

**Dr. FARZAD MASHAYEK**

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**PERSONAL DATA:**

Married, one child. U.S. Citizen.

**EDUCATION:**

- ◆ Ph.D., Mechanical Engineering, State University of New York at Buffalo, Buffalo, NY, June 1994. Dissertation: "Numerical Study of Capillary and Thermocapillary Jets and Drops." GPA: 4.00/4.00.
- ◆ M.S., Mechanical Engineering, Sharif University of Technology, Tehran, Iran, February 1988. Thesis: "Analysis of Heat Transfer in Freezing of Liquids Flowing Inside Tubes." GPA: 4.00/4.00.
- ◆ B.S., Mechanical Engineering, Sharif University of Technology, February 1986.

**EMPLOYMENT HISTORY:**

- ◆ Associate Head, Department of Mechanical and Industrial Engineering, University of Illinois at Chicago, Chicago, IL, July 2005 – Present.
- ◆ Director of Graduate Studies, Department of Mechanical and Industrial Engineering, University of Illinois at Chicago, Chicago, IL, August 2004 – Present.
- ◆ Adjunct Professor, Department of Bioengineering, University of Illinois at Chicago, Chicago, IL, January 2008 – Present.
- ◆ Professor, Department of Mechanical and Industrial Engineering, University of Illinois at Chicago, Chicago, IL, August 2004 – Present.
- ◆ Visiting Research Associate, National Center for Supercomputing Applications, University of Illinois at Urbana-Champaign, Urbana, IL, May – August 2007.
- ◆ Associate Professor (with tenure), Department of Mechanical and Industrial Engineering, University of Illinois at Chicago, Chicago, IL, August 2002 – August 2004.
- ◆ Associate Professor (without tenure), Department of Mechanical and Industrial Engineering, University of Illinois at Chicago, Chicago, IL, August 2000 – August 2002.

- ◆ Assistant Professor, Department of Mechanical Engineering, University of Hawaii at Manoa, Honolulu, HI, August 1997 – July 2000.
- ◆ Research Assistant Professor, Department of Mechanical and Aerospace Engineering, SUNY at Buffalo, Buffalo, NY, September 1996 – July 1997.
- ◆ Postdoctoral Research Associate, Department of Mechanical and Aerospace Engineering, SUNY at Buffalo, Buffalo, NY, June 1994 – August 1996.
- ◆ Teaching and/or Research Assistant, Department of Mechanical and Aerospace Engineering, SUNY at Buffalo, September 1991 – June 1994.
- ◆ Director of Heat Transfer Division, Mohsen Engineering Research Center, Tehran, Iran, March 1988 – August 1991.

### **RESEARCH INTERESTS:**

Turbulence, two-phase flow, combustion, plasma, nanoparticle coating, statistical and stochastic modeling, petascale simulation, direct numerical simulation, interface modeling, computational fluid dynamics.

### **HONORS AND AWARDS:**

- ◆ Summer Faculty Fellow, National Center for Supercomputing Applications (NCSA), 2007
- ◆ Fellow, American Society of Mechanical Engineers, 2006
- ◆ Member of Editorial Board of *Atomization and Sprays*, 2006
- ◆ UIC College of Engineering Faculty Research Award, 2004
- ◆ Associate Fellow, American Institute of Aeronautics and Astronautics (AIAA), 2002
- ◆ Young Investigator Award, the Office of Naval Research, 1999
- ◆ CAREER Award, the National Science Foundation, 1999
- ◆ Honored by the President and the Board of Regents of the University of Hawaii, June 1999. Featured in *malamalama*, the magazine of the University of Hawaii system, January-June 2000
- ◆ Ranked first in the graduate class of Mechanical Engineering, Sharif University of Technology, Iran, 1987
- ◆ Ranked first in the overall entry-level exam for the Master of Science degree, 1985

### **FEATURED ARTICLES:**

- ◆ “Simulation of Novel Biofuel Liquid Combustors: Toward Petaflop Computing,” *Strategic Applications Programs (SAP)*, National Center for Supercomputing Applications, <http://www.ncsa.uiuc.edu/UserInfo/SAP/project9.html>
- ◆ “1999 Office of Naval Research Young Investigator Winner Organizes 14<sup>th</sup> Annual ONR Propulsion Meeting,” *Engineering News*, the magazine of the College of Engineering, University of Illinois at Chicago, Vol. IV, No. 2, 2001.
- ◆ “Mechanical Engineers Win Professional Appointments,” *UIC News Tips*, Nov. 12, 2001.

- ◆ “Reacting Fuel Droplets in Combustion Engines,” *ENVISION*, science magazine of the National Partnership for Advanced Computational Infrastructure (NPACI) & San Diego Supercomputing Center (SDSC), October-December 1999. <http://www.npaci.edu/enVision/v15.4/mashayek.html>

**PUBLICATIONS: I. BOOK EDITED:**

1. Roy, G.D. and Mashayek, F., editors, *Proceedings of the Fourteenth ONR Propulsion Meeting*, Chicago, IL, August 8-10, 2001.

**PUBLICATIONS: II. BOOK CHAPTERS: (Invited articles are identified by ●)**

1. ● Mashayek, F. and Minkowycz, W.J., “Eulerian-Lagrangian Simulations of Particle/droplet-Laden Turbulent Flows,” in Minkowycz, W.J., Sparrow, E.M., and Murthy, J.Y., editors, *Handbook of Numerical Heat Transfer*, 2<sup>nd</sup> ed., Chapter 22, John Wiley & Sons, Inc., 2006.
2. ● Jacobs, G.B., Gao, Z., Pandya, R.V.R., Shotorban, B., and Mashayek, F., “Numerical Simulation of Two-Phase Flows for Prediction/Control of Combustion in Liquid-Fueled Combustors,” in Roy, G.D., editor, *Advances in Combustion and Noise Control*, Cranfield University Press, 2005.
3. ● Jacobs, G.B., Pandya, R.V.R., Shotorban, B., Gao, Z., and Mashayek, F., “Deterministic and Probabilistic Approaches for Prediction of Two-Phase Turbulent Flow in Liquid-Fuel Combustors,” in Roy, G.D., editor, *Combustion Processes in Propulsion: Control, Noise, and Pulse Detonation*, Chapter 3, Elsevier, 2005.
4. ● Jaber, F.A., Mashayek, F., Madnia, C.K., Taulbee, D.B., and Givi, P., “Advances in Analytical Description of Turbulent Reacting Flows,” in Roy, G.D., editor, *Advances in Chemical Propulsion: Science to Technology*, Chapter 9, CRC Press, Boca Raton, FL, 2001.
5. ● Mashayek, F., Taulbee, D.B., and Givi, P., “Modeling and Simulation of Two-Phase Turbulent Flow,” in Roy, G.D., editor, *Propulsion Combustion: Fuels to Emissions*, Chapter 8, Taylor & Francis, Washington, D.C., 241-280, 1998.

**PUBLICATIONS: III. REVIEW ARTICLES: (Invited articles are identified by ●)**

1. ● Mashayek, F., “Combustion,” in Crowe, C.T., editor, *Multiphase Flow Handbook*, Chapter 12: Multiphase Interactions, Section 7, CRC Press, Boca Raton, FL, 2006.
2. ● Mashayek, F. and Pandya, R.V.R., “Analytical Description of Particle/Droplet-Laden Turbulent Flows,” *Progress in Energy and Combustion Science*, **29**(4), 329-378, 2003.

#### **PUBLICATIONS: IV. JOURNAL ARTICLES:**

1. Davoudabadi, M. and Mashayek, F., "Numerical Modeling of Dust Particles Configurations in a Cylindrical Radio-frequency Plasma Reactor," *Physical Review E*, **76**(5), 2007.
2. Rovagnati, B., Davoudabadi, M., Lapenta, G. and Mashayek, F., "Effect of Collisions on Dust Particle Charging via PIC-MCC," *Journal of Applied Physics*, **102**(7), 073302, 2007.
3. Sengupta, K., Russell, K. and Mashayek, F. "Step Geometry and Counter-current Effects in Dump Combustors. Part I: Cold Flow," *AIAA Journal*, **45**(8), 2033-2041, 2007.
4. Shotorban, B., Zhang, K.K.Q. and Mashayek, F., "Improvement of Particle Concentration Prediction in Large-Eddy Simulation by Defiltering," *International Journal of Heat and Mass Transfer*, **50**(19-20), 3728-3739, 2007.
5. Gandhi, P., Rovagnati, B., Mashayek F. and Jacobs, G.B., "Subsonic Compressible Flow in Two-Sided Lid-Driven Cavity. Part I: Equal Walls Temperatures," *International Journal of Heat and Mass Transfer*, **50**(21-22), 4206-4218, 2007.
6. Gandhi, P., Rovagnati, B., Mashayek F. and Jacobs, G.B., "Subsonic Compressible Flow in Two-Sided Lid-Driven Cavity. Part II: Unequal Walls Temperatures," *International Journal of Heat and Mass Transfer*, **50**(21-22), 4219-4228, 2007.
7. Jacobs, G.B., Kopriva, D.A. and Mashayek, F., "Towards Efficient Tracking of Inertial Particles with High-Order Multidomain Methods," *Journal of Computational and Applied Math*, **206**(1), 392-408, 2007.
8. Zhang, K.K.Q., Rovagnati, B., Gao, Z., Minkowycz, W.J., and Mashayek, F., "An Introduction to Lattice Grid," *Numerical Heat Transfer, Part B*, **51**(5), 415-431, 2007.
9. Jacobs, G.B., Kopriva, D.A. and Mashayek, F., "A Conservative Isothermal Wall Boundary Condition for the Compressible Navier-Stokes Equations," *Journal of Computing Science*, **30**(2), 177-192, 2007.
10. Davoudabadi, M. and Mashayek, F. "Dust Particle Dynamics in Low-pressure Plasma Reactor," *Journal of Applied Physics*, **100**(8), 083302, 2006.
11. Elhami Amiri, A., Kazemzadeh Hannani, S., and Mashayek, F., "Large-Eddy Simulation of Heavy-Particle Transport in Turbulent Channel Flow," *Numerical Heat Transfer, Part B*, **50**(4), 285-313, 2006.
12. Yarin, A.L., Rovagnati, B., Mashayek, F. and Matsoukas, T., "A Reaction Model for Plasma Coating of Nanoparticles by Amorphous Carbon Layers," *Journal of Applied Physics*, **99**(6), 064310, 2006.
13. Davoudabadi, M., Rovagnati, B. and Mashayek, F., "Lateral Motion of a Dust Particle in Magnetized Plasma Sheath," *IEEE Transactions in Plasma Science*, **34** (2), 142-148, 2006.
14. Shotorban B. and Mashayek, F., "A Stochastic Model for Particle Motion in Large-Eddy Simulation," *Journal of Turbulence*, **7**(18), 1-13, 2006.
15. Zhang, K.K.Q., Shotorban, B., Minkowycz, W.J., and Mashayek, F., "A Compact Finite Difference Method on Staggered Grid for Navier-Stokes Flows," *International Journal for Numerical Methods in Fluids*, **52**(8), 867-881, 2006.

16. Zhang, K.K.Q., Minkowycz, W.J., and Mashayek, F., "Exact Factorization Technique for Numerical Simulations of Incompressible Navier-Stokes Flows," *International Journal of Heat and Mass Transfer*, **49**(3), 535-54, 2006.
17. Davoudabadi, M. and Mashayek, F., "Publisher's Note: Dust Particle Dynamics in Magnetized Plasma Sheath," *Physics of Plasmas*, **12**(8), 089903, 2005.
18. Davoudabadi, M. and Mashayek, F., "Dust Particle Dynamics in Magnetized Plasma Sheath," *Physics of Plasmas*, **12**(7), 073505, 2005.
19. Shotorban B. and Mashayek, F., "Modeling Subgrid-Scale Effects on Particles by Approximate Deconvolution," *Physics of Fluids*, **17**(8), 081701, 2005.
20. Sengupta, K., Russell, K., Minkowycz, W.J., and Mashayek, F., "Numerical Simulation Data for Assessment of Particle-Laden Turbulent Flow Models," *International Journal of Heat and Mass Transfer*, **48**(15), 3035-3046, 2005.
21. Elhami Amiri, A., Kazemzadeh Hannani, S., and Mashayek, F., "Evaluation of a Fourth-Order Finite Volume Compact Scheme for LES with Explicit Filtering," *Numerical Heat Transfer, Part B*, **48**(2), 147-164, 2005.
22. Jacobs, G.B., Kopriva, D.A. and Mashayek, F., "Validation Study of a Multidomain Spectral Code for Simulation of Turbulent Flows," *AIAA Journal*, **43**(6), 1256-1264, 2005.
23. Gao, Z. and Mashayek, F., "Stochastic Modeling of Evaporating Droplets Polydispersed in Turbulent Flows," *International Journal for Heat and Mass Transfer*, **47**(20), 4339-4348, 2004.
24. Gao, Z. and Mashayek, F., "A Stochastic Model for Non-Isothermal Droplet-Laden Turbulent Flows," *AIAA Journal*, **42**(2), 255-260, 2004.
25. Gao, Z. and Mashayek, F., "A Stochastic Model for Gravity Effects in Particle-Laden Turbulent Flows," *Journal of Fluids Engineering*, **126**(4), 620-625, 2004.
26. Jacobs, G.B., Kopriva, D.A., and Mashayek, F., "Compressible Subsonic Particle-Laden Flow over a Square Cylinder," *AIAA Journal of Propulsion and Power*, **20**(2), 353-359, 2004.
27. Shotorban, B., Mashayek, F., and Pandya, R.V.R., "Temperature Statistics in Particle-Laden Turbulent Homogeneous Shear Flow," *International Journal of Multiphase Flow*, **29**(8), 1333-1353, 2003.
28. Pandya, R.V.R. and Mashayek, F., "Kinetic Equation for Particle Transport and Heat Transfer in Non-Isothermal Turbulent Flows," *AIAA Journal*, **41**(5), 841-847, 2003.
29. Jacobs, G.B., Kopriva, D.A., and Mashayek, F., "A Comparison of Outflow Boundary Conditions for the Multidomain Staggered-Grid Spectral Method," *Numerical Heat Transfer, Part B*, **44**(3), 225-251, 2003.
30. Pandya, R.V.R. and Mashayek, F., "Non-Isothermal Dispersed Phase of Particles in Turbulent Flow," *Journal of Fluid Mechanics*, **475**, 205-245, 2003.
31. Mashayek, F., Minkowycz, W.J., Shotorban, B., and Ashgriz, N., "Coalescence Collision of Liquid Drops," *International Journal for Heat and Mass Transfer*, **46**(1), 77-89, 2003.
32. Zeda, J.D. and Mashayek, F., "Dynamics of Evaporating Capillary Jets," *Atomization and Sprays*, **12**(5), 559-576, 2002.

33. Pandya, R.V.R. and Mashayek, F., "Two-Fluid Large-eddy Simulation Approach for Particle-Laden Turbulent Flows," *International Journal for Heat and Mass Transfer*, **45**(24), 4753-4759, 2002.
34. Pandya, R.V.R. and Mashayek, F., "Turbulent Thermal Diffusion and Barodiffusion of Passive Scalar and Dispersed Phase of Particles in Turbulent Flows," *Physical Review Letters*, **88**(4), 044501, 2002.
35. Mashayek, F. and Taulbee, D.B., "A Four-Equation Model for Prediction of Gas-Solid Turbulent Flows," *Numerical Heat Transfer, Part B*, **41**(2), 95-116, 2002.
36. Mashayek, F. and Taulbee, D.B., "Turbulent Gas-Solid Flows. Part I: Direct Simulations and Reynolds Stress Closures," *Numerical Heat Transfer, Part B*, **41**(1), 1-29, 2002.
37. Mashayek, F. and Taulbee, D.B., "Turbulent Gas-Solid Flows. Part II: Explicit Algebraic Closures," *Numerical Heat Transfer, Part B*, **41**(1), 31-52, 2002.
38. Pandya, R.V.R. and Mashayek, F., "Probability Density Function Modeling of Evaporating Droplets Dispersed in Isotropic Turbulence," *AIAA Journal*, **39**(10), 2001.
39. Liao, S. and Mashayek, F., "A Multigrid Approach for Steady State Laminar Viscous Flows," *International Journal for Numerical Methods in Fluids*, **37**, 107-123, 2001.
40. Pandya, R.V.R. and Mashayek, F., "Probability Density Function Model Equation for Particle Charging in Homogeneous Dusty Plasma," *Physical Review E*, **64**, 036405, 2001.
41. Liao, S., Mashayek, F., and Guo, D., "Numerical Simulations of Particle-Laden Axisymmetric Turbulent Flows," *Numerical Heat Transfer, Part A*, **39**(8), 847-855, 2001.
42. Mashayek, F. and Jacobs, G.B., "Temperature-Dependent Reaction in Droplet-Laden Homogeneous Turbulence," *Numerical Heat Transfer, Part A*, **39**, 101-121, 2001.
43. Lau, B.S.C. and Mashayek, F., "Dynamics of Oscillating Drops with Thermocapillary Flows," *Theoretical and Computational Fluid Dynamics*, **14**, 203-222, 2001.
44. Mashayek, F., "Dynamics of Evaporating Drops. Part I: Formulation and Evaporation Model," *International Journal of Heat and Mass Transfer*, **44**(8), 1517-1526, 2001.
45. Mashayek, F., "Dynamics of Evaporating Drops. Part II: Free Oscillations," *International Journal of Heat and Mass Transfer*, **44**(8), 1527-1541, 2001.
46. Mashayek, F., "Velocity and Temperature Statistics in Reacting Droplet-Laden Homogeneous Shear Turbulence," *AIAA Journal of Propulsion and Power*, **17**(1), 197-202, 2001.
47. Barre, C., Mashayek, F., and Taulbee, D.B., "Statistics in Particle-Laden Plane Strain Turbulence by Direct Numerical Simulation," *International Journal of Multiphase Flow*, **27**(2), 347-378, 2001.
48. Mashayek, F., "Numerical Investigation of Reacting Droplets in Homogeneous Shear Turbulence," *Journal of Fluid Mechanics*, **405**, 1-36, 2000.
49. Jaber, F.A. and Mashayek, F., "Temperature Decay in Two-Phase Turbulent Flows," *International Journal of Heat and Mass Transfer*, **43**(6), 993-1005, 2000.
50. Mashayek, F., "Stochastic Simulations of Particle-Laden Isotropic Turbulent Flows," *International Journal of Multiphase Flow*, **25**(8), 1575-1599, 1999.

51. Mashayek, F., "Simulations of Reacting Droplets Dispersed in Isotropic Turbulence," *AIAA Journal*, **37**(11), 1420-1425, 1999.
52. Taulbee, D.B., Mashayek, F., and Barre, C., "Simulation and Reynolds Stress Modeling of Particle-Laden Turbulent Shear Flows," *International Journal of Heat and Fluid Flow*, **20**(4), 368-373, 1999.
53. Jaber, F.A., James, S., and Mashayek, F., "Direct Numerical Simulations of Parallel/Serial Reactions in Turbulent Flows," *Chemical Engineering Communications*, **173**, 215-244, 1999.
54. Mashayek, F. and Jaber, F.A., "Particle Dispersion in Forced Isotropic Low Mach Number Turbulent Flows," *International Journal of Heat and Mass Transfer*, **42**(15), 2823-2836, 1999.
55. Mashayek, F., "Droplet-Turbulence Interactions in Low Mach Number Homogeneous Shear Two-Phase Flows," *Journal of Fluid Mechanics*, **367**, 163-203, 1998.
56. Mashayek, F., "Direct Numerical Simulations of Evaporating Droplet Dispersion in Forced Low Mach Number Turbulence," *International Journal of Heat and Mass Transfer*, **41**(17), 2601-2617, 1998.
57. Mashayek, F. and Ashgriz, N., "Nonlinear Oscillations of Drops with Internal Circulation," *Physics of Fluids*, **10**(5), 1071-1082, 1998.
58. Jaber, F.A., Miller, R.S., Mashayek, F., and Givi, P., "Differential Diffusion in Binary Scalar Mixing and Reaction," *Combustion and Flame*, **109**, 561-577, 1997.
59. Mashayek, F., Jaber, F.A., Miller, R.S., and Givi, P., "Dispersion and Polydispersity of Liquid Drops in Stationary Isotropic Turbulence," *International Journal of Multiphase Flow*, **23**(2), 337-355, 1997.
60. Mashayek, F., Farzad, H., and Ashgriz, N., "A Geometry Independent Technique for Solid Propellant Grain Design," *Journal of Aerospace Engineering*, **210**, 209-220, 1996.
61. Miller, R.S., Mashayek, F., Adumitorai, V., and Givi, P., "Structure of Homogeneous Non-Helical Magnetohydrodynamic Turbulence," *Physics of Plasmas*, **3**(9), 3304-3317, 1996.
62. Huynh, H., Ashgriz, N., and Mashayek, F., "Instability of a Liquid Jet Subject to Disturbances Composed of Two Wavenumbers," *Journal of Fluid Mechanics*, **320**, 185-210, 1996.
63. Ashgriz, N. and Mashayek, F., "Temporal Analysis of Capillary Jet Breakup," *Journal of Fluid Mechanics*, **291**, 163-190, 1995.
64. Mashayek, F. and Ashgriz, N., "Nonlinear Instability of Liquid Jets with Thermocapillarity," *Journal of Fluid Mechanics*, **283**, 97-123, 1995.
65. Mashayek, F. and Ashgriz, N., "Instability of Liquid Coatings on Cylindrical Surfaces," *Physics of Fluids*, **7**(9), 2143-2153, 1995.
66. Mashayek, F. and Ashgriz, N., "A Spine-Flux Method for Simulation of Free Surface Flows," *Journal of Computational Physics*, **122**, 367-379, 1995.
67. Mashayek, F. and Ashgriz, N., "Advection of Axisymmetric Interfaces," *International Journal for Numerical Methods in Fluids*, **20**, 1337-1361, 1995.

68. Mashayek, F. and Ashgriz, N., "A Hybrid Finite Element - Volume of Fluid Method for Simulating Free Surface Flows and Interfaces," *International Journal for Numerical Methods in Fluids*, **20**, 1363-1380, 1995.
69. Mashayek, F. and Ashgriz, N., "Solid-Propellant Grain Design by an Interface Reconstruction Scheme," *AIAA Journal of Spacecraft and Rockets*, **31**(5), 908-910, 1994.
70. Mashayek, F. and Ashgriz, N., "A Height-Flux Method for Simulating Free Surface Flows and Interfaces," *International Journal for Numerical Methods in Fluids*, **17**, 1035-1054, 1993.
71. Zhang, K.K.Q., Sengupta, K., Xia, K., Minkowycz, W.J., and Mashayek, F., "A Superposition-based Parallel Discrete Operator Splitting Finite Element Method for Incompressible Flows," *SIAM Journal of Scientific Computing*, submitted.
72. Rovagnati, B., Lapenta G. and Mashayek, F., "Dynamic Nature of the Ion Wake in Dusty Plasmas," *Physical Review Letters*, submitted.
73. Sengupta, K., Mashayek, F. and Jacobs, G.B., "Large-eddy Simulation of Compressible Flows using a Multi-domain Spectral Method," *International Journal for Numerical Methods in Fluids*, submitted.
74. Al-Ahmad, G., Shrimpton, J.S., Ergene, E.L. and Mashayek, F., "Atomization of Pure Liquid Organic Oils using the Charge-injection Method," *Atomization and Sprays*, submitted.

**PUBLICATIONS: V. NON-ARCHIVAL FULL-LENGTH ARTICLES:**

1. Al-Ahmad, G., Shrimpton, J.S., Ergene, E.L. and Mashayek, F., "Atomization of High-viscosity Organic Oils using the Charge-injection Method," in the *Volume of Extended Abstracts of the 21<sup>st</sup> Annual Conference on Liquid Atomization and Spray Systems*, Orlando, FL, May 2008.
2. • Sengupta, K., Jacobs, G.B., and Mashayek, F., "Direct Numerical Simulation of Turbulent Flows Using Spectral Method," AIAA Paper 2008-1450, Jan. 2008.
3. Sengupta, K., Russell, K., and Mashayek, F., "The Effects of Subsonic Microjets on Turbulent Properties in Cold Flow in Dump Combustors," AIAA Paper 2008-1167, Jan. 2008.
4. Sengupta, K., Russell, K., and Mashayek, F., "Shear Flow Control in Dump Combustor Using Microjets," *Proceedings of the 20<sup>th</sup> ONR Propulsion Meeting*, Washington, DC, December 12-14, 2007.
5. Al-Ahmad, G., Shrimpton, J.S., and Mashayek, F., "Electrostatic Atomization of Vegetable Oils," in the *Volume of Extended Abstracts of the 20<sup>th</sup> Annual Conference on Liquid Atomization and Spray Systems*, Chicago, IL, May 2007.
6. Sengupta, K., Russell, K., and Mashayek, F., "Reacting Flow Studies in Counter-Current Dump Combustors," AIAA Paper 2007-0192, Jan. 2007.
7. Sengupta, K., Jacobs, G.B., and Mashayek, F., "Large-Eddy Simulation Using a Discontinuous Galerkin Spectral Element Method," AIAA Paper 2007-0402, Jan. 2007.

8. Davoudabadi, P. and Mashayek, F., "Dynamics of a Swarm of Non-Interacting Nanoparticles in a Cylindrical Plasma Reactor," AIAA Paper 2007-0790, Jan. 2007.
9. Rovagnati, B., Mashayek, F., and Lapenta, G., "Grain Coating in Low-Pressure Plasma via a Fully Kinetic Particle-in-Cell Method," AIAA Paper 2007-0792, Jan. 2007.
10. Sengupta, K., Russell, K., and Mashayek, F., "Reacting Flow Studies in Counter-current Dump Combustor," *Proceedings of the 19<sup>th</sup> ONR Propulsion Meeting*, Costa Mesa, CA, December 18-20, 2006.
11. Sengupta, K., Jacobs, G.B., and Mashayek, F., "Large-Eddy Simulation Using a High-Order Nodal Discontinuous Galerkin Method on Unstructured Grids," ASME Paper IMECE2006-16050, November 2006.
12. Bian, X. and Mashayek, F., "Compound Capillary Jet Breakup," in the *Volume of Extended Abstracts of the 19<sup>th</sup> Annual Conference on Liquid Atomization and Spray Systems*, Toronto, Canada, May 2006.
13. Shrimpton, J.S. and Mashayek, F., "Spraying Electrically Insulating Liquids Using Electrostatic Atomizers," in the *Volume of Extended Abstracts of the 19<sup>th</sup> Annual Conference on Liquid Atomization and Spray Systems*, Toronto, Canada, May 2006.
14. Sengupta, K., Russell, K., and Mashayek, F., "Numerical Simulation of Counter-current Dump Combustor for Efficient Flame Stabilization," AIAA Paper 2006-0174, Jan. 2006.
15. Davoudabadi, P. and Mashayek, F., "Simulation of Nanoparticle Dynamics in Low-Pressure Cold Plasma Reactor," AIAA Paper 2006-1169, Jan. 2006.
16. Shotroban, B. and Mashayek, F., "On Stochastic Modeling of Heavy Particle Dispersion in LES of Two-Phase Turbulent Flows," *Proceedings of the IUTAM Symposium on Computational Approaches to Disperse Multiphase Flow*, Kluwer, 2005.
17. Sengupta, K., Russell, K., and Mashayek, F., "Numerical Studies of Counter-current Dump Combustor for Flame Stabilization," *Proceedings of the 18<sup>th</sup> ONR Propulsion Meeting*, Monterey, CA, August 24-26, 2005.
18. Rovagnati, B., Yarin, A.L., and Mashayek, F., "Modeling of Chemical Reactions for Plasma Coating of Nanoparticles," *Proceedings of the 17<sup>th</sup> International Symposium on Plasma Chemistry*, Toronto, Canada, August 7-12, 2005.
19. Davoudabadi, P. and Mashayek, F., "Dust Particle Dynamics in Plasma Sheath with an Oblique Magnetic Field," *Proceedings of the 17<sup>th</sup> International Symposium on Plasma Chemistry*, Toronto, Canada, August 7-12, 2005.
20. Sengupta, K., Mashayek, F., and Gao, Z., "Numerical Study of Pulsed Injection for Control of Combustion," AIAA Paper 2005-0954, Jan. 2005.
21. Davoudabadi, P. and Mashayek, F., "Behavior of Dust Particles in Magnetized Plasma Sheath," AIAA Paper 2005- 0162, Jan. 2005.
22. Sengupta, K., Gao, Z., and Mashayek, F., "An Efficient Computational Model for Testing Control Strategies in Liquid-Fuel Combustors," *Proceedings of the 17<sup>th</sup> ONR Propulsion Meeting*, Boston, MA, June 16-18, 2004.
23. Jacobs, G.B., Kopriva, D.A., and Mashayek, F., "Validation Study of a Multidomain Spectral Element Code for Simulation of Turbulent Flows," AIAA Paper 2004-0659, Jan. 2004.

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## **PUBLICATIONS: VI. ABSTRACTS:**

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6. Rovagnati, B., Mashayek, F., Yarin, A.L., and Matsoukas, T., "Particle Coating in Low-Pressure CH<sub>4</sub>/H<sub>2</sub> Plasma: The Effect of Particle Size," *Abstract Book of the 33<sup>rd</sup> IEEE International Conference on Plasma Science*, Traverse City, MI, June 4 – 8, 2006.
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**PUBLIC LECTURES: (Invited lectures are identified by ●)**

1. ● "Particle-laden Flows," Department of Mechanical and Aerospace Engineering, State University of New York at Buffalo, Buffalo, NY, January 23, 2008.
2. "DNS and LES of Turbulent Flows Using Spectral Methods," *AIAA Aerospace Sciences Meeting*, Reno, NV, January 8, 2008.
3. "Shear Flow Control in Dump Combustors Using Microjets," 20<sup>th</sup> ONR Propulsion Meeting, Washington, DC, December 13, 2007.
4. ● "Particle-laden Flows," Department of Mechanical Engineering, San Diego State University, San Diego, CA, November 20, 2007.
5. ● "Simulation of Nanoparticle Dynamics and Coating in Low-pressure Plasma Reactor," Department of Chemical Engineering, Pennsylvania State University, State College, PA, September 27, 2007.
6. ● "Simulation of Nanoparticle Dynamics and Coating in Low-pressure Plasma Reactor," Department of Aerospace Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, September 10, 2007.
7. ● "Nanoparticle Coating in Low-pressure Plasma Reactor for Energy-related Applications," Nanotechnology Workshop, The Center for Nanoscale Science and Technology, University of Illinois at Urbana-Champaign, IL, May 3, 2007.
8. "Numerical Studies of Counter-current Dump Combustor for Flame Stabilization," 19<sup>th</sup> ONR Propulsion Meeting, Costa Mesa, CA, December 19, 2006.

9. • “Can Renewable Liquid Fuels Quench Our Energy Thirst?” Department of Aerospace and Mechanical Engineering, University of Notre Dame, Notre Dame, IN, December 5, 2006.
10. • “Counter-current Dump Combustor,” NASA Glenn Research Center, Cleveland, OH, June 23, 2006.
11. “Particle Mobilization in PECVD Reactor Using Thermophoretic Force,” *33<sup>rd</sup> IEEE International Conference on Plasma Science*, Traverse City, MI, June 6, 2006.
12. “Compound Capillary Jet Breakup,” *19<sup>th</sup> Annual Conference on Liquid Atomization and Spray Systems*, Toronto, Canada, May 25, 2006.
13. • “Simulation of Nanoparticle Coating in Low-pressure Plasma Reactor,” Department of Mechanical Engineering, University of Minnesota, Minneapolis, MN, April 19, 2006.
14. “Numerical Simulation of Counter-current Dump Combustor for Efficient Flame Stabilization,” *AIAA Aerospace Sciences Meeting*, Reno, NV, January 9, 2006.
15. “Simulation of Nanoparticle Dynamics in Low-Pressure Cold Plasma Reactor,” *AIAA Aerospace Sciences Meeting*, Reno, NV, January 11, 2006.
16. • “Simulation of Dispersed Particles in Complex Flows,” Department of Engineering Science and Mechanics, Virginia Polytechnic Institute and State University, Blacksburg, VA, September 14, 2005.
17. “Numerical Studies of Counter-current Dump Combustor for Flame Stabilization,” *18<sup>th</sup> ONR Propulsion Meeting*, Monterey, CA, August 25, 2005.
18. “Modeling of Chemical Reactions for Plasma Coating of Nanoparticles,” *the 17<sup>th</sup> International Symposium on Plasma Chemistry*, Toronto, Canada, August 8, 2005.
19. • “Low-Pressure Plasma Process for Nanoparticle Coating,” *the 32<sup>nd</sup> IEEE International Conference on Plasma Science*, Monterey, CA, June 23, 2005.
20. “Efficient Turbulent Flame Stabilization for Advanced Propulsion,” *ONR Interim Review Meeting on Innovative Combustion for Propulsion*, Chicago, IL, May 16 2005.
21. • “Simulation of Dispersed Particles in Complex Flows,” Division of Applied Mathematics, Brown University, Providence, RI, April 8, 2005.
22. • “Simulation of Dispersed Particles in Complex Flows,” Department of Mechanical Engineering, University of Hawaii at Manoa, Honolulu, HI, December 14, 2004.
23. “On Stochastic Modeling of Heavy Particle Dispersion in LES of Two-Phase Turbulent Flows,” *IUTAM Symposium on Computational Approaches to Disperse Multiphase Flow*, Argonne, IL, October 4, 2004.
24. “An Efficient Computational Model for Testing Control Strategies in Liquid-Fuel Combustors,” *17<sup>th</sup> ONR Propulsion Meeting*, Boston, MA, June 16, 2004.
25. • “Simulation of Dispersed Particles in Complex Flows,” Department of Theoretical & Applied Mathematics and Department of Aerospace Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, April 8, 2004.
26. • “Deterministic, Probabilistic and Stochastic Description of Gas-Solid Turbulent Flows,” Department of Mechanical Engineering, Sharif University of Technology, Tehran, Iran, October 11, 2003.

27. "Deterministic and Stochastic Simulations of Two-Phase Flows for Prediction/Control of Combustion in Liquid-Fueled Combustors," the International Colloquium on Combustion and Noise Control, Cranfield, UK, August 14, 2003.
28. • "Evaporating Drops: Oscillation Effect and Turbulence Application," Department of Mechanical Engineering, Imperial College London, London, UK, August 11, 2003.
29. "Current Issues in Analytical Description of Particle/Droplet-Laden Turbulent Flows," 4<sup>th</sup> ASME/JSME Joint Fluids Engineering Conference, Honolulu, HI, July 8, 2003.
30. "Numerical Simulation of Controlled Liquid-Fuel Combustors," 16<sup>th</sup> ONR Propulsion Meeting, Los Angeles, CA, June 11, 2003.
31. "Model Development for and Numerical Simulation of Two-Phase Turbulent Flow in Liquid-Fuel Combustors," Mid-Year ONR Combustion Control Review Meeting, Los Angeles, CA, January 16, 2003.
32. "Two-Fluid Large-Eddy Simulation Approach for Two-Phase Turbulent Flows," 55<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, Dallas, TX, November 26, 2002.
33. "Deterministic and Probabilistic Approaches for Prediction of Two-Phase Turbulent Flow in Liquid-Fuel Combustors," 15<sup>th</sup> ONR Propulsion Meeting, Washington, DC, August 5, 2002.
34. • "A Review of Current Advances in Computations of Two-phase Turbulent Flows," Faculty of Aerospace Engineering, Delft University, Delft, the Netherlands, July 9, 2002.
35. • "A Review of State-of-the-Art Computational Techniques to Study Heterogeneous Mixing Relevant to Deflagration and Detonation," International Colloquium on Advances in Confined Detonations, Moscow, Russia, July 3, 2002.
36. "Simulation and Modeling of Two-Phase Turbulent Flows for Prediction and Control of Combustion Systems," Mid-Year ONR Combustion Control Review Meeting, Orlando, FL, February 21, 2002.
37. "Kinetic Equation for Particle Transport and Heat Transfer in Non-Isothermal Turbulent Flows," 40<sup>th</sup> Aerospace Sciences Meeting and Exhibit, AIAA, Reno, NV, January 14, 2002.
38. • "Evaporating Drops: Oscillation Effect and Turbulence Application," Department of Mechanical Engineering, University of Iowa, Iowa City, IA, October 18, 2001.
39. "Simulation and Modeling of Two-Phase Turbulent Flows for Prediction and Control of Combustion Systems," 14<sup>th</sup> ONR Propulsion Meeting, Chicago, IL, August 8, 2001.
40. "Simulation and Modeling of Two-Phase Turbulent Flows for Prediction and Control of Combustion Systems," Mid-Year ONR Combustion Control Review Meeting, San Diego, CA, February 15, 2001.
41. "Probability Density Function Modeling of Evaporating Droplets Dispersed in Isotropic Turbulence," 39<sup>th</sup> Aerospace Sciences Meeting and Exhibit, AIAA, Reno, NV, January 8, 2001.
42. "Simulation and Modeling of Two-Phase Turbulent Flows for Prediction and Control of Combustion Systems," 13<sup>th</sup> ONR Propulsion Meeting, Minneapolis, MN, August 10, 2000.

43. • “Analytical Investigation of Turbulent Gas-Liquid Flows,” Department of Mechanical Engineering, University of Illinois at Chicago, Chicago, IL, March 27, 2000.
44. • “Analytical Investigation of Turbulent Gas-Liquid Flows,” Department of Aerospace Engineering and Mechanics, University of Minnesota, Minneapolis, MN, March 16, 2000.
45. • “Analytical Investigation of Turbulent Gas-Liquid Flows,” Department of Mechanical Engineering, University of Minnesota, Minneapolis, MN, March 15, 2000.
46. • “Analytical Investigation of Turbulent Gas-Liquid Flows,” Department of Mechanical Engineering, Texas A&M University, College Station, TX, March 13, 2000.
47. “Simulation and Modeling of Two-Phase Turbulent Flows for Prediction and Control of Combustion Systems,” Mid-Year ONR Combustion Control Review Meeting, Tallahassee, FL, February 17, 2000.
48. “Velocity and Temperature Statistics in Reacting Droplet-Laden Homogeneous Shear Turbulence,” 38<sup>th</sup> Aerospace Sciences Meeting and Exhibit, AIAA, Reno, NV, January 10, 2000.
49. • “Two-Phase Turbulent Flows: A Systematic Analytical Approach,” Department of Mechanical Engineering, Northwestern University, Evanston, IL, December 8, 1999.
50. • “Two-Phase Turbulent Flows: A Systematic Analytical Approach,” Department of Mechanical, Materials, and Aerospace Engineering, Illinois Institute of Technology, Chicago, IL, December 6, 1999.
51. • “Two-Phase Turbulent Flows: A Systematic Analytical Approach,” Department of Mechanical, Industrial, and Manufacturing Engineering, Northeastern University, Boston, MA, November 8, 1999.
52. • “Two-Phase Turbulent Flows: A Systematic Analytical Approach,” Department of Mechanical Engineering, Florida State University, Tallahassee, FL, November 4, 1999.
53. • “Two-Phase Turbulent Flows: A Systematic Analytical Approach,” Mechanical Engineering Department, University of Connecticut, Storrs, CT, September 24, 1999.
54. • “Recent Approaches to Turbulent Two-Phase Flows,” Department of Mechanical Engineering, University of Hawaii at Manoa, Honolulu, HI, September 16, 1999.
55. “Direct Numerical Simulation of Particle-Laden Homogeneous Plane Strain Turbulent Flow,” First International Symposium on Turbulence and Shear Flow Phenomena, Santa Barbara, CA, September 13, 1999.
56. “Simulation and Modeling of Two-Phase Turbulent Flows for Prediction and Control of Combustion Systems,” 12<sup>th</sup> ONR Propulsion Meeting, Salt Lake City, UT, August 4, 1999.
57. • “Simulation and Modeling of Turbulent Two-Phase Reactive Flows,” the Monthly Meeting of the Board of Regents of the University of Hawaii, Honolulu, HI, July 16, 1999.
58. “Simulation and Modeling of Two-Phase Turbulent Flows for Prediction and Control of Combustion Systems,” ONR Combustion Control Workshop, Baton Rouge, LA, April 22, 1999.
59. “Numerical Simulation of Heterogeneous Flow with Homogeneous Reaction,” 37<sup>th</sup> Aerospace Sciences Meeting and Exhibit, AIAA, Reno, NV, January 11, 1999.

60. • “Analytical Treatment of Two-Phase Turbulent Flows,” Department of Mechanical Engineering, University of Hawaii at Manoa, Honolulu, HI, December 3, 1998.
61. “Drop Oscillations with Thermocapillary Effects,” 51<sup>st</sup> Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, Philadelphia, PA, November 23, 1998.
62. “Statistics in Two-Phase Reacting Homogeneous Shear Turbulence,” 51<sup>st</sup> Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, Philadelphia, PA, November 23, 1998.
63. “Direct Numerical Simulation of Two-Phase Turbulent Reacting Flows” 50<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, San Francisco, CA, November 25, 1997.
64. “A Solution to the Modeled Reynolds Stress Transport Equation and Algebraic Stress Models” 50<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, San Francisco, CA, November 24, 1997.
65. • “Finite Element Analysis of Free Surface Flows,” Department of Mechanical Engineering, University of Hawaii at Manoa, Honolulu, HI, December 4, 1997.
66. • “Two-Phase Turbulent Reacting Flows: Mathematical Modeling and Numerical Simulation” Department of Mechanical Engineering, University of Hawaii at Manoa, Honolulu, HI, April 14, 1997.
67. • “Two-Phase Turbulent Reacting Flows: Mathematical Modeling and Numerical Simulation” Department of Mechanical Engineering, Carnegie Mellon University, Pittsburgh, PA, March 10, 1997.
68. • “Two-Phase Turbulent Flows: Modeling and Simulations,” Mechanical Engineering Department, Louisiana State University, Baton Rouge, LA, December 5, 1996.
69. • “Applications and Numerical Treatments of Two-Phase Flows,” Department of Mechanical Engineering, University of Michigan at Dearborn, Detroit, MI, November 26, 1996.
70. “Direct Numerical Simulation of Evaporating Droplet Dispersion in Low Mach Number Shear Turbulence,” 49<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, Syracuse, NY, November 25, 1996.
71. “Thermocapillary Instability of Liquid Jets,” 7<sup>th</sup> Annual Conference on Liquid Atomization and Spray Systems, Bellevue, WA, June 1, 1994.
72. “A Hybrid Finite Element - Volume of Fluid Method for Simulating Liquid Atomization,” 6<sup>th</sup> Annual Conference on Liquid Atomization and Spray Systems, Worcester, MA, May 19, 1993.
73. “A Brief Review of Upwind Techniques in Finite Elements Methods,” Department of Civil Engineering, State University of New York at Buffalo, Buffalo, NY, December 7, 1992.
74. “Solid Propellant Grain Design Using an Interface Reconstruction Scheme,” Central State Section Meeting of the Combustion Institute, Columbus, OH, April 27, 1992.
75. “Simultaneous Conduction and Radiation in an Absorbing-Emitting-Conducting Medium with Moving Boundaries,” First Conference on Computational Fluid Dynamics in Iran, Tehran, January 1990.

## **GRANT SUPPORT: I. RESEARCH FUND:**

### **Active Grants:**

1. Principle Investigator, "Plasma Deposition of Thin Films on Nanowires and Nanoparticles," Co-PI: Themis Matsoukas (Penn State University), the National Science Foundation, \$358,000, May 2007 – April 2010.
2. Co-Principle Investigator, "Efficient Turbulent Flame Stabilization for Advanced Propulsion," PI: P. Strykowski (University of Minnesota), the Office of Naval Research, \$450,000, January 2005 – December 2007.
3. Principal Investigator, "Flame Anchoring in Dump Combustors with Counter-current Shear Flow," NASA, \$84,000, September 2006 – August 2009.
4. Principle Investigator, "Ultra-rich Superadiabatic Combustion of Hydrogen Sulfide in a Reverse Flow Reactor," Co-PI: Alexei Saveliev (UIC), Innovative Energy Solution, \$152,492, February 2007 – January 2009.
5. Principle Investigator, "US–UK Workshop on Electrostatic Atomization of Electrically-Insulating Liquids," the National Science Foundation, \$25,000, May 2007 – April 2008.

### **Pending Grants:**

6. Principle Investigator, "PetaApps: Petascale Simulation of Liquid-fuel Combustors," Co-PIs: Laxmikant Kale (University of Illinois at Urbana-Champaign) and Gustaaf Jacobs (San Diego State University), the National Science Foundation, \$2,000,000, February 2008 – January 2013.

### **Completed Grants:**

7. Principal Investigator, "Design and Analysis of Electrohydraulic Systems for Autonomous Vehicle Applications," Co-PI: Sabri Cetinkunt (UIC), Servo Tech Inc., 50,414, March 2006 – March 2007.
8. Principle Investigator, "REU: A Low-Pressure Plasma Process for Nano-coating of Micron- and Nano-sized Particles," the National Science Foundation, \$6,000, March 2006 – February 2007.
9. Principle Investigator, "A Low-Pressure Plasma Process for Nano-coating of Micron- and Nano-sized Particles," Co-PI: Themis Matsoukas (Penn State University), the National Science Foundation, \$120,000, March 2005 – February 2007.
10. Principal Investigator, "Development and Implementation of Volume-of-Fluid Techniques for Direct Numerical Simulation of Turbulent Flows," Sverdrup Technology Inc, \$39,000, January 2003 – September 2003.
11. Principal Investigator, "Development of Kinetic-Approach-Based Two-Fluid Models for Two-Phase Turbulent Flows," the National Science Foundation, \$109,913, March 2003 – February 2006.

12. Principal Investigator, "Analytical Investigation of Fuel Droplets Dispersed in Turbulent Flows for Control and Design of Practical Combustion-Propulsion Systems," the Office of Naval Research, Arlington, VA, \$100,238, February 2003 – September 2004.
13. Principal Investigator, "Analytical Investigation of Fuel Droplets Dispersed in Turbulent Flows for Control and Design of Practical Combustion-Propulsion Systems," the Office of Naval Research, Arlington, VA, \$67,588, November 2002 – May 2003.
14. Principal Investigator, "CAREER: Two-Phase Turbulent Reactive Flows, Matching Fund," the National Science Foundation, Washington, D.C., Grant Number: CTS-0096349, \$50,000, April 2002 - February 2005.
15. Co-Principal Investigator, "CFD Calculations of METHANE deNOX Reburn Process," the Gas Technology Institute, Des Plaines, IL, \$1,020,000 (Mashayek's share \$340,000), April 2002 – May 2005.
16. Principal Investigator, "CAREER: Two-Phase Turbulent Reactive Flows, Matching Fund," the National Science Foundation, Washington, D.C., Grant Number: CTS-0096349, \$35,000, June 2001 - February 2005.
17. Principal Investigator, "CFD Calculations of METHANE deNOX Reburn Process on a Parallel Computer," the Gas Technology Institute, Des Plaines, IL, \$25,000, January 2001 - December 2001.
18. Principal Investigator, "Analytical Investigation of Fuel Droplets Dispersed in Turbulent Flows for Control and Design of Practical Combustion-Propulsion Systems," the Office of Naval Research, Arlington, VA, Grant Number: N00014-99-1-0808 (at UH) and N00014-01-1-0122 (at UIC), \$222,412, June 1999 - May 2002.
19. Principal Investigator, "CAREER: Two-Phase Turbulent Reactive Flows," the National Science Foundation, Washington, D.C., Grant Number: CTS-9874655 (at UH) and CTS-0096349 (at UIC), \$200,000, March 1999 - February 2005.
20. Principal Investigator, "14<sup>th</sup> ONR Propulsion Program Meeting," the Office of Naval Research, Arlington, VA, \$2,500, April-August 2001.
21. Principal Investigator, "Modeling and Numerical Simulation of Two-Phase Turbulent Reacting Flows," the Petroleum Research Fund, the American Chemical Society, Washington, D.C., Grant Number: ACS-PRF# 33044-G, \$20,000, June 1998 - August 2000.
22. Principal Investigator, "Development of a Local Base for Utilizing Nationwide Supercomputing Facilities," the Seed Money Grant, the University of Hawaii, Honolulu, HI, Grant Number: 382688, \$14,500, February 1998 - January 1999.
23. Travel Award, Research and Training Revolving Fund, the University of Hawaii, Honolulu, HI, \$3350, 1997 - 1999.
24. Sub-contractor, "Hydrodynamic Coefficient Analysis," \$25,000, August 1997 - July 1998. Sub-contracted from "Development of a Semi-Autonomous Underwater Vehicle for Intervention Missions (SAUVIM)," the Office of Naval Research.

## **GRANT SUPPORT: II. SUPERCOMPUTER TIME:**

1. Principal Investigator, "Simulation of Liquid-Fuel Combustors," 1,000,000 Service Units on the Abe, National Center for Supercomputing Applications, November 2007 – October 2008.
2. Principal Investigator, "Simulation of Novel Liquid-Fuel Combustors," 100,000 Service Units on the Abe, National Center for Supercomputing Applications, June 2007 – May 2008.
3. Principal Investigator, "Simulation of Novel Liquid-Fuel Combustors," 10,000 Service Units on the Tungsten, National Center for Supercomputing Applications, June 2007 – May 2008.
4. Principal Investigator, "Simulation of Novel Liquid-Fuel Combustors," 20,000 Service Units on the Copper, National Center for Supercomputing Applications, September 2006 – August 2007.
5. Principal Investigator, "Direct Numerical Simulation of Turbulent Flow over a Backward-Facing Step with Countercurrent Shear," 20,000 Service Units on the IBM/SP at the University of Michigan, July 2002 – June 2003.
6. Principal Investigator, "Direct Numerical Simulation of Two-Phase Turbulent Reacting Flow," 500 Service Units on the CRAY/T90 supercomputer at the San Diego Supercomputing Center, July 2001 - June 2002.
7. Principal Investigator, "Numerical Simulation of Two-Phase Turbulent Reacting Flow," 5000 Service Units on the IBM/SP at the San Diego Supercomputing Center, January 2001 - December 2001.
8. Principal Investigator, "Direct Numerical Simulation of Two-Phase Turbulent Reacting Flow," 650 Service Units on the CRAY/T90 supercomputer at the San Diego Supercomputing Center, January 2000 - June 2001.
9. Principal Investigator, "Numerical Simulation of Two-Phase Turbulent Reacting Flow," 2000 Service Units on the IBM/SP at the San Diego Supercomputing Center, October 1999 - December 2000.
10. Principal Investigator, "Direct Numerical Simulation of Two-Phase Turbulent Reacting Flow," 290 Service Units on the CRAY/T90 supercomputer at the San Diego Supercomputing Center, October 1998 - December 1999.
11. Principal Investigator, "Development of Parallel CFD Codes for Simulation of Multiphase Turbulent Flow," 3990 CPU Hours/year on the IBM Parallel Computing System at the Maui High Performance Computing Center, March 1998 - February 2000.
12. Principal Investigator, "Direct Numerical Simulation of Two-Phase Turbulent Reacting Flow," 40 Service Units on the CRAY/T90 supercomputer at the San Diego Supercomputing Center, April 1998 - September 1998.
13. Principal Investigator, "Direct Numerical Simulation of Two-Phase Turbulent Reacting Flow," 60 Service Units on CRAY/C90 supercomputer at Pittsburgh Supercomputing Center, August 1997 - June 1998.

## **COURSES TAUGHT:**

### **At the University of Illinois at Chicago:**

- ◆ Intermediate Heat Transfer (ME 421)
- ◆ Heat Conduction (ME 521)
- ◆ Numerical Heat Transfer (ME 528)
- ◆ Numerical Methods in Mechanical Engineering (ME 428)
- ◆ Turbulence Modeling (ME594)

### **At the University of Hawaii at Manoa:**

- ◆ Numerical Methods in Fluid Mechanics and Heat Transfer (ME 625)
- ◆ Conduction Heat Transfer (ME 621)
- ◆ Seminar (ME 691)
- ◆ Mechanical Engineering Experimentation (ME 301)
- ◆ Air Conditioning and Refrigeration (ME 417)
- ◆ Thermodynamics (ME 311)
- ◆ Heat Transfer (ME 422)

### **At SUNY/Buffalo:**

- ◆ Thermodynamics I (EAS 204)

## **VISITING FACULTY & POST-DOCTORAL RESEARCH ASSOCIATES:**

- ◆ Professor John Shrimpton (February 2006 – present), on sabbatical from Department of Mechanical Engineering, Imperial College London.
- ◆ Dr. Zhaosheng Gao (August 2003 – June 2004), Current Position: Postdoctoral Fellow, University of Utah.
- ◆ Dr. Ahmed Taha (July 2003 – June 2004)
- ◆ Dr. R. Vikram P. Pandya (September 1999 – May 2003), Current Position: Assistant Professor, Department of Mechanical Engineering, University of Puerto Rico.
- ◆ Dr. Prasanta Deb (April 2002 – April 2003)
- ◆ Dr. Shi-Jun Liao (September 1999 - May 2000), Current Position: Professor, School of Naval Architecture and Ocean Engineering, Shanghai Jiao Tong University, PR China.
- ◆ Dr. Yunlong Liu (June - November 1999), Current Position: Research Scientist, Swiss Federal Institute of Technology, Zurich, Switzerland.

## **GRADUATE STUDENTS ADVISED: I. CURRENT STUDENTS:**

- ◆ Keqin Zhang (August 2001 – Present), Ph.D. Candidate. Thesis: Novel Methodologies for Simulation of Incompressible Flows. Expected December 2007.

- ◆ Beniamino Rovagnati (May 2004 – Present), Ph.D. Candidate. Thesis: Modeling of Chemistry and Nanoparticle Coating in Low-Pressure Plasma Reactors. Expected May 2008.
- ◆ Kaustav Sengupta (January 2005 – Present), Ph.D. Candidate. Thesis: High-fidelity DNS and LES of Non-homogenous Turbulent Flows. Expected December 2008
- ◆ Ghazi Al-Ahmad (August 2005 – Present), Ph.D. Candidate. Thesis: Experimental Investigation of Electrostatic Atomizers. Expected August 2008.
- ◆ Karima Russell (August 2004 – Present), Ph.D. Candidate.
- ◆ Egemen Ergene (August 2006 – Present), Ph.D. Candidate.
- ◆ Harish Pandurang Kanchi (December 2007 – Present), Ph.D. Candidate.
- ◆ Chien-Wei Chang (August 2007 – Present), M.S. student.
- ◆ Martino Zuccali (August 2007 – Present), M.S. student.
- ◆ Justin Nocchi (January 2008 – Present), M.S. student.

## **GRADUATE STUDENTS ADVISED: II. FORMER STUDENTS:**

### Ph.D. Students

1. Mohammad Davoudabadi (2005 – 2007), Ph.D. Degree in Mechanical Engineering, University of Illinois at Chicago, December 2007. Thesis: Plasma and Particles Dynamics Modeling in PECVD Reactors. Received UIC Fellowship in 2006. Current Position: Fluent Inc., Evanston, IL.
2. Xiaoyan Bian (2004-2007), Ph.D. Degree in Mechanical Engineering, University of Illinois at Chicago, December 2007. Thesis: Towards Simulation of Charging and Breakup in Electrostatic Atomizers.
3. Babak Shotorban (2001 – 2005), Ph.D. Degree in Mechanical Engineering, University of Illinois at Chicago, May 2005. Thesis: Modeling of Subgrid-Scale Effects on Particles in Large-Eddy Simulation of Turbulent Two-Phase Flows. Received UIC Fellowship in 2003. Current Position: Postdoctoral Fellow, University of Illinois at Urbana-Champaign.
4. Gustaaf B. Jacobs (1999 – 2003), Ph.D. Degree in Mechanical Engineering, University of Illinois at Chicago, August 2003. Thesis: Direct Numerical Simulation of Two-phase Compressible Complex Flows with a Multidomain Spectral Method. Received UIC Fellowship in 2002. Current Position: Assistant Professor, Department of Aerospace Engineering, San Diego State University.
5. Zhaosheng Gao (2001 – 2003), Ph.D. Degree in Mechanical Engineering, University of Illinois at Chicago, August 2003. Thesis: Stochastic Modeling and Simulation of Particle/Droplet-Laden Turbulent Flows. Current Position: Postdoctoral Fellow, Iowa State University.

### M.S. Students

1. Mohammad Davoudabadi (2003 – 2005), M.S. Degree in Mechanical Engineering, University of Illinois at Chicago, August 2005. Thesis: Dust Particle Dynamics in Magnetized Low-Pressure Plasma Sheath.

2. Kaustav Sengupta (2003 – 2004), M.S. Degree in Mechanical Engineering, University of Illinois at Chicago, December 2004. Thesis: Numerical Simulation of Liquid-Fuel Combustor for Control of Combustion.
3. Nahid Sedighi (2002 – 2004), M.S. Degree in Mechanical Engineering, University of Illinois at Chicago, December 2004. Thesis: Simulation of Charging and Shielding of Dust Particles in Low Pressure Cold Plasma.
4. Palak Gandhi (2002 - 2003), M.S. Degree in Mechanical Engineering, University of Illinois at Chicago, December 2004. Thesis: Numerical Investigation of Compressible Flow in Two-Sided Lid-Driven Cavity.
5. Beniamino Rovagnati (2000 - 2002), M.S. Degree in Mechanical Engineering, University of Illinois at Chicago, August 2002. Thesis: A Computational Investigation of NO<sub>x</sub> Reduction by Reburn Process in Wood-Fired Stoker Boiler.
6. Marco Fumagalli (2000 - 2002), Co-advisor (Advisor: Suresh Aggarwal), M.S. Degree in Mechanical Engineering, University of Illinois at Chicago, August 2002. Thesis: A Numerical Investigation of Fluid and Particle Dynamics in an Unsteady Flow past an Oscillating Cylinder.
7. Dazhi Guo (1999 - 2001), M.S. Degree in Mechanical Engineering, University of Illinois at Chicago, December 2001. Thesis: Numerical Simulations of Particle-Laden Turbulent Flows.
8. Brian S.C. Lau (1997 - 1999), M.S. Degree in Mechanical Engineering, University of Hawaii at Manoa, May 1999. Thesis: Simulation of Oscillating Drops with Thermocapillary Effects.
9. Jason D. Zeda (1998 - 1999), M.S. Degree in Mechanical Engineering, University of Hawaii at Manoa, August 1999. Major Report: Numerical Simulation of Evaporating Capillary Jets.
10. Celine Barre, (1996 - 1997), Co-advisor, M.S. Degree in Aerospace Engineering, SUNY at Buffalo, February 1998. Thesis: Direct Numerical Simulation of Particle-Laden Plane Strain Turbulent Flows.

#### **UNDERGRADUATE STUDENTS ADVISED:**

- ◆ Donald Frederick, “ME 392 project: Simulation of Liquid-fuel Combustors,” Fall 2007.
- ◆ Christopher Naylor, “ME 392 project: Electrostatic Atomization,” Spring 2007.
- ◆ Mark Moreno, “NSF/REU: Electrostatic Spraying,” Summer – Fall 2006.
- ◆ Michael Liss, ME 392 project: “Heat Transfer in Electronic Packages,” Spring 2006.
- ◆ Jason Wennerberg, ME 392 project: “Numerical Simulation of Plasma Systems using a Particle-in-Cell (PIC) Code,” Fall 2003 and Spring 2004.
- ◆ Karima Russell, “Two-Phase Flow in Confined Enclosures,” Fall 2003 and Spring 2004.
- ◆ Hyo Jin Hahn, ME 392 project: “Graphical Representation of Simulation Results for Two-Phase Flow in a Combustor,” Summer 2001.

- ◆ Jorge Mauricio, Sharif Zaben, Judee Tam, Ruben Roman, and George Tape, ME 396 project: “Thin Si Integrated Circuit (IC) and IC Package Evaluation,” Spring 2001.

**THESIS/DISSERTATION COMMITTEES SERVED:**

- ◆ Andrew Lock, Ph.D., UIC (Advisor: Puri & Aggarwal), 2006
- ◆ Alejandro Brianos, Ph.D., UIC (Advisor: Aggarwal), 2006
- ◆ Jenny Lock, Ph.D., UIC (Advisor: Kennedy), 2006
- ◆ Leandro Sphaier, Ph.D., UIC (Advisor: W. Worek), 2005
- ◆ Jerzy Wielgus, M.S., UIC (Advisor: L. Kennedy), 2005
- ◆ Nirmal K. Manna, Ph.D., Jadavpour University, India (Advisors, D. Sanyal and S. Sen), 2005
- ◆ Ilker Bayer, Ph.D., UIC (Advisor: C. M. Megaridis), 2006
- ◆ S.-W. Lee, Ph.D., UIC (Advisor: F. Loth), 2005
- ◆ R. A. Khurram, Ph.D., UIC, Civil Engineering (Advisor: A. Masud), 2004
- ◆ Hamid Elhami, Ph.D., Sharif University of Technology, Iran (Advisor: S. Kazemzadeh), 2004
- ◆ Emiliano Giacchetti, M.S., UIC (Advisor: L.A. Kennedy), 2003
- ◆ Ugur Alakoc, M.S., UIC (Advisor: C. M. Megaridis), 2003
- ◆ Khyati M. Shukla, M.S., UIC (Advisor: S.K. Aggarwal), 2003
- ◆ Seung Eun Lee, M.S., UIC (Advisor: F. Loth), 2002
- ◆ Marco Fumagalli, M.S., UIC (Advisor: S.K. Aggarwal), 2002
- ◆ Yi Ge, Ph.D., UIC (Advisor: S. Cha), 2002
- ◆ Anurag Jhalani, M.S., UIC (Advisor: I.K. Puri), 2001
- ◆ Eric A. Howell, M.S., UIC (Advisor: C.M. Megaridis), 2001
- ◆ Guilio Bellizia, M.S., UIC (Advisor: C.M. Megaridis), 2001
- ◆ Zhuang Shu, Ph.D., UIC (Advisor: Z. Shu), 2001
- ◆ Andrea Pasquali, M.S., UIC (Advisor: S.S. Cha), 2000
- ◆ Shiling Liu, M.S., University of Hawaii (Advisor: B.H. Chao), 1999
- ◆ Yunqing Xia, M.S., University of Hawaii (Advisor: B.H. Chao), 1999
- ◆ Darren N. Horiuchi, M.S. University of Hawaii (Advisor: L.H. Hihara), 1998

**BOOK REVIEWER FOR:**

- ◆ “Electrostatic Atomization, Introduction to,” author, Dvora Michelson, Taylor & Francis, 2006

**PAPER REVIEWER FOR:**

- ◆ AIAA Journal
- ◆ Applied Thermal Engineering

- ◆ Atomization and Sprays
- ◆ Chemical Engineering Science
- ◆ Combustion and Flame
- ◆ Combustion Science and Technology
- ◆ Computer Methods in Applied Mechanics and Engineering
- ◆ International Journal for Numerical Methods in Fluids
- ◆ International Journal of Heat and Mass Transfer
- ◆ International Journal of Multiphase Flow
- ◆ Journal of Applied Physics
- ◆ Journal of Fluid Mechanics
- ◆ Journal of Fluids Engineering (ASME)
- ◆ Journal of Heat Transfer (ASME)
- ◆ Journal of Propulsion and Power (AIAA)
- ◆ Journal of Thermophysics and Heat Transfer (AIAA)
- ◆ Numerical Heat Transfer
- ◆ Physics of Fluids
- ◆ Physics of Plasmas
- ◆ Powder Technology
- ◆ Proceedings of the Royal Society A
- ◆ Proceedings of IUTAM Symposium on Computational Approaches to Disperse Multiphase Flow

**PROPOSAL REVIEWER FOR:**

- ◆ National Science Foundation
- ◆ Department of Energy
- ◆ Petroleum Research Fund
- ◆ Israel Science Foundation
- ◆ Cooperative Grants Program of the U.S. Civilian Research and Development Foundation (CRDF)
- ◆ UIC Internal Competition

**PANELIST FOR:**

- ◆ “SciDAC-2, Turbulence Panel,” Department of Energy, April 13, 2006.
- ◆ “SBIR Phase I Panel Combustion Technologies,” National Science Foundation, Feb 1, 2006.
- ◆ “Nanoscale Exploratory Research,” National Science Foundation, March 16, 2005.
- ◆ “SBIR/STTR Phase I, Fluids Panel,” National Science Foundation, March 25, 2004.

- ◆ “CAREER: Multiphase and Particulate Systems,” National Science Foundation, December 11-12, 2003.
- ◆ “SBIR/STTR Phase II Panel Chemistry/Chemical Engineering,” National Science Foundation, September 16, 2003.
- ◆ “Information Technology Research/Medium Geofluids,” National Science Foundation, May 29, 2003.
- ◆ “Small Business Innovation Research/Technology Transfer Programs,” National Science Foundation, September 19, 2002.
- ◆ “Advantages and Specific System Applications of Pulse Detonation Engines,” International Colloquium on Advances in Confined Detonations, Moscow, Russia, July 5, 2002.

### **UNIVERSITY SERVICES:**

- ◆ Member of the Large Scale Integrative Research Group (March 2005 – August 2005)
- ◆ Member of the UIC Senate Executive Committee (August 2005 – May 2006)
- ◆ UIC Senator (August 2003 – May 2006)
- ◆ Member of the UIC Graduate College (August 2000 – Present)

### **COLLEGE OF ENGINEERING SERVICES:**

- ◆ College Space Committee, Member (April 2006 – November 2006)
- ◆ College Executive Committee, Elected Member (August 2006 – Present)

### **DEPARTMENTAL SERVICES:**

#### *At the University of Illinois at Chicago:*

- ◆ Associate Head (July 2005 – Present)
- ◆ Director of Graduate Studies (August 2004 – Present)
- ◆ Fluid/Thermal Faculty Search Committee, Chair (August 2004 – August 2005)
- ◆ Fluid/Thermal Faculty Search Committee, Member (August 2004 – August 2005)
- ◆ Department Advisory Committee, Elected Member (August 2001 – July 2003, August 2004 – July 2005)
- ◆ Department Advisory Committee, Ex-Officio Member (August 2005 – Present)
- ◆ Department Computer Committee, Chair (August 2001 – Present)
- ◆ J.P. Hartnett Professor of Mechanical Engineering Faculty Search Committee, Member (August 2001 – July 2002)
- ◆ Department Graduate Committee, Member (August 2000 – August 2004)
- ◆ Department National Outreach and Publicity Committee, Member (August 2001 – Present)
- ◆ Department Seminar Committee, Member (August 2000 – August 2002)

- ◆ Secretary to the ME Faculty (Fall 2000)

At the University of Hawaii at Manoa:

- ◆ Faculty Search Committee in Fluid-Thermal Sciences, Member (Fall 1999)
- ◆ Publicity Committee, Member (August 1998 - May 2000)
- ◆ Curriculum Committee, Member (January 1999 - May 2000)
- ◆ Election Committee, Member (August 1997 - May 2000)
- ◆ Participant in Open Houses held by the College and the Department (1998 and 1999)
- ◆ Faculty Advisor for the Student Chapter of the American Society of Heating, Refrigerating and Air Conditioning Engineers, ASHRAE (August 1997 - July 2000)

**MEETING/SESSION ORGANIZER:**

- ◆ Host, "ONR Propulsion Planning Meeting," Addison, IL, May 8, 2007.
- ◆ Topical Organizer for Terrestrial Energy Systems Sessions, 45<sup>th</sup> AIAA Aerospace Sciences Meeting, Reno, NV, January, 2007.
- ◆ Organizer and Host, "ONR Interim Review Meeting on Innovative Combustion for Propulsion," Chicago, IL, May 16, 2005.
- ◆ Member of Local Organizing Committee, "30<sup>th</sup> International Symposium on Combustion," Chicago, IL, July 25-30, 2004.
- ◆ Topical Organizer for AIAA Sessions, "2<sup>nd</sup> International Energy Conversion Engineering Conference," Providence, RI, August 16-19, 2004.
- ◆ Organizer for Session 28-FREPS-4, "Alternative Fuels," 1<sup>st</sup> International Energy Conversion Engineering Conference, Portsmouth, VA, August 17-21, 2003.
- ◆ Organizer for Session 20-FREPS-3, "Alternative Fuels for Power Systems," 1<sup>st</sup> International Energy Conversion Engineering Conference, Portsmouth, VA, August 17-21, 2003.
- ◆ Member of Local Organizing Committee, "3<sup>rd</sup> Joint Meeting of the U.S. Sections of the Combustion Institute," Chicago, IL, March 16-19, 2003.
- ◆ Organizer and Host, "14<sup>th</sup> ONR Propulsion Meeting," Chicago, IL, August 8-10, 2001.

**SESSIONS CHAIRED:**

- ◆ Session 113-TES-4, "Advances in Turbulence and Transition," 45<sup>th</sup> AIAA Aerospace Sciences Meeting, Reno, NV, January 8, 2008.
- ◆ Session 3A "Electrostatics," 20<sup>th</sup> Annual ILASS-Americas Conference, Chicago, IL, May 16, 2007.
- ◆ Session 26-TES-1 "Combustion Modeling in Energy Systems," 45<sup>th</sup> AIAA Aerospace Sciences Meeting, Reno, NV, January 8, 2007.

- ◆ Session 1B “Droplet Dynamics,” 19<sup>th</sup> Annual ILASS-Americas Conference, Toronto, CA, May 25, 2006.
- ◆ Session 25-TES-1 “Combustion Modeling in Energy Systems,” 44<sup>th</sup> AIAA Aerospace Sciences Meeting, Reno, NV, January 9, 2006.
- ◆ Session “Modeling in Plasma Chemistry,” 17<sup>th</sup> International Symposium on Plasma Chemistry, Toronto, Canada, August 11, 2005.
- ◆ Session “Standards for CFD in the Aerospace Industry,” 42<sup>nd</sup> AIAA Aerospace Sciences Meeting, Reno, NV, January 2004.
- ◆ Session 28-FREPS-4, “Alternative Fuels for Power Systems,” 1<sup>st</sup> International Energy Conversion Engineering Conference, Portsmouth, VA, August 19, 2003.
- ◆ Session 20-FREPS-3, “Alternative Fuels,” 1<sup>st</sup> International Energy Conversion Engineering Conference, Portsmouth, VA, August 19, 2003.
- ◆ Session F-320-4, “Open Forum on Multiphase Flows: Gas-Particle Flows,” 2003 Fluids Engineering Division of the ASME, Summer Meeting, July 8, 2003.
- ◆ Session 1, “Confined Gaseous Deflagrations and Detonations (III),” International Colloquium on Advances in Confined Detonations, Moscow, Russia, July 2, 2002.

#### **PROFESSIONAL ACTIVITIES:**

- ◆ Member of Editorial Board of *Atomization and Sprays*, 2006
- ◆ Member of the Terrestrial Energy Systems Committee of the American Institute of Aeronautics and Astronautics, AIAA (2001-Present)
- ◆ Associate Fellow AIAA, 2002
- ◆ Member of the American Physical Society, APS (1996-Present)
- ◆ Fellow of the American Society of Mechanical Engineers, ASME (1990-92, 1999-Present)
- ◆ Member of the Institute of Liquid Atomization and Spray Systems, ILASS (1992-Present)
- ◆ Member of the Combustion Institute (2003-Present)
- ◆ Member of the International Plasma Chemistry Society, IPCS (2005 – Present)
- ◆ Member of the Program Subcommittee of the International Conference on Multiphase Flow, ICMF 2007, Leipzig, Germany.
- ◆ Member of the Program Review Subcommittee of the 28<sup>th</sup>, 29<sup>th</sup> and 30<sup>th</sup> International Symposium on Combustion
- ◆ Former Member of the American Society of Engineering Education, ASEE
- ◆ Former Member of the American Society of Heating, Refrigerating and Air Conditioning Engineers, ASHRAE
- ◆ Former Member of the National Education Association, NEA
- ◆ Participant in “Gas Turbine Combustion Technology and Research Symposium,” GE Aircraft Engines, Cincinnati, OH, April 23-25, 2001