 A3. Date of Patent (Publication Date) May 24, 2007.

SELECTED HONORS, AWARDS, ACADEMIC RECOGNITIONS

2010 to 2018, Distinguished Advisory Professor, Inje University, South Korea.

January 2017, Marquis Who's Who Lifetime Achievement Award, Marquis Who's Who.

July 2016, Invited Lecture, "Turbine Component Aerodynamic Losses Within Gas Turbine Engines" for the "China-Germany Workshop on Gas Turbine Technologies: Aerodynamics, Heat Transfer, and Combustion," ITLR-Institute of Aerospace Thermodynamics, University of Stuttgart, Stuttgart, Germany, and Shanghai Jiao Tong University, Shanghai, P. R. China.

March 2016, Invited Article for Heat Transfer Research, Special Issue: Heat Transfer Advances for Energy Conservation and Pollution Control (IWHT2013), "Jet Array Impingement Cooling Local Nusselt Number Variations: Effects of Hole Array Spacing, Jet-to-Target Plate Distance, and Reynolds Number."

February 2016 Outstanding Mechanical Engineer of the Year Award 2016, ASME – American Society of Mechanical

- Engineers, NAS - North Alabama Section, Huntsville, Alabama, USA.
- January 2016, Invited to contribute a chapter on “Forced Convection – External Flow” to the Handbook of Thermal Science and Engineering, Springer Publishing Corporation, Editor: Francis A. Kulacki.
- January 2016 Invited as Lead Editor of Special Issue of “Recent Advances in Enhanced Heat Transfer and Engineering Applications,” Cogent Engineering Journal, CRC Press, Taylor and Francis Group.
- January 2016, Invited Paper, “Onset and Transition to Elastic Turbulence: Effects of Rheological Property Variations for Polyacrylamide-Water Solutions,” B. Lund, P. M. Ligrani, and A. Fatemi, 20th International Colloquium Tribology - Industrial and Automotive Lubrication, Stuttgart / Ostfildern, Germany.
- December 2015, Certificate of Excellence. Propulsion Research Center. With recognition of the sustained and dedicated efforts of faculty and staff for their roles as mentors, educators, and leaders. Office of the Vice President for Research and Economic Development (OVPRED), University of Alabama in Huntsville, Huntsville, Alabama, USA.
- October 2015, Invited Plenary Paper, ICHHFF5, Fifth International Conference “Heat and Mass Transfer and Hydrodynamics in Swirled Flows,” National Committee of the Russian Academy of Sciences, Kazan, Russia.
- October 2015, Invited Plenary Paper, ICTE 2015, International Conference: “IX Workshop on Thermophysics and Power Engineering for Higher Education Institutions,” Ministry of Education and Science of the Russian Federation, Kazan State Power Engineering University, Kazan, Russia.
- July 2015, Distinguished Visiting Scholar, School of Energy and Power, Dalian University of Technology, Dalian, P. R. China.
- September 2014, Distinguished Visiting Professor, School of Energy and Power Engineering, Beihang University, BUAA – Beijing University of Aeronautics and Astronautics, Beijing, P. R. China.
- September 2014, Keynote Lecture at the ISJPPE 2014 – International Symposium on Jet Propulsion and Power Engineering, Beijing, P. R. China.
- February 2014, Invited Lecture, Academic Forum on Gas Turbine Technology, Opening Ceremony for the Institute of Gas Turbines, Beijing Tsinghua University, Beijing, P. R. China.
- February 2014-February 2017. Vice-Chairman and Member, Academic Committee, Institute of Gas Turbines, Beijing Tsinghua University, Beijing, P. R. China.
- October 2013, Invited Lecture, Evolution of Secondary Dean Vortices in Spiral Microchannels for Cell Separations, Miniaturized Systems for Chemistry and Life Sciences MicroTAS 2013, University of Freiburg, Freiburg, Germany.
- October 2013, Plenary Lecture as an Invited Keynote Speaker, Recent Developments in Impingement Array Cooling, Including Consideration of the Separate Effects of Mach Number, Reynolds Number, Temperature Ratio, Hole Spacing, and Jet-to-Target Plate Distance, IWHT2013, 2nd International Workshop on Heat Transfer Advances for Energy Conservation and Pollution Control, Northwestern Polytechnical University (NPU), Xi’an, P. R. China.
- October 2013, Distinguished Visiting Professor, School of Energy and Power Engineering, Institute of Turbomachinery, Xi’an Jiaotong University, Xi’an, P. R. China.
- November 2012, Invited Plenary Keynote Paper, New Developments in Surface Heat Transfer Augmentation Technologies as Applied to Internal Flow Environments, ISTP-23, The 23rd International Symposium on Transport Phenomena, The University of Auckland, Auckland, New Zealand.
- September 2012, Invited Keynote Paper, Invited Expert, Heat Transfer Augmentation Technologies for Internal Cooling of Turbine Components of Gas Turbine Engines, Fourth International Symposium on Jet Propulsion and Power Engineering, 4th ISJPPE Meeting, Northwestern Polytechnical University, Xi’an, P. R. China.
- January 2012, Invited Paper, Spiral Inertial Microfluidic Devices For Continuous Blood Cell Separation, MOEMS-MEMS Conference on Micro- and Nano-Fabricated Electromechanical and Optical Components, SPIE – International Society for Optics and Photonics, San Francisco, California, USA.
- November 2011, Invited Keynote Paper, Aerodynamic Loss Determination and Evaluation in Turbine Components, 11th Asian International Conference on Fluid Machinery, and 3rd Fluid Power Technology Exhibition, Indian Institute of Technology Madras, Chennai, India.
- November 2011, Invited Keynote Paper, Aerodynamic Losses in Turbines With and Without Film Cooling, IGTC’11 Osaka, International Gas Turbine Congress 2011 Osaka, 10th Congress in Japan, Gas Turbine Society of Japan, Osaka, Japan.
- June 2011, Silver Winner – Annual 26th Educational Advertising Awards, for Brochure – Graduate Program Profile – Saint Louis University – Parks College, Higher Ed Marketing, Higher Education Marketing Report.
- April 2011, Distinguished Lecture Award, Over-Tip Shock Wave Structure and Its Impact on Turbine Blade Tip Heat Transfer Including the Effects of Varying Tip Gap, CEAS Distinguished Lecture Series, Department of Mechanical Engineering, College of Engineering, University of Wisconsin-Milwaukee, Milwaukee, Wisconsin, USA.
- October 2008, Technology Trends in the Gas Turbine Industry, Invited Keynote Paper - 4th International Conference on the Future of Gas Turbine Technology, European Turbine Network Conference, Brussels, Belgium.
- November 1991, NASA Space Act Tech Brief Award, ARC-12228-1, "Development of Subminiature Multi-Sensor Hot-Wire Probes."
- December 1990, Carl E. and Jessie W. Menneken Faculty Award for Excellence in Scientific Research.

SELECTED PUBLICATIONS

1. Investigation of Shock Wave – Boundary Layer Interactions in a 3.57 Aspect Ratio Wind Tunnel (S. W. Warning, M. Turlin, L. Carlson, P. M. Ligrani, and M. McQuilling), 52nd AIAA Aerospace Sciences Meeting, American Institute of Aeronautics and Astronautics, National Harbor, Maryland, USA, January 13-17, 2014.
2. Experimental and Computational Investigations of Shock Wave – Boundary Layer Interactions in a Wide Aspect Ratio Wind Tunnel (M. McQuilling, P. M. Ligrani, S. Warning, M. Turlin, L. Carlson), 7th Annual Shock Wave Boundary Layer Interaction Workshop, Cleveland, Ohio, USA, May 6-7, 2014.
3. Recent Developments in Impingement Array Cooling, Including Consideration of the Separate Effects of Mach Number, Reynolds Number, Temperature Ratio, Hole Spacing, and Jet-to-Target Plate Distance (P. M. Ligrani), Impingement Jet Cooling in Gas Turbines (Editors: R. S. Amano, B. Sundén), WIT Press, Southampton, United Kingdom, Chapter 3, pp. 63-102, 2014.
4. Comparison of Heat Transfer Augmentation Techniques, (P. M. Ligrani, M. M. Oliveira, and T. Blaskovich) AIAA Journal, Vol. 41, No. 3, pp. 337-362, March 2003.
5. Effects of Dimple Depth on Channel Nusselt Numbers and Friction Factors, (N. K. Burgess, and P. M. Ligrani), ASME Transactions-Journal of Heat Transfer, Special Issue – Gas Turbine Heat Transfer, Vol. 127, No. 8, pp. 839-847, August 2005.
6. Aerodynamic Losses of a Cambered Turbine Vane: Influences of Surface Roughness and Freestream Turbulence Intensity (Q. Zhang, and P. M. Ligrani), ASME Transactions-Journal of Turbomachinery, Vol. 128, No. 3, pp. 536-546, July 2006.
7. Separate Effects of Mach Number and Reynolds Number on Jet Array Impingement Heat Transfer (J. Park, M. Goodro, P. M. Ligrani, M. Fox, and H.-K. Moon), ASME Transactions-Journal of Turbomachinery, Vol. 129, No. 2, pp. 269-280, April 2007.
8. Mach Number, Reynolds Number, Jet Spacing Variations: Full Array of Impinging Jets (M. Goodro, P. M. Ligrani, M. Fox, and H.-K. Moon), AIAA Journal of Thermophysics and Heat Transfer, Vol. 24, No. 1, pp. 133-144, January – March 2010.
9. Aerodynamic Performance of Suction-Side Gill Region Film Cooling (J. C. Chappell, P. M. Ligrani, S. Sreekanth, T. Lucas, and E. Vlasic), ASME Transactions-Journal of Turbomachinery, Vol. 132, No. 3, pp. 031020-1 to 031020-11, July 2010.
10. Transonic Turbine Blade Tip Aerothermal Performance with Different Tip Gaps - Part I: Tip Heat Transfer (Q. Zhang, D. O. O’Dowd, L. He, M. L. G. Oldfield, and P. M. Ligrani), ASME Transactions-Journal of Turbomachinery, Vol. 133, No. 4, pp. 041027-1 to 041027-9, October 2011.
11. Overtip Shock Wave Structure and Its Impact on Turbine Blade Tip Heat Transfer, (Q. Zhang, D. O’Dowd, L. He, A. P. S. Wheeler, P. M. Ligrani, and B. C. Y. Cheong), ASME Transactions-Journal of Turbomachinery, Vol. 133, No. 4, pp. 041001-1 to 041001-8, October 2011.
12. Aerodynamic Losses in Turbines With and Without Film Cooling, as Influenced by Mainstream Turbulence, Surface Roughness, Airfoil Shape, and Mach Number (P. M. Ligrani), International Journal of Rotating Machinery, Vol. 2012, Article ID 957421, pp. 957421-1 to 957421-28, (doi:10.1155/2012/957421), 2012.
13. Heat Transfer Augmentation Technologies for Internal Cooling of Turbine Components of Gas Turbine Engines (P. M. Ligrani), International Journal of Rotating Machinery, Vol. 2013, Article ID 275653, pp.1-32, 2013.
14. Second Law Analysis of Aerodynamic Losses: Results for a Cambered Vane With and Without Film Cooling (P. M. Ligrani, and J. S. Jin), ASME Transactions-Journal of Turbomachinery, Vol. 135, No. 4, pp. 041013-1 to 041013-14, July 2013.
15. Unsteady Structure and Development of a Row of Impingement Jets, Including Kelvin-Helmholtz Vortex Development (L. Yang, P. M. Ligrani, J. Ren, and H. Jiang), ASME Transactions-Journal of Fluids Engineering, Vol. 137, No. 5, pp. 051201-1 to 051201-12, May 2015.

SELECTED RECENT PROFESSIONAL DEVELOPMENT ACTIVITIES

1. As Director of the Thermal-Fluid Sciences Laboratory at Parks College of Engineering, Aviation, and Technology, Saint Louis University, and as Director of the Thermal-Fluid Sciences Laboratory in the Department of Mechanical and Aerospace Engineering, Propulsion Research Center, University of Alabama in Huntsville, actively recruited and successfully involved numerous undergraduate students in different research project activities..
2. As Director of Graduate Programs, Parks College of Engineering, Aviation, and Technology, Saint Louis University, actively involved in graduate student recruitment, especially women and minority students, and especially Ph.D. level graduate students. From the beginning of activity in July of 2010 to 2013, the program grew from about 18 graduate students to an enrollment of about 65 active students, 24 of whom were Ph.D. program students.
3. Successfully advised 90 graduate students, 10 of whom obtained Ph.D. degrees, and 5 of whom were women, who have completed either a Ph.D., M.S., or M.E. degree, or obtained a Turbomachinery Diploma
4. Actively funded in several thermal-fluids areas for the past 32 years with continued support from governmental and industrial organizations.
5. Developed and in progress developing collaborations and cooperative arrangements for a variety of research project topics with individuals at a number of different institutions (including several universities) in Asia, especially in Korea, Japan, and China. This includes activities as a Distinguished Advisory Professor at Inje University in Gimhae, South Korea.

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS AND ACTIVITIES

ASME, Member, American Society of Mechanical Engineering, July 1985-Present.

ASME, Fellow, American Society of Mechanical Engineering, December 2000-Present.

ASME, American Society of Mechanical Engineering, K-14 Gas Turbine Heat Transfer Committee. December 1986-Present.

Chairman (Entire Committee), July 2016-June 2018.

Vice Chairman (Entire Committee), July 2014-June 2016.

Chairman, Honors and Awards Sub-Committee, July 2012-June 2014.

IGTI, International Gas Turbine Institute Heat Transfer Committee. December 1986-Present

ASEE, Member, American Society for Engineering Education, September 2010-Present.

AIAA, Member, American Institute of Aeronautics and Astronautics, January 2013 – Present.

AIAA, Associate Fellow, American Institute of Aeronautics and Astronautics, January 2016 – Present.

ICHMT – International Center for Heat and Mass Transfer. Member of the Scientific Council, January 2014 – Present.

NATIONAL AND INTERNATIONAL SERVICE ACTIVITIES**SELECTED INTERNATIONAL SCIENTIFIC COMMITTEE MEMBERSHIPS.**

1. Member of the Scientific Committee, ICHHFF6, Sixth International Conference “Heat and Mass Transfer and Hydrodynamics in Swirled Flows,” Siberian Branch of Russian Academy of Sciences, Novosibirsk, Russian Federation, November 21-23, 2017.

2. Member of the Scientific Committee, ICHHFF5, Fifth International Conference “Heat and Mass Transfer and Hydrodynamics in Swirled Flows,” National Committee of the Russian Academy of Sciences, Kazan, Russia, October 19-21, 2015.

3. February 2014-February 2017. Vice-Chairman and Member, Academic Committee, Institute of Gas Turbines, Beijing Tsinghua University, Beijing, P. R. China.

4. January 2014, Elected to be a member of the Scientific Council of the ICHMT – International Center for Heat and Mass Transfer.

5. International Scientific Committee, International Symposium on “Heat Transfer in Gas Turbine Systems,” Antalya, Turkey, August 9-14, 2009.

6. International Conference on Mechanical Engineering-Algeria, Ministere de l’Enseignement Superieur et de la Recherche Scientifique, Oran, Algeria, April 28-29, 2002.

SELECTED SESSIONS ORGANIZED, INTERNATIONAL MEETINGS AND CONFERENCES.

1. UAH Propulsion Research Center, Propulsion Symposium, Co-Chair (with Eminent Scholar Dale Thomas), UAH Charger Union Theatre, University of Alabama in Huntsville, Huntsville, Alabama, USA, October 13-14, 2016.

2. ASME TURBO EXPO 2016: Turbomachinery Technical Conference and Exposition, Seoul, South Korea, June 13-17, 2016. Session organizer. Session 10-2: Conjugate Analysis of Film Cooling/Internal Flows.

3. ASME TURBO EXPO 2015: Turbine Technical Conference and Exposition, Montreal, Canada, June 15-19, 2015. Session co-organizer. Session 12-13: Film Cooling.

4. Academic Forum on Gas Turbine Technology, Opening Ceremony for the Institute of Gas Turbines, Beijing Tsinghua University, Beijing, P. R. China, February 27-28, 2014. Forum Session Chairman.

5. IWHT2013, 2nd International Workshop on Heat Transfer Advances for Energy Conservation and Pollution Control, Northwestern Polytechnical University (NPU), Xi’an, P. R. China, October 18-21, 2013. Session Chair, Technical Session 2C, Heat/Mass Transfer and Enhancement Techniques.

6. TURBO EXPO 2013 – 58th TURBO EXPO Turbine Technical Conference and Exposition, San Antonio, Texas, USA, June 3-7, 2013. Session organizer. Session 14-6: Experimental Test Techniques II.

7. ISTP-23, The 23rd International Symposium on Transport Phenomena, The University of Auckland, Auckland, New Zealand, November 19-22, 2012. Session Chair, Technical Session 1, Stream C: Air Conditioning.

8. ISTP-23, The 23rd International Symposium on Transport Phenomena, The University of Auckland, Auckland, New Zealand, November 19-22, 2012. Session Chair, Technical Session 8, Stream D: Turbomachinery I.

9. ISTP-23, The 23rd International Symposium on Transport Phenomena, The University of Auckland, Auckland, New Zealand, November 19-22, 2012. Session Chair, Technical Session 9, Stream D: Turbomachinery II.

10. Fourth International Symposium on Jet Propulsion and Power Engineering, 4th ISJPPE Meeting, Northwestern Polytechnical University (NPU), Xi’an, China, September 10-12, 2012. Session Chair. Technical Session: Heat Transfer.

11. International Mechanical Engineering Congress & Exposition 2012, IMECE 2012, Houston, Texas, USA, November 9-15, 2012. Session organizer. Session: Film Cooling Over Gas Turbine Blades-1.

12. TURBO EXPO 2012 – 57th TURBO EXPO Turbine Technical Conference and Exposition, Copenhagen, Denmark, June 11-15, 2012. Session organizer. Session 11-3: Shaped Hole Film Cooling.

13. IGTC’11 Osaka, International Gas Turbine Congress 2011 Osaka, 10th Congress in Japan, Gas Turbine Society of Japan, Osaka, Japan, November 13-18, 2011. Session Chair. Session HT(7): Heat Transfer on Film Cooling III.

14. 11th Asian International Conference on Fluid Machinery, and 3rd Fluid Power Technology Exhibition, Indian Institute of Technology, Madras, Chennai, India, November 21-23, 2011. Session Chair. Session 2: Fluid Mechanics-FM-1.

15. TURBO EXPO 2011 – 56th TURBO EXPO Turbine Technical Conference and Exposition, Vancouver, Canada, June 6-10, 2011. Session organizer. Session 11-8: Innovative Film Cooling Approaches.
16. TURBO EXPO 2010 – 55th ASME Gas Turbine Technical Congress and Exposition, Glasgow, Scotland, June 2010. Session organizer. Session 10-12: Innovative Film Cooling Concepts.
17. TURBO EXPO 2010 – 55th ASME Gas Turbine Technical Congress and Exposition, Glasgow, Scotland, June 2010. Session organizer. Session 12-2: Transition.
18. 49th ASME Gas Turbine and Aeroengine Technical Congress, Exposition, and Users Symposium, Vienna, Austria, June 2004. Session co-organizer. Session 11-25: Internal Channels VIII.

EDITORSHIPS

1. Guest Editor, Special Topical Issue on "Measuring Techniques for Turbomachinery," Measurement Science and Technology, 1998-2000.
2. Associate Technical Editor, ASME Transactions-Journal of Heat Transfer, July 1, 2003 – June 30, 2007.
3. "Special Issues on Gas Turbine Heat Transfer: Parts 1 and 2," ASME Transactions-Journal of Heat Transfer, Co-Editor with S. Acharya, Part 1 - April 2005, Part 2 – May 2005.
4. Associate Technical Editor, ASME Transactions-Journal of Fluids Engineering, July 1, 2005 – December 31, 2008.
5. Member, Distinguished Editorial Review Board, Advances in Transport Phenomena, Book Series, Springer Publishing Corporation, 2006 – Present.
6. Associate Technical Editor, ASME Transactions-Journal of Heat Transfer, July 1, 2010 – June 30, 2014.
7. Associate Editor, Journal of Propulsion Technology (JPT), ISSN: 1001-4055, Published by CNPIEC, P. R. China. August 2015 – Present.
8. Lead Editor, Special Issue of "Recent Advances in Enhanced Heat Transfer and Engineering Applications," Cogent Engineering Journal, CRC Press, Taylor and Francis Group. January 2016 – December 2016.
9. Editorial Board Member, Power and Thermal Engineering Processes and Equipment Journal, ISSN: 2078-774X, Published by the National Technical University "Kharkov Polytechnic Institute", Russia and Ukraine. November 2015 – Present.
10. Editorial Board Member, International Journal of Innovative Works in Engineering and Technology (IJIWET), ISSN: 2455-5797, Published by NAANJIL, India. October 2015 – Present.

U.S. NATIONAL SERVICE

1. Panel Member, Thermal Transport Processes (Unsolicited) Panel, Thermal Transport Processes Program, Chemical, Bioengineering, Environmental and Transport Systems (CBET) Division, National Science Foundation, Arlington, Virginia, USA, 2016.
2. Sponsored Representative, CVD – Congressional Visits Day, U. S. Senate and House of Representatives, Washington, D. C. Sponsored by Greater Huntsville Section of the AIAA – American Institute of Aeronautics and Astronautics, March 4, 2015.
3. Panel Member, Convection (Unsolicited) Panel, Thermal Transport Processes Program, Chemical, Bioengineering, Environmental and Transport Systems (CBET) Division, National Science Foundation, Arlington, Virginia, USA, 2014.
4. Participation as Panelist, "Educating Today's and Tomorrow's Propulsion Engineers" Panel, "Continuing Education and Professional Development" Program of the AIAA Science and Technology Forum and Exposition - SCITECH 2014, Washington, D.C., January, 13-17, 2014.
5. Participant, Second Graduate Deans Workshop on Institutionalizing Interdisciplinary Graduate Education, Virginia Tech, Virginia Polytechnic Institute and State University, and National Science Foundation, Arlington, Virginia, USA, November 1-2, 2012.
6. Participant, Graduate Deans Workshop on Institutionalizing Interdisciplinary Graduate Education, Virginia Tech, Virginia Polytechnic Institute and State University, and National Science Foundation, Arlington, Virginia, USA, April 2-3, 2012.
7. Panel Member, Convection (Unsolicited) Panel, Thermal Transport Processes Program, Chemical, Bioengineering, Environmental and Transport Systems (CBET) Division, National Science Foundation, Arlington, Virginia, USA, 2011.
8. Panel Member, Thermal Transport Processes Program (Unsolicited) Panel, Thermal Transport Processes Program, Chemical, Bioengineering, Environmental and Transport Systems (CBET) Division, National Science Foundation, Arlington, Virginia, USA, 2010.
9. Panel Member, Thermal Transport and Thermo Processing (TTTP) Program, Chemical and Transport Systems (CTS) Division, National Science Foundation, Arlington, Virginia, USA, 2005.
10. Session Chair, External Turbine Cooling, Aero-Heat Transfer Workshop, SCIES-South Carolina Institute for Energy Studies, Baton Rouge, Louisiana, USA, November 11-13, 2002.
11. Preproposal Panel Member, Science and Technology Centers (STC) Program, National Science Foundation, Arlington, Virginia, USA, 2000.
12. Career Panel Member, National Science Foundation, Division of Chemical & Thermal Systems, Dallas, Texas, USA, 1997.