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**RESEARCH AREAS**

Rarefied gas dynamics, deterministic and stochastic numerical methods for the Boltzmann and model kinetic equations, direct simulation Monte Carlo (DSMC); High-altitude aerothermodynamics and micropropulsion; Gas-phase effects in N/MEMS sensors and actuators; Vacuum gas dynamics; Modeling, analysis and design of vacuum deposition systems (MBE, P/CVD, EBPVD) for nano/microfabrication; Vacuum freeze-drying for bio/pharmaceutical manufacturing.

**EDUCATION**

Ph.D. Aerospace Engineering      The Pennsylvania State University      December 2003  
 Dissertation: "Modeling of Microscale Gas Flows using the DSMC Method"  
 M.S. Applied Mathematics      Novosibirsk State University      June 1999  
 Thesis: "Vibrational Relaxation in the Normal Shock"  
 B.S. Mathematics      Novosibirsk State University      June 1997  
 Thesis: "On the Rectilinear Steiner Tree Problem"

**PROFESSIONAL EXPERIENCE**

*Assistant Professor*      August 2006 – present  
 School of Aeronautics and Astronautics, Purdue University  
*Postdoctoral Scholar*      July 2004 – July 2006  
 Department of Aerospace and Mechanical Engineering, University of Southern California  
*Consultant on Basic Research*      January 2004 – March 2006  
 ERC Inc., Edwards Air Force Base, Edwards, CA  
*Research Assistant*      August 2000 – December 2003  
 Department of Aerospace Engineering, The Pennsylvania State University  
*Research Assistant*      August 1999 – July 2000  
 Department of Chemistry, George Washington University  
*Senior Laboratory Assistant*      January 1998 – June 1999  
 Computational Aerodynamics Laboratory, Khristianovich Institute of Theoretical and Applied Mechanics, The Siberian Branch of Russian Academy of Sciences, Novosibirsk

**HONORS AND AWARDS**

National Science Foundation CAREER Award      2011  
 1st Place, Poster Competition, International Rarefied Gas Dynamics Symposium      2010  
 Air Force Research Laboratory/Air Vehicles Directorate Summer Faculty      2009  
 Team Excellence Award, Purdue University College of Engineering      2009  
 American Society for Engineering Education /Air Force Summer Faculty      2007  
 Sun Microsystems Inc. Academic Excellence Grant      2007

Women in Science and Engineering (WiSE) Postdoctoral Fellowship  
Zonta International Foundation Amelia Earhart Award

2004 – 2006  
2003

## PUBLICATIONS

### Published and Accepted for Publication Refereed Journal Papers (\* denotes graduate student advisee)

**J1.** A.A. Alexeenko, D.A. Levin, S.F. Gimelshein, R.J. Collins, and G.N. Markelov, “Numerical Simulation of High-Temperature Gas Flows in a Millimeter-Scale Thruster,” *Journal of Thermophysics and Heat Transfer*, Vol. 16, No. 1, pp. 10–16, 2002.

**J2.** S.F. Gimelshein, A.A. Alexeenko, and D.A. Levin, “Modeling of the Interaction of a Side Jet with a Rarefied Atmosphere,” *Journal of Spacecraft and Rockets*, Vol. 39, No. 2, pp. 168–176, 2002.

**J3.** A.A. Alexeenko, N.E. Gimelshein, D.A. Levin, R.J. Collins, R. Rao, G.V. Candler, S.F. Gimelshein, J.S. Hong, and T. Schilling, “Modeling of Flow and Radiation in the Atlas Plume,” *Journal of Thermophysics and Heat Transfer*, Vol. 16, No. 1, pp. 50–57, 2002.

**J4.** A.A. Alexeenko, R.J. Collins, S.F. Gimelshein, D.A. Levin, and B.D. Reed, “Numerical Modeling of Axisymmetric and Three-Dimensional Flows in MEMS Nozzles,” *AIAA Journal*, Vol. 40, No. 5, pp. 897–904, 2002.

**J5.** A.A. Alexeenko, S.F. Gimelshein, D.A. Levin, A.D. Ketsdever, and M.S. Ivanov, “Measurements and Simulation of Orifice Flow for Micropropulsion Testing,” *Journal of Propulsion and Power*, Vol. 19, No. 4, pp. 588–594, 2003.

**J6.** S.F. Gimelshein, D.A. Levin, and A.A. Alexeenko, “Modeling of Chemically Reacting Flows from a Side Jet at High Altitudes,” *Journal of Spacecraft and Rockets*, Vol. 41, No. 4, pp. 582–591, 2004.

**J7.** A.A. Alexeenko, D.A. Levin, D.A. Fedosov, and S.F. Gimelshein, “Performance Analysis of Microthrusters Based on Coupled Thermal-Fluid Modeling and Simulation,” *Journal of Propulsion and Power*, Vol. 21, No. 1, pp. 95–101, 2005.

**J8.** A.D. Ketsdever, M. Clarbough, S.F. Gimelshein, and A.A. Alexeenko, “Experimental and Numerical Determination of Micropropulsion Device Efficiencies at Low Reynolds Numbers,” *AIAA Journal*, Vol. 43, No. 3, pp. 633–641, 2005.

**J9.** A.A. Alexeenko, S.F. Gimelshein, and D.A. Levin, “Reconsideration of Low Reynolds Number Flows through Constriction Microchannels using the DSMC Method,” *Journal of MicroElectroMechanical Systems*, Vol. 14, No. 4, pp. 847–865, 2005.

**J10.** A.A. Alexeenko, D.A. Fedosov, S.F. Gimelshein, and D.A. Levin, “Transient Heat Transfer and Gas Flow in a MEMS-based Thruster,” *Journal of MicroElectroMechanical Systems*, Vol. 15, No. 1, pp. 181–194, 2006.

**J11.** A.A. Alexeenko, S.F. Gimelshein, E.P. Muntz, and A.D. Ketsdever, “Kinetic Modeling of Temperature-Driven Flows in Short Microchannels,” *International Journal of Thermal Sciences*, Vol. 45, No. 11, pp. 1045–1051, 2006.

**J12.** Y.-L. Han, E.P. Muntz, A.A. Alexeenko, and M. Young, “Experimental and

Computational Studies of Temperature Gradient Driven Molecular Transport in Gas Flows through Nano/Micro-Scale Channels,” *Nanoscale and Microscale Thermophysical Engineering*, Vol. 11, No. 1&2, pp. 151-175, 2007.

**J13.** W.F. Louissos, A.A. Alexeenko, D.L. Hitt, and A. Zilic, “Design Considerations for Supersonic Micronozzles,” *International Journal of Manufacturing Research*, Vol. 3, No. 1, pp. 80-113, 2008.

**J14.** X. Guo\*, C. Huang, A. Alexeenko, and J. Sullivan, “Numerical and Experimental Study of Gas Flows in 2D and 3D Microchannels,” *Journal of Micromechanics and Microengineering*, Vol. 18, No. 2, 025034, 8 pages, 2008. Also in *IOP Select*, a free service from Institute of Physics (IOP) journals “comprising articles chosen by editors for their novelty, significance and potential impact on future research,” and in *JMM 2008 Highlights Collection*, “a showcase of the top contributions published in 2008.”

**J15.** W. B. Stein\*, A. Alexeenko, and I. Hrbud, “Performance Modeling of a Coaxial Radio-Frequency Gas Discharge Microthruster,” *Journal of Propulsion and Power*, Vol. 24, No. 5, pp. 1007-1017, 2008.

**J16.** N. Selden, C. Ngalande, S. Gimelshein, E.P. Muntz, A. Alexeenko, and A. Ketsdever, “Area and Edge Effects in Radiometric Forces,” *Physical Review E*, Vol. 79, 041201, 6 pages, 2009.

**J17.** X. Guo\* and A. Alexeenko, “Compact Model of Squeeze-Film Damping based on Rarefied Flow Simulations,” *Journal of Micromechanics and Microengineering*, Vol. 19, No. 4, 045026, 7 pages, 2009.

**J18.** R. Bidkar, R. Tung, A. Alexeenko, H. Sumali, and A. Raman, “Unified Theory of Gas Damping of Flexible Microcantilevers at Low Ambient Pressures,” *Applied Physics Letters*, Vol. 94, 163117, 3 pages, 2009.

**J19.** D. Singh, X. Guo\*, A. A. Alexeenko, J.Y. Murthy, and T.S. Fisher, “Modeling of Subcontinuum Thermal Transport Across Semiconductor-Gas Interfaces,” *Journal of Applied Physics*, Vol. 106, No. 2, 024314, 13 pages, 2009.

**J20.** A. Alexeenko, A. Ganguly\*, and S. L. Nail, “Computational Analysis of Fluid Dynamics in Pharmaceutical Freeze-Drying,” *Journal of Pharmaceutical Sciences*, Vol. 98, No. 9, pp. 3484-3494, 2009.

**J21.** X. Guo\*, D. Singh, J. Y. Murthy, and A. A. Alexeenko, “Numerical Simulation of Gas-Phonon Coupling in Thermal Transpiration Flows,” *Physical Review E*, Vol. 80, No. 4, 046310, 10 pages, 2009.

**J22.** X. Guo\*, J. Li, D. Xiu, and A.A. Alexeenko, “Uncertainty Quantification Models for Microscale Squeeze-Film Damping,” *International Journal for Numerical Methods in Engineering*, Vol. 84, No. 10, pp. 1257-1272, 2010.

**J23.** S. Chigullapalli\*, A. Venkattraman\*, M.S. Ivanov, and A.A. Alexeenko, “Entropy Considerations in Numerical Simulations of Non-Equilibrium Rarefied Flows,” *Journal of Computational Physics*, Vol. 229, pp. 2139-2158, 2010.

**J24.** A. Venkattraman\*, and A. Alexeenko, “DSMC Modeling of E-Beam Metal Deposition,” *Journal of Vacuum Science and Technology A*, Vol. 28, No. 4, pp. 916-924,

2010.

**J25.** A. B. Weaver\*, A.A. Alexeenko, R. B. Greendyke, and J.A. Camberos, "Flowfield Uncertainty Analysis for Hypersonic CFD Simulations", *Journal of Thermophysics and Heat Transfer*, Vol. 25, No. 1, pp. 10-20, 2011.

**J26.** J. Nabeth\*, S. Chigullapalli\*, and A. Alexeenko, "Quantifying the Knudsen Force on Heated Microbeams: A Compact Model and Direct Comparison with Measurements", *Physical Review E*, Vol. 83, Article 066306, 5 pages, 2011.

**J27.** A. Alexeenko, S. Chigullapalli\*, J. Zeng, X. Guo\*, A. Kovacs, and D. Peroulis, "Uncertainty in Microscale Gas Damping: Implications on Dynamics of Capacitive MEMS Switches", *Reliability Engineering and System Safety*, Vol. 96, No. 9, pp. 1171-1183, 2011.

**J28.** W. Stein\* and A. Alexeenko, "Plug-Annular Micronozzles: A New Prospect for Microthrusters", *Journal of Propulsion and Power*, Vol. 27, No. 6, pp. 1259-1265, 2011.

**J29.** A. Venkatraman\* and A. Alexeenko, "DSMC Study of Effects of Thermal Non-Uniformities in Electron-Beam Physical Vapor Deposition", *Journal of Vacuum Science and Technology A*, Vol. 29, No. 4, Article 041509, 10 pages, 2011.

**J30.** M. Kulakhmetov\* and A. A. Alexeenko, "Model Uncertainties in Simulations of Hypersonic Leading-Edge Flow", accepted for publication in *Journal of Spacecraft and Rockets*, September 2011.

**J31.** A. Venkatraman\* and A. A. Alexeenko, "Binary Scattering Model for Lennard-Jones Potential: Transport Coefficients and Collision Integrals for Non-equilibrium Gas Flow Simulations", *Physics of Fluids*, Vol. 24, 2012, in press.

**J32.** A. Venkatraman\*, A. Garg, D. Peroulis, and A. A. Alexeenko, "Direct Measurements and Numerical Simulations of Gas Charging in MEMS Capacitive Switches", accepted for publication in *Applied Physics Letters*, February 2012.

### **Submitted Journal Papers**

**J33.** A. Ganguly\* and A. A. Alexeenko, "Modeling and Measurements of Water-Vapor Flow and Icing at Low Pressures with Application to Pharmaceutical Freeze-Drying", submitted, July 2011.

**J34.** A. Venkatraman\* and A. A. Alexeenko, "Direct Simulation Monte Carlo Model of Elastic Scattering with the Lennard-Jones Potential", submitted, August 2011.

**J35.** A. Venkatraman\* and A. A. Alexeenko, "DSMC Modeling of Metal Vapor Flows in Application to Thin Film Deposition", submitted, November 2011.

**J36.** A. Ganguly\*, S. L. Nail, and A. A. Alexeenko, "Rarefied Gas Dynamics Aspects of Pharmaceutical Freeze-Drying", submitted, November 2011.

**J37.** S. Chigullapalli\*, S. Mathur, G. Yildirim, L. Sun, J. Murthy, and A. A. Alexeenko, "An Unstructured Finite Volume Method for Unsteady Rarefied Flows in Complex Geometries", submitted, November 2011.

**J38.** S. Chigullapalli\*, A. B. Weaver\*, A. A. Alexeenko, "Non-linear Effects in Squeeze-

Film Gas Damping on Microbeams”, submitted, November 2011.

### **Published Conference Proceedings**

*(\* denotes graduate student advisee; \*\* denotes undergraduate student )*

**C1.** A.A. Alexeenko, R.J. Collins, S.F. Gimelshein, and D.A. Levin, “Challenges of Three-dimensional Modeling of Microscale Propulsion Devices with the DSMC Method,” American Institute of Physics Conf. Proc. 585, pp. 464-471, 2001, 22nd International Symposium on Rarefied Gas Dynamics, Sydney, Australia, July 9–16, 2000.

**C2.** A.A. Alexeenko, R.J. Collins, S.F. Gimelshein, and D.A. Levin, “Numerical Modeling of Three-dimensional and Axisymmetric Flows in MEMS Nozzles,” AIAA Paper 2000-3668, 36th AIAA/ASME/SAE/ASEE Joint Propulsion Conference, Huntsville, AL, July 16–19, 2000.

**C3.** A.A. Alexeenko, N.E. Gimelshein, D.A. Levin, S.F. Gimelshein, J.S. Hong, T. Schilling, R.J. Collins, G. Candler, and R. Rao, “Modeling of Radiation in the Atlas Plume-Flow,” AIAA Paper 2001-0355, 39th AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, Jan. 9–11, 2001.

**C4.** S.F. Gimelshein, A.A. Alexeenko, and D.A. Levin, “Modeling of the Interaction of a Side Jet with a Rarefied Atmosphere,” AIAA Paper 2001-0503, 39th AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, Jan. 9–11, 2001.

**C5.** A.A. Alexeenko, D.A. Levin, S.F. Gimelshein, R.J. Collins, and G.N. Markelov, “Numerical Simulation of Gas Flows in a Millimeter-Scale Thruster,” AIAA Paper 2001-1011, 39<sup>th</sup> AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, Jan. 9–11, 2001.

**C6.** A.A. Alexeenko, D.A. Levin, S.F. Gimelshein, R.J. Collins, and B.D. Reed, “Numerical Study of Flow Structure and Thrust Performance for 3-D MEMS-based Nozzles,” AIAA Paper 2002-3194, 32nd AIAA Fluid Dynamics Conference and Exhibit, St. Louis, Missouri, June 24–26, 2002.

**C7.** A.A. Alexeenko, S.F. Gimelshein, D.A. Levin, A.D. Ketsdever, and M.S. Ivanov, “Study of Orifice Flow in the Transitional Regime,” American Institute of Physics Conf. Proc. 663, pp. 565-571, 2003, 23rd International Symposium on Rarefied Gas Dynamics, Whistler, BC, Canada, July 21–25, 2002.

**C8.** A.A. Alexeenko, D.A. Levin, S.F. Gimelshein, and B.D. Reed, “Numerical Investigation of Physical Processes in High-Temperature MEMS-based Nozzle Flows,” American Institute of Physics Conf. Proc. 663, pp. 760-767, 2003, 23rd International Symposium on Rarefied Gas Dynamics, Whistler, BC, Canada, July 21–25, 2002.

**C9.** A.A. Alexeenko, D.A. Levin, D. A. Fedosov, S. F. Gimelshein, and R.J. Collins, “Coupled Thermal-Fluid Analyses of Microthruster Flows,” AIAA Paper 2003-673, 41st, AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, Jan. 6–9, 2003.

**C10.** A.A. Alexeenko, S.F. Gimelshein, and D.A. Levin, “Reconsideration of Flows through Constriction Microchannels Using the DSMC Method,” AIAA Paper 2003-4009, 33<sup>rd</sup> AIAA Fluid Dynamics Conference and Exhibit, Orlando, Florida, June 23–26, 2003.

**C11.** A.A. Alexeenko, D.A. Levin, D.A. Fedosov, S.F. Gimelshein, and R.J. Collins, “Coupled Thermal-Fluid Modeling of Micronozzles for Performance Analysis,” AIAA Paper 2003-4717, 39th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, Huntsville, AL, July 20–23, 2003.

**C12.** S.F. Gimelshein, A.A. Alexeenko, N. Selden, and A.D. Ketsdever, “Plume Interactions of Multiple Jets Expanding into Vacuum: Experimental and Numerical Investigation,” AIAA Paper 2004-1348, 42nd AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, Jan. 5–8, 2004.

**C13.** A.D. Ketsdever, T.C. Lilly, S.F. Gimelshein, and A.A. Alexeenko, “Experimental and Numerical Study of Nozzle Plume Impingement on Spacecraft Surfaces,” American Institute of Physics Conf. Proc. 762, pp. 367-372, 2005, 24th International Symposium on Rarefied Gas Dynamics, Monopoli, Bari, Italy, July 10–16, 2004.

**C14.** D.A. Fedosov, S.V. Rogazinsky, M.I. Zeifman, M.S. Ivanov, A.A. Alexeenko, and D.A. Levin, “Analysis of Numerical Errors in the DSMC Method,” American Institute of Physics Conf. Proc. 762, pp. 589-594, 2005, 24th International Symposium on Rarefied Gas Dynamics, Monopoli, Bari, Italy, July 10–16, 2004.

**C15.** A.A. Alexeenko, D.C. Wadsworth, S.F. Gimelshein, and A.D. Ketsdever, “Numerical Modeling of ISS Thruster Plume Induced Contamination,” SPIE Proc. 5526, pp. 125-136, 2004, 49th SPIE International Symposium on Optical Science and Technology, Denver, CO, Aug. 2–6, 2004.

**C16.** S.F. Gimelshein, A.A. Alexeenko, D.C. Wadsworth, and N.E. Gimelshein, “The Influence of Particulates on Thruster Plume/Shock Wave Interaction at High Altitudes,” AIAA Paper 2005-766, 43rd AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, Jan. 10–13, 2005.

**C17.** A.A. Alexeenko, S.F. Gimelshein, E.P. Muntz, and A.D. Ketsdever, “Modeling of Thermal Transpiration Flows for Knudsen Compressor Optimization,” AIAA Paper 2005-963, 43<sup>rd</sup> AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, Jan. 10–13, 2005.

**C18.** A.A. Alexeenko, E.P. Muntz, M. Gallis, and J.R. Torczynski, “Comparison of Kinetic Models for Gas Damping of Moving Microbeams,” AIAA Paper 2006-3715, 36th AIAA Fluid Dynamics Conference and Exhibit, San Francisco, CA, June 5–8, 2006.

**C19.** Y.-L. Han, A.A. Alexeenko, M. Young, and E.P. Muntz, “Experimental and Computational Studies of Temperature Gradient Driven Molecular Transport in Gas Flows through Nano/Micro-Scale Channels,” 2nd International Conference on Transport Phenomena in Micro and Nanodevices, Barga, Italy, June 11–15, 2006.

**C20.** A.A. Alexeenko, “Numerical Error Analysis for Deterministic Kinetic Solutions of Low-Speed Flows,” Proceedings of 25th International Symposium on Rarefied Gas Dynamics, Saint-Petersburg, Russia, July 21–28, 2006. Publishing House of Siberian Branch of Russian Academy of Sciences, 2007.

**C21.** M.S. Ivanov, A.V. Kashkovsky, S.F. Gimelshein, G.N. Markelov, A.A. Alexeenko, Y. A. Bondar, G.A. Zhukova, S.B. Nikiforov, and P.V. Vaschenkov, “SMILE System for 2D/3D DSMC Computations,” Proceedings of 25th International Symposium on Rarefied

Gas Dynamics, St. Petersburg, Russia, July 21-28, 2006. Publishing House of Siberian Branch of Russian Academy of Sciences, 2007, pp. 539-544.

**C22.** E. P. Muntz, A.A. Alexeenko, S. F. Gimelshein, A. D. Ketsdever, Y.-L. Han, M. P. Young, J. H. Park, C. Ngalande, N. P. Selden, and R. H. Lee, “Low Speed Nano/Micro/Meso-Scale Rarefied Flows Driven by Temperature and Pressure Gradients,” Proceedings of 25<sup>th</sup> International Symposium on Rarefied Gas Dynamics, St. Petersburg, Russia, July 21-28, 2006. Publishing House of Siberian Branch of Russian Academy of Sciences, 2007, pp. 1085-1092.

**C23.** W. B. Stein\*, A. A. Alexeenko, I. Hrbud, and Y. Bondar, “Performance Modeling of RF Co-Axial Thruster,” AIAA Paper 2007-5292, 43rd AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit, Cincinnati, OH, July 8-11 2007.

**C24.** X. Guo\*, C. Huang, A.A. Alexeenko, and J. Sullivan, “Numerical and Experimental Study of Gas Flow in 2D and 3D Microchannels,” ICNMM Paper 2007-30178, 5th Int. Conf. On Nanochannels, Microchannels, Minichannels, Puebla, Mexico, June 18-20, 2007.

**C25.** A. Zilic, D. Hitt, and A. Alexeenko,” Numerical Simulations of Supersonic Flow in a Linear Aerospike Micro Nozzle,” AIAA Paper 2007-3984, 37th AIAA Fluid Dynamics Conference and Exhibit, Miami, FL, June 25-28, 2007.

**C26.** K.L. Gates Medlock, A.A. Alexeenko, and J.M. Longuski, “Trajectory and Aerothermodynamic Analysis of Towed-Ballute Aerocapture Using DSMC,” AAS Paper 07-307, AAS/AIAA Astrodynamics Specialist Conference, Mackinac Island, MI, August 19-24, 2007.

**C27.** W. B. Stein\*, A.A. Alexeenko, and I. Hrbud, “RFCCD Microthruster Performance via Numerical Simulation,” AIAA Paper 2008-962, 46th AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, Jan. 7-10, 2008.

**C28.** X. Guo\*, C. Huang, A. Alexeenko, and J. P. Sullivan, “Modeling and Preliminary Experiment for Rarefied Gas Flows in Constricted Microchannels,” ICNMM Paper 2008-62287, 6<sup>th</sup> International ASME Conference on Nanochannels, Microchannels and Minichannels, Darmstadt, Germany, June 23-25, 2008.

**C29.** S. Chigullapalli\*, V. Ayyaswamy, A. Alexeenko, and M.S. Ivanov, “Non-Equilibrium Flow Modeling Using High-Order Schemes for the Boltzmann Model Equations,” AIAA Paper 2008-3929, 40th Thermophysics Conference, Seattle, Washington, June 23-26, 2008.

**C30.** A. Alexeenko, C. Galitzine\*, and A. M. Alekseenko, “High-Order Discontinuous Galerkin Method for Boltzmann Model Equations,” AIAA Paper 2008-4256, 40th Thermophysics Conference, Seattle, Washington, June 23-26, 2008.

**C31.** W. Stein\* and A. Alexeenko, “Application of the DSMC Method for Design of a Coaxial Microthruster Nozzle,” AIAA Paper 2008-4530, 44th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, Hartford, CT, July 21-23, 2008.

**C32.** W. Stein\*, A. Alexeenko, and I. Hrbud, “Plasma-Neutral Heat Transfer in Coaxial RF Argon Discharges,” AIAA Paper 2008-5192, 44th AIAA/ASME/SAE/ASEE Joint

Propulsion Conference and Exhibit, Hartford, CT, July 21-23, 2008.

**C33.** J.D. Olliges, A.D. Ketsdever, W.B. Stein, A.A. Alexeenko, and I. Hrbud, “Experimental and Computational Investigation of an RF Plasma Micro-Thruster,” 26th International Symposium on Rarefied Gas Dynamics, Kyoto, Japan, July 20-25, 2008.

**C34.** N.P. Selden, S.F. Gimelshein, E.P. Muntz, A. Alexeenko, and A.D. Ketsdever, “Experimental and Computational Study of Area and Perimeter Contributions to Radiometer Forces,” 26<sup>th</sup> International Symposium on Rarefied Gas Dynamics, Kyoto, Japan, July 20-25, 2008.

**C35.** X. Guo\*, D. Singh, J. Y. Murthy, and A. Alexeenko, “Gas-Phonon Interaction Model for Subcontinuum Thermal Transport Simulations,” 26th International Symposium on Rarefied Gas Dynamics, Kyoto, Japan, July 20-25, 2008.

**C36.** D. Singh, X. Guo\*, A. Alexeenko, and J. Murthy, “Modeling of subcontinuum thermal transport across semiconductor-gas interfaces,” Proceedings of Summer Heat Transfer Conference, Jacksonville, Florida, August 10-14, 2008.

**C37.** S. Chigullapalli\*, V. Ayyaswamy, and A. Alexeenko, “Modeling of Viscous Shock Tube Using ES-BGK Model Kinetic Equations”, AIAA Paper 2009-1317, 47th AIAA Aerospace Sciences Meeting and Aerospace Exposition, Orlando, Florida, Jan. 5-8, 2009.

**C38.** A. Ashok\*\*, W. Stein\*, and A.A. Alexeenko, “Numerical Investigation of Power Transmission Efficiency in a RF Plasma”, AIAA Paper 2009-1383, 47th AIAA Aerospace Sciences Meeting and Aerospace Exposition, Orlando, Florida, Jan. 5-8, 2009.

**C39.** V. Ayyaswamy\* and A. Alexeenko, “Simulations and Measurements of Gas-Droplet Flows in Supersonic Jets in Vacuum”, AIAA Paper 2009-3751, 41st AIAA Thermophysics Conference, San Antonio, Texas, June 22-25, 2009.

**C40.** X. Guo\* and A. Alexeenko, “Simulations of Aerodynamics Damping for MEMS Resonators”, AIAA Paper 2009-3581, 39th AIAA Fluid Dynamics Conference, San Antonio, Texas, June 22-25, 2009.

**C41.** A. Weaver\*, A. Alexeenko, R. Greendyke, and J. Camberos, “Flowfield Uncertainty Analysis for Hypersonic CFD Simulations”, AIAA Paper 2010-1180, 48th AIAA Aerospace Sciences Meeting Including the New Horizons Forum and Aerospace Exposition, Orlando, Florida, Jan. 4-7, 2010.

**C42.** A. Ganguly\*, S. Nail, and A. Alexeenko, “Experimental Determination of the Key Heat Transfer Mechanisms in Pharmaceutical Freeze Drying”, AIAA Paper 2010-4654, 10<sup>th</sup> AIAA/ASME Joint Thermophysics and Heat Transfer Conference, Chicago, Illinois, June 28-1, 2010.

**C43.** J. Nabeth\*, S. Chigullapalli, and A. Alexeenko, “Numerical Simulations of Knudsen Forces in Microsystems”, AIAA Paper 2010-5054, 10th AIAA/ASME Joint Thermophysics and Heat Transfer Conference, Chicago, Illinois, June 28-1, 2010.

**C44.** A. Ganguly\*, A. Venkatraman\*, and A. Alexeenko, “3D DSMC Simulations of Vapor/Ice Dynamics in a Freeze-Dryer Condenser”, AIP Conf. Proc., Vol. 1333, 27th International Symposium on Rarefied Gas Dynamics, pp. 254-259, 2011.

**C45.** A. Venkatraman\* and A. Alexeenko, “Visualizing Non-Equilibrium Flow Simulations using 3-D Velocity Distribution Functions”, AIP Conf. Proc., Vol. 1333, 27th International Symposium on Rarefied Gas Dynamics, pp. 366-371, 2011.

**C46.** M. Kulakhmetov\*, A. Venkatraman\*, and A. Alexeenko, “Effects of Uncertainty in Gas-Surface Interaction on DSMC Simulations of Hypersonic Flows”, AIP Conf. Proc., Vol. 1333, 27th International Symposium on Rarefied Gas Dynamics, pp. 452-457, 2011.

**C47.** J. Nabeth\*, S. Chigullapalli\*, and A. Alexeenko, “What Determines Knudsen Force at the Microscale”, AIP Conf. Proc., Vol. 1333, 27th International Symposium on Rarefied Gas Dynamics, pp. 754 – 759, 2011.

**C48.** A. Venkatraman\* and A. Alexeenko, “Molecular Models for DSMC Simulations of Metal Vapors in Vacuum Deposition Systems”, AIP Conf. Proc., Vol. 1333, 27th International Symposium on Rarefied Gas Dynamics, pp. 1057-1062, 2011.

**C49.** A. Alexeenko and S. Chigullapalli, "Implications of Rarefied Gas Damping for RF MEMS Reliability", AIP Conf. Proc., Vol. 1333, 27th International Symposium on Rarefied Gas Dynamics, pp. 701-706, 2011.

**C50.** M. Kulakhmetov\* and A. Alexeenko, "Model Uncertainties in a Sharp Leading-Edge Hypersonic Boundary Layer", AIAA Aerospace Sciences Meeting, January 4-7, 2011.

**C51.** D. Parkos\*\*, N. Raghunathan, V. Ayyaswamy\*, A. Alexeenko, and D. Peroulis, "Near-Contact Damping Model and Dynamic Response of Microbeams under High-g Loads", Proceedings of International Conference on Microelectromechanical Systems (MEMS 2011), Cancun, Mexico, January 23-27, 2011, pp. 1084-1089.

**C52.** A. Garg, V. Ayyaswamy\*, A. Kovacs, A. Alexeenko, and D. Peroulis, "Direct Measurement of Field Emission Current in Static MEMS Structures", Proceedings of International Conference on Microelectromechanical Systems (MEMS 2011), Cancun, Mexico, January 23-27, 2011, pp. 412 - 415.

**C53.** V. Ayyaswamy\* and A. Alexeenko, “DSMC Collision Model for the Lennard-Jones Potential: Efficient Algorithm and Verification”, AIAA Paper 3313, 42<sup>nd</sup> AIAA Thermophysics Conference, Honolulu, HI, June 27-30, 2011.

**C54.** S. Chigullapalli and A. Alexeenko, “Unsteady 3D Rarefied Flow Solver Based on Boltzmann-ESBGK Model Kinetic Equations”, AIAA Paper 2011-3993, 41<sup>st</sup> AIAA Fluid Dynamics Conference, Honolulu, HI, June 27-30, 2011.

**C55.** A. Venkatraman\*, A. Garg, D. Peroulis, and A. Alexeenko, “Field Emission Driven Microplasma in MEMS: PIC/MCC Modeling and Direct Measurements”, Proceedings of International Symposium on Plasma Chemistry, Philadelphia, PA, July 22 – 27, 2011.

**C56.** A. Cofer\*, A. Venkatraman\*, and A. Alexeenko, “Micro-Spike based Hybrid Chemical/Electric Thruster Concept for Versatile Nanosat Propulsion”, AIAA Paper 2011-5921, 47th AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit, San Diego, CA, July 31 – August 03, 2011.

**C57.** A. Alexeenko and A. Venkatraman\*, “Focused Solar Ablation: A Nanosat-Based Method for Active Removal of Space Debris”, AIAA Paper 2011-6143, 47th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, San Diego, CA, July 31-3, 2011.

**C58.** A. Ganguly\*, A. Alexeenko, and F. DeMarco, “Simulations and Measurements of Water Vapor Flows and Ice Dynamics in a Freeze-Dryer Condenser”, Proceedings of the ASME 2011 International Mechanical Engineering Congress & Exposition IMECE2011-63593, Denver, Colorado, USA, November 11-17, 2011.

**C59.** S. Chigullapalli\* and A. A. Alexeenko, “Modeling of Microstructures Actuation by the Knudsen Thermal Force”, Proceedings of the ASME 2011 International Mechanical Engineering Congress & Exposition IMECE2011-64685, Denver, Colorado, USA, November 11-17, 2011.

**C60.** A. Venkatraman\* and A. A. Alexeenko, “Simulations of Impulsive Dynamics in RF MEMS Capacitive Switches”, Proceedings of the ASME 2011 International Mechanical Engineering Congress & Exposition IMECE2011-64693, Denver, Colorado, USA, November 11-17, 2011.

**C61.** A. Alexeenko, M. Kulakhmetov, A. Weaver, M. Slipchenko, J. Mihaly, M. Adams, A. Rosakis, "Feasibility of Non-Equilibrium Hypersonic Flow Measurements in Small Particle Hypervelocity Impact Range", AIAA Paper 2012-0596, Proceedings of 50th AIAA Aerospace Sciences Meeting, Nashville, TN, January 9-12, 2012, 15 pages.

**C62.** N. Raghunathan, B. Sanborn, A. Venkatraman\*, A. Alexeenko, W. Chen, D. Peroulis, “Real-Time In Situ Electronic Monitoring of Dynamic Contact Behavior of MEMS High-g Switches”, Proceedings of International Conference on Microelectromechanical Systems (MEMS 2012), January 29-February 1, 2012, Paris, France.

### **Invited Presentations at Conferences and Symposia**

(\* denotes the speaker)

**I1.** E.P. Muntz\*, A.A. Alexeenko, S.F. Gimelshein, A.D. Ketsdever, Y.-L. Han, M.P. Young, J.H. Park, C. Ngalande, N.P. Selden, R.H. Lee, “Low Speed Nano/Micro/Meso-Scale Rarefied Flows Driven by Temperature and Pressure Gradients,” 25<sup>th</sup> International Symposium on Rarefied Gas Dynamics, St. Petersburg, Russia, July 21-28, 2006.

**I2.** J.D. Olliges, A.D. Ketsdever\*, W.B. Stein, A.A. Alexeenko, I. Hrbud, “Experimental and Computational Investigation of an RF Plasma Micro-Thruster,” 26<sup>th</sup> International Symposium on Rarefied Gas Dynamics, Kyoto, Japan, July 20-25, 2008.

**I3.** A. Alexeenko\*, “Modeling of Vapor Flow in A Freeze Dryer”, Freeze-Drying of Pharmaceuticals and Biologicals Conference, Breckenridge, CO, August 7 – 9, 2008.

**I4.** A. Alexeenko\*, “Micropropulsion Devices: Challenges and Novel Concepts,” 2nd Nanotechnology International Forum, Moscow, Russia, October 6-8, 2009.

**I5.** A. Alexeenko\*, A. Ganguly, S. Nail, “Modeling and Simulation of Vapor/Ice Dynamics in Pharmaceutical Freeze-Drying”, Freeze-Drying of Pharmaceuticals and Biologicals Conference, Garmisch, Germany, September 27 – October 1, 2010.

**I6.** A. Alexeenko\*, “Controlling the Freeze Drying Process: Simulations and Modeling”, World Lyophilization Summit, Cambridge, MA, May 23 – 25, 2011.

**I7.** A. Alexeenko, W. Chen, D. Peroulis\*, “Design, Modeling, and Experimental Validation of High-g MEMS Accelerometers”, 50th AIAA Aerospace Sciences Meeting, Nashville, TN, January 9-12, 2012.

### **Invited Seminars at Universities, Industry and Government Laboratories**

**S1.** “Thermally Driven Microflows: Phenomena and Modeling Approaches,” School of Engineering, University of Vermont, October 20, 2006.

**S2.** “Modeling of Gas Flows in Freeze-Drying Systems,” Baxter BioPharma, Bloomington, IN, November 16, 2007.

**S3.** “Thermally Driven Microflows: Phenomena and Modeling Approaches,” Department of Mathematical Sciences at the George Mason University, November 30, 2007.

**S4.** “Cluster Formation in Supersonic Jets,” Veeco Instruments, St. Paul, MN, May 1, 2008.

**S5.** “Modeling of Flows with Translational Non-Equilibrium,” invited seminar at the Computational Sciences Branch, AFRL-RB, Wright-Patterson Air Force Base, January 22, 2009.

**S6.** “Fluid Dynamics of Pharmaceutical Freeze-Drying: Phenomena and Modeling Approaches,” Department of Pharmaceutical Chemistry, The University of Kansas, Lawrence, KS, January 27, 2009.

**S7.** “Gas-Phase Effects in Electrostatically Actuated MEMS,” Laboratory for Computational Physics and Fluid Dynamics, Naval Research Laboratory, Washington, DC, May 7, 2009.

**S8.** “Freeze-Drying Condenser Modeling”, IMA Edwards Pharmaceutical Systems (now IMA Life), Tonawanda, NY, November 12, 2009.

**S9.** “Advanced DSMC/CFD Modeling of Vacuum Deposition Systems”, Veeco Instruments, St. Paul, MN, January 11, 2011.

**S10.** “Knudsen Forces at the Microscale: Key Mechanisms, Modeling Approaches and Pathways to Practical Devices”, Oak Ridge National Laboratory, Oak Ridge, TN, March 8, 2011.

**S11.** “Modeling and Measurements of Vapor/Ice Dynamics for Freeze-Drying Technology”, Pfizer Inc., Andover, MA, May 23, 2011.

**S12.** “Advanced DSMC/CFD Modeling for Freeze-Drying Technology”, SP Scientific, Gardiner, NY, July 25, 2011.

**S13.** “Fluid Dynamics of Freeze-Drying: Phenomena, Modeling Approaches and Implications for Process Design”, Department of Pharmaceutical Sciences, The University of Connecticut, September 20, 2011.

**S14.** “Fluid Dynamic Modeling for Lyophilization Technology: Quantifying and Reshaping the Design Space”, Abbott Laboratories, Chicago, IL, December 8, 2011.

### Patent Application

W. Stein, A. Alexeenko, I. Hrbud, D. Hitt, “Method of Enhancing Microthruster Performance”. U.S. Utility Patent Application No. 61/127,553 filed May 14, 2009.

### Software and Online Tools

**T1.** Co-Developer, “SMILE: Statistical Modeling in Low-density Environment.” A general purpose 2D/3D parallel DSMC solver.

**T2.** Author and Developer, “Gas Dynamics Toolbox”: <http://web.ics.purdue.edu/~alexeenk/GDT>

**T3.** Co-Author, “Q-UQ: Q-factor Calculator with Uncertainty Quantification”: <http://nanohub.org/resources/6759>

**T4.** Co-Author, “Coarse-Grained Model of RF MEMS Device”: <http://memshub.org/resources/prismcg>

### FUNDED RESEARCH PROGRAMS

#### Summary

**Total external funding for A. Alexeenko’s group: \$1.43 million**

**Total external award amount as PI or Co-PI: \$19 million**

**Principal Investigator on 10 externally funded projects**

#### Government Agency Sponsored Programs

**G1.** NNSA/DOE, “PRISM: Center for Prediction of Reliability, Integrity, and Survivability of Microsystems”, \$21.2M (external award amount: \$17M; for Alexeenko’s group: approx. \$400k), 04/15/08-04/14/13, Co-PI (PI: Jayathi Murthy; Co-PIs: Weinong Chen(AAE), Ananth Grama(CS), Ahmed Sameh(CS), Alejandro Strachan(MSE), Anil Bajaj(ME), Arvind Raman(ME), Deborah Sulsky(U. New Mexico), Dongbin Xiu (Math), Eric Stach(MSE), Marisol Koslowski(ME), Michael McLennan (ITaP), Muhammad A. Alam(ECE), Narayan Aluru (UIUC), Dimitrios Peroulis (ECE), Faisal Saied (ITaP), Suchuan Dong(Math), Tim Fisher(ME), Sankaran Mahadevan (Vanderbilt)).

**G2.** National Science Foundation, “GOALI: Modeling and Control of Fluid Dynamics and Ice Formation in Pharmaceutical Freeze-Drying”, \$93,157; 09/01/2008-02/28/2010, PI (Co-PI: Steven L. Nail, Baxter BioPharma).

**G3.** Defense Threat Reduction Agency, “Development and Evaluation of Novel MEMS Digital Accelerometers”, \$1,320,000 (for Alexeenko’s group: \$70,000 during 01/01/2010 – 03/31/2011), 04/01/2008 – 03/31/2011, Co-PI (PI: Weinong Chen; Co-PI: Dimitrios Peroulis).

**G4.** National Science Foundation, “CAREER: Quantifying and Exploiting Knudsen Thermal Forces in Nano/Microsystems”, \$400,000; 02/01/2011 – 01/31/2016, PI.

**G5.** Defense Threat Reduction Agency, “Exploration of MEMS G-Switches at 100 – 10,000 G-Levels with Redundancy”, \$346,000 (for Alexeenko’s group: \$100,000), 08/15/2011-08/14/2012, Co-PI (PI: Weinong Chen; Co-PI: Dimitrios Peroulis).

**G6.** National Institute for Pharmaceutical Technology and Education/Food and Drug

Administration, “Variation in Pressure within the Drying Chamber and Impact on Freeze-Drying Design Space: A Combination Theoretical and Experimental Study”, \$90,000 (for Alexeenko’s group: \$45,000), 03/01/2012-02/28/2013, Co-PI (PI: Robin Bogner, University of Connecticut; Co-PI: Michael Pikal, University of Connecticut).

### ***Industry Sponsored Programs***

**G7.** Sun Microsystems, Inc., Academic Excellence Grant Program, “Java Parallel Computing for Fluid Dynamics and Heat Transfer Simulation,” \$42,995; March 2007 (one time equipment grant), PI.

**G8.** Veeco Instruments, Inc., “Verification of DSMC Source Modeling”, \$85,801; 02/01/08 – 07/31/09, PI.

**G9.** Baxter BioPharma Solutions, LLC, Voluntary support for research on pharmaceutical freeze-drying, \$12,000; September 2009, PI.

**G10.** IMA Life, Voluntary support for research on pharmaceutical freeze-drying, \$50,000; February 2010, PI.

**G11.** Baxter BioPharma Solutions, LLC, Voluntary Support for research on pharmaceutical freeze-drying, \$10,000; September 2010, PI.

**G12.** Veeco Instruments, Inc., “Flow Modeling in Conductance Tube of Linear Source,” \$70,714; 03/01/2011 – 11/30/2011, PI.

**G13.** Raybestos Powertrain, “CFD Modeling of Flow and Heat Transfer in Automotive Clutch”, \$30,000; 12/01/2011-05/31/2012, PI (Co-PI: Steven Collicott)

**G14.** IMA Life North America, “Fusion Shelf Fluid Heat Transfer Model”, \$18,428; 12/12/2011-02/29/2012, PI

### ***Other Sponsored Programs***

**OG1.** Purdue Research Foundation, Computing Research Institute Special Incentive Research Grant, “Large-Scale Simulation of Coupled Phonon-Gas Thermal Transport in Nanoscale Geometries,” \$15,772, 08/01/2007–07/31/2008, PI (Co-PI: Jayathi Murthy).

**OG2.** Center for Advanced Manufacturing, Discovery Park Seed Grant, “Lyophilization Modeling for Pharmaceutical Manufacturing,” \$33,853; 12/01/2007 – 11/30/2008, PI.

**OG3.** Purdue Research Foundation, “High-Order Space/Time Methods and Solver for Transient Rarefied Flows”, \$16,374; 08/01/2008–07/31/2009, PI.

**OG4.** Birck Nanotechnology Center, Kirk Endowment Seed Grant, “Modeling of Thin-Film Metal Deposition”, \$15,000; 05/11/2010–12/31/2011, PI (Co-PI: Dimitrios Peroulis).

## **TEACHING**

### ***Contributions to Curriculum***

*Molecular Gas Dynamics (AAE590)*, a new graduate course providing an introduction to gas kinetic theory and applications. First taught in 2006.

*Unsteady Aerodynamics (AAE517)*, a re-organized graduate course on analysis of unsteady incompressible and compressible flows. Reintroduced in Fall 2009 with significant new material after not being taught at AAE for over 15 years.

*Introduction to Uncertainty Quantification (AAE590/ME597)*, a new graduate class developed together with Prof. Jayathi Murthy (ME) focusing on quantification of uncertainty in simulations for engineering analysis. First taught in Fall 2010.

### **Teaching Evaluations**

The scores below are on a 5.0 basis scale with 5 as the highest and 1 as the lowest. All courses were taught at 100% responsibility except AAE590/ME597 for which instructor's duties were shared equally with Prof. Jayathi Murthy.

SEM	COURSE TITLE	# RESP/ # ENR	COURSE EVAL SCORE	PROF EVAL SCORE	AVG* COURSE SCORE	AVG* PROF SCORE
F06	Molecular Gas Dynamics, AAE590	6/7	4.8	4.5	4.6	4.6
S07	Fluid Dynamics, AAE333	33/46	3.7	3.7	3.7	3.4
F07	Fluid Dynamics, AAE333	43/82	3.7	3.6	3.9	3.7
S08	Fluid Dynamics, AAE333	32/42	3.4	3.3	3.7	4.0
F08	Fluid Dynamics, AAE333	88/119	3.3	2.9	3.8	3.9
F08	Molecular Gas Dynamics, AAE590	12/12	4.0	4.0	4.2	4.3
F09	Unsteady Aerodynamics, AAE517	16/18	4.2	4.4	4.4	4.5
S10	Fluid Mechanics, AAE333	32/44	4.7	4.6	4.0	4.2
F10	Introduction to Uncertainty Quantification, AAE590/ME597	18/36	4.2	4.3	4.0	4.2
F10	Molecular Gas Dynamics, AAE590	7/13	4.8	4.8	4.0	4.2
S11	Fluid Dynamics, AAE333	31/58	4.0	4.0	3.9	3.9
Average score in the School of Aeronautics & Astronautics for the level of <i>course</i> (i.e., 200s, 300s, 600s) during the <i>semester offered</i> .						

### **Students Who Completed Their PhD Dissertations**

1. William Stein (Ph.D., May 2008, co-advisor: I. Hrbud; dissertation: "*Performance Characterization of a RF Capacitively Coupled Discharge Microthruster*"; then at NASA Marshall/Jacobs Engineering, Huntsville, AL)
2. Xiaohui Guo (Ph.D., May 2009; dissertation: "*Investigations of Microscale Fluid-Thermal Phenomena Based on the Deterministic Boltzmann-ESBGK Model*"; then at Intel, Scottsdale, AZ)
3. Sruti Chigullapalli (Ph.D., December 2011; dissertation: "*Deterministic Approach for Unsteady Rarefied Flow Simulations in Complex Geometries and its Application to Gas Flows in Microsystems*", then at Intel, Chandler, AZ)

### **Students Who Completed Their MS Theses**

1. Sruti Chigullapalli (M.S., May 2008; thesis: "*Application of High-Order Numerical Schemes for the Boltzmann Transport Equations to Non-Equilibrium Flows*"; continued as a PhD student at Purdue)

2. Venkattraman Ayyaswamy (M.S., May 2009; thesis: “*Simulations of Low-Density Gas Droplet Supersonic Flows Expanding into Vacuum*”; now at Purdue)
3. Arnab Ganguly (M.S., May 2010, thesis: “*Simulation and Experiments of Low-Pressure Water Vapor Flows Applied to Freeze-drying*”; now at Purdue)
4. Jeremy Nabeth (M.S., May 2010, thesis: “*Numerical Simulation of Knudsen Forces in Microsystems*”; then at Samsung Semi, Austin, TX)
5. Andrew Weaver (M.S., May 2010, “*Analysis of Flowfield and Surface Heat-Flux Uncertainties Under Typical Blunt-Body Re-entry Conditions*”; now at Purdue)
6. Marat Kulakhmetov (M.S., May 2011, “*Quantification of Modeling Uncertainties in Hypersonic Nonequilibrium Flows*”; now at Purdue)

#### ***Current MS and PhD Students***

1. Venkattraman Ayyaswamy, PhD, started Fall 2009; qualifying examination passed Spring 2009; oral comprehensive examination passed Spring 2011; expected graduation May 2012.
2. Arnab Ganguly, PhD, started Fall 2010, expected graduation May 2013.
3. Andrew Weaver, PhD, started Fall 2010, expected graduation May 2013.
4. Anthony Cofer, PhD, started Fall 2010, expected graduation May 2013.
5. Marat Kulakhmetov, PhD, started Fall 2011, expected graduation May 2014.
6. Mizuki Wada, MS, started Fall 2011, expected graduation May 2013.
7. Cem Pekardam, MS, started Fall 2011, expected graduation May 2013.
8. Matthew Lakebrink, PhD, started Fall 2011, expected graduation May 2014.
9. Siva Tholeti, MS, started Fall 2011, expected graduation May 2013.

#### ***Visiting Scholar***

1. Wei Su, visiting from Beijing University of Aeronautics and Astronautics, August 2011 – August 2012.

### **PROFESSIONAL ACTIVITIES AND SERVICE**

#### ***Professional Organizing/Technical Committee Activities and Service***

AIAA Thermophysics Technical Committee:

Voting Member, 2007 – present

Liaison to Fluid Dynamics Technical Committee, 2008 – present

Member, Awards Subcommittee, 2009 – present.

U.S. Organizing Committee, 27<sup>th</sup> International Symposium on Rarefied Gas Dynamics, Pacific Grove, CA, July 10 – 15, 2010.

Chaired over 15 different sessions on Non-Equilibrium Flows, Direct Simulation Monte Carlo, Microfluidics, Microscale Heat Transfer at AIAA meetings in 2007 – 2011; 27<sup>th</sup> International Rarefied Gas Dynamics Symposium in 2010, 20<sup>th</sup> International Symposium on Plasma Chemistry in 2011.

International member of selection committee for Young Scientists Competition at 2nd International Nanotechnology Forum, October 6 – 8, 2009, Moscow, Russia.

***School, College, and University Service***

Educational Coordinator, National Nuclear Security Administration (NNSA) Center for Prediction of Reliability, Integrity and Survivability of Microsystems (PRISM), Purdue University, 2008 – present.

Faculty Advisor, Sigma Gamma Tau Honor Society, 2007 – present.

AAE Computer Committee, 2007 – present

AAE Faculty Search Committee, 2010 – present

ME Heat Transfer Faculty Search Committee, 2011 – present

***Reviewing Activities***

*AIAA Journal, Chemical Engineering Science, International Journal of Numerical Methods for Heat and Fluid Flow, Journal of Applied Physics, Journal of Applied Thermal Engineering, Journal of Spacecraft and Rockets, Journal of Thermophysics and Heat Transfer, International Journal of Thermal Sciences, Journal of Fluid Mechanics, Journal of Micromechanics and Microengineering, Journal of Microelectromechanical Systems, Journal of Vacuum Science and Technology A, Physics of Fluids, Vacuum*

***Professional Society Affiliations***

Senior Member of American Institute of Aeronautics and Astronautics

Member of American Association for the Advancement of Science

Member of Society of Women Engineers

Member of American Vacuum Society

Member of Nuclear and Plasma Sciences Society at Institute of Electrical and Electronics Engineers

Member of American Society of Mechanical Engineers