

# Dr. Nasser Ashgriz

## Biographical Sketch

Professor Ashgriz received his B.S. in 1979, M.S. in 1981 and Ph.D. in 1984 from the department of Mechanical Engineering at Carnegie-Mellon University in Pittsburgh, Pennsylvania. He then joined the department of Mechanical and Aerospace engineering at the State University of New York at Buffalo where he stayed until 2002. He is currently a professor at the department of Mechanical and Industrial Engineering at the University of Toronto. Professor Ashgriz is also a trained patent attorney. He received his J.D. in 1996 from the School of Law at the State University of New York at Buffalo. He is admitted to the New York bar, as well as being a registered patent attorney with the U.S. patent and trademark office.

Professor Ashgriz is world renowned for developing novel computational techniques for the modeling of free surface flows and interfaces; for conducting the seminal experiments which detailed the complicated process of the droplet collision and coalescence; for advancing several novel diagnostic methods for the spray characteristics, including tomographic imaging of sprays; for developing new models for the breakup mechanism of liquid masses into small droplets, the first ever model for this complicated process; for his contribution towards the development of better fuel injectors, and better solid and liquid propellant rocket engines; and for his contributions towards the development of better ink-jet printers.

Because of the success of his computational model for the simulation of the free surface flows and interfaces, he formed Simulent Incorporation in 1999. Simulent Inc. is now a leading computational fluid dynamics (CFD) software development and engineering consulting company delivering the most advanced solutions for the design and testing of liquid spray nozzles such as fuel spray nozzles or splash plate atomizers for black liquor.

Professor Ashgriz has more than 120 publications and numerous conference presentations and invited lectures. His articles have received more than 500 citations by other scientists, which is an indication of the impact of his research on the scientific community. He has published several books and book chapters. He is the recipient of several prestigious awards including TOKTEN award from the United Nations, and the Ralph Teetor award from the Society of Automotive Engineers. He is currently on the editorial board of the international Journal of the Atomization and Sprays, as well as, Recent Research Development in Applied Physics. Professor Ashgriz has served as a member of Graduate Program & Admissions Committee, Aerospace Engineering Curriculum Committee, the Space Committee, and AIAA Niagara Frontier Section Council. He has also been very involved with various student organizations such as being the faculty advisor for the Society of Automotive Engineering Student organization, being mentor for the university honor students.

Professor Ashgriz has been a member of several advisory panels for NASA, NSF, CSA and DOE. He has been a visiting professor at the Imperial College in London England; Phillips Laboratory at Edwards Air force Base in California; and at NASA Lewis Research Center at Cleveland, Ohio. His research has been funded by various government organizations and numerous industries including auto, aerospace, utilities, pulp and paper, printing, and many more.

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## Résumé

*Dr. Nasser Ashgriz*

(Revised May 2004)

### Work Address

Department of Mechanical & Industrial Engineering  
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Home Page: <http://www.mie.utoronto.ca/labs/mfrc/>

### Vital Statistics

Born: June 21, 1957  
Married: two children  
Citizenship: U.S.  
Canadian Landed Immigrant

### Present Status

- Professor of Mechanical and Industrial Engineering, University of Toronto.
- President and CEO, Simulent Inc. Development and marketing of commercial CFD software for flow simulation and process design.

### Education

- Ph.D. (1984), M.S. (1981), B.S. (1979), Mechanical Engineering  
Carnegie-Mellon University, Pittsburgh, PA.
  - Major: Fluid and Thermal Sciences.
  - Minor: Chemical Engineering.
- J.D. (1996), State University of New York at Buffalo, Buffalo, NY.  
Admitted to NY Bar.
- Patent Attorney (1999), Registered with USPTO, Registration Number 44,514.

## Employment

- Professor, University of Toronto, Department of Mechanical and Industrial Engineering, Toronto, ON, 2002-present.
- Research Professor, State University of New York at Buffalo, Department of Mechanical and Aerospace Engineering, Buffalo, NY, 2002-Present.
- Patent Attorney, Berskin and Parr, Toronto, ON 8/1998-1/1999.
  - Review of patent applications
  - Research – Performed prior art searches for patent application.
  - Disclosure – Conducted inventor interviews to augment and complete disclosure.
- Professor, State University of New York at Buffalo, 1996-2002.
- Associate Professor, State University of New York at Buffalo, 1990-1996.
- Assistant Professor, State University of New York at Buffalo, 1984-1990.
- Visiting Professor, Department of Mechanical Engineering, Imperial College, London, England, 1/1998-7/1998.
- Faculty Fellow, Phillips Laboratory, Edwards Air force Base, AFB, CA 5/1995-9/1995.
- Summer Faculty Fellow, NASA - Lewis Research Center, Cleveland, OH 5/1986-9/1986.
- Computer User Consultant, in charge of helping students with their problems in various programming Languages. Carnegie-Mellon University, Pittsburgh, PA 1/1982-1/1983.
- Research Assistant, Mechanical Engineering Department, Carnegie-Mellon University Pittsburgh, PA, 9/1979-8/1984.
- Consultant Engineer, Provided mechanical analysis of product failure for equipment involved in litigation by an insurance company. Dickie-MaCamey Law Firm, Pittsburgh, PA, 5/1979-9/1979.
- Engineer Assistant, involved in grinding machine design. Analyzing characteristics and behaviors of the mineral samples under the grinding process for the design of grinding machines. Allis-Chalmers Corp. Milwaukee, WI, 5/1978-9/1978.

## Editorship

- Editorial Board, *Atomization and Sprays*, Journal of the International Institute for Liquid Atomization and Spray Systems, Norman Chigier, Editor, Begell House, Inc., 1996-present.
- Editorial Board, *Recent Research Development in Applied Physics*, S.G. Pandalai, Editor, Transworld Research Network, 1998-present.
- Associate Editor, Buffalo Environmental Law Journal, 1995-1996.
- Heat Transfer in Combustion Systems, Proceedings of the 1989 ASME Winter Annual Meeting, HTD, Vol.122, San Francisco, California, December 10-15, 1989 (co-editor with J.G. Quintiere, H.G. Semerjian, and S.E Slezak) ASME, New York, N.YH. 10017.

## **Consulting**

- XEROX Corp., Rochester, NY., 5/1998-2002. Research and consulting on the Ink-Jet Printer technology.
- ANSYS, Inc., Pittsburgh, PA, 12/1997-3/1999 Development of an Algorithm for Interface Advection in Unstructured Grids.
- Ohmcraft, Inc. Rochester, NY 7/1996-10/1996 Adhesive Delivery System for Computer Chips.
- American Precision Industries Buffalo, NY 1/1996-8/1996 Moisture Separation from Condensers and Intercoolers.
- Atlantic Research Company Buffalo, NY 7/1989-5/1990 Fuel Distribution in Bipropellant Rocket Engines.
- Occidental Chemical Corp. Buffalo, NY 8/1988-7/1992 Incineration of Hazardous Liquid Waste.
- Combustion of Chlorinated Hydrocarbon Droplets. Transfer of Technology from Lab-Scale to Full-Scale.
- Bell Aerospace-Textron Corp. Buffalo, NY 1/1988-6/1989 Cooling of Mirrors for High Power Lasers. Flow Behavior in Thin-Gapped Diamond-Shape Channels with Pins.

## **Committee Assignment**

- Member of the Canadian Space Agency conference review board, 2003.
- Panel Chairman for the Ontario Graduate Scholarship Program (OGS), 2002-2003.
- Member of the Graduate Program & Admissions Committee, 1992-1998.
- Member of Aerospace Engineering Curriculum Committee, since 1990.
- Doctoral Qualifying Exam Committee, since 1987.
- AIAA Niagara Frontier Section Vice-Chairman for Education, 1989-1990.
- Society of Automotive Engineering Student Section faculty advisor, 1989-1990.
- Honor Student Mentor, 1988-1990.
- Zimmerman Award Committee, 1987.
- Space Committee, 1987.
- Faculty Senate Alternate, State University of New York at Buffalo, 1986.
- AIAA Niagara Frontier Section Council member, 1986-1991.

## Patents

- Multi-Orifice Impulsed Spray Generator, Patent No. 4,667,877, May 26, 1987 (19870526).
- A Method for Designing and Testing Spray Nozzles, Disclosure, Provisional patent application 2002.

## Academic Honors & Professional Recognition

- TOKTEN Award, United Nations, New York, NY, 1995. Transfer of Knowledge Through Expatriate Nationals.
- AFOSR Summer Faculty Research Award Phillips Laboratory, Edwards Airforce Base, CA, 1994.
- Best Paper Award, The Combustion Institute, Columbus, OH, 1992. For a paper entitled "Combustion Characteristics of Chlorobenzene and Its Mixtures with Decane and Dodecane."
- NSF Initiation Award National Science Foundation, Washington, DC, 1990. Investigation of the Binary Drop Collisions.
- Best Picture Award American Physical Society, New York, NY, 1988. Picture Gallery of the 41st Meeting of the American Physical Society, Fluid Dynamic Division.
- Ralph Teetor Award Society of Automotive Engineers, Detroit, MI, 1988. In recognition of significant contribution to research, teaching and student development.
- Bennet Prize Carnegie-Mellon University, Pittsburgh, PA, 1981 & 1983. In recognition of outstanding scholarly work in Mechanical Engineering.
- Biographical data recorded in Who is Who in America.
- "UB researchers see light at end of scramjet tunnel," Research noted in the Buffalo News, Monday, June 12 (1989), p. A-8.
- "Dissecting Flames," Research was highlighted in *Source* a Research Digest from the University at Buffalo, Fall (1989), p. 26.
- "Clean Burning of Toxic Wastes," Research noted in the *Reporter*, UBriefs, University at Buffalo Newspaper, August 3 (1989), p. 14.
- Biographical data recorded in Who is Who in the East, 22<sup>nd</sup> Edition (1988).
- Biographical data recorded in Men of Achievement, 13th Edition (1988).
- Member, SIGMA XI scientific research honor society (1984).

## Meetings Organized

- Chairman of a Committee on "Deposition and Coating" at ILASS America, Monterey, California, May 18-21, 2003.
- Session Chair on Modeling II at 16<sup>th</sup> Annual Conference on Liquid Atomization and Spray Systems, May 18 - 21, 2003, Monterey, CA.
- Session Chair on Modeling II. 15<sup>th</sup> Annual Conference on Liquid Atomization & Spray Systems. May 14 - 17, 2002, Madison, Wisconsin.
- Chairman of a Committee on "Deposition and Coating" at ILASS, 15<sup>th</sup> Annual Conference on Liquid Atomization & Spray Systems. May 14 - 17, 2002, Madison, Wisconsin.
- Session Chairman. 14<sup>th</sup> Annual Conference on Liquid Atomization & Spray Systems. Institute for Liquid Atom. & Spray Sys., Dearborn, MI, 5/(20-23)/200.
- Session Chairman, session on "Atomization." 8<sup>th</sup> International Conference on Liquid Atomization & Spray Systems ICLASS 2000, Pasadena, CA, 7/(16-20)/2000.
- Session Chairman, session on "Spray Dynamics." 12<sup>th</sup> Annual Conference on Liquid Atomization and Spray System Institute for Liquid Atom. & Spray Sys., Indianapolis, IN 5/(16-19)/1999.
- Session Chairman, session on "Drops and Bubbles." Annual Meeting of the Division of Fluid Mechanics American Physical Society, Berkley, CA, 11/(20-22)/1997.
- Session Chairman, session on "Taylor Instability." Annual Meeting of the Division of Fluid Mechanics American Physical Society, Syracuse, NY, 11/(20-22)/1996.
- Session Chairman, session on "Spray Modeling." 8<sup>th</sup> Annual Conference on Liquid Atomization and Spray System Institute for Liquid Atom. & Spray Sys., Troy, MI 5/(21-24)/1995.
- Session Organizer and Chairman, sessions on "Exhibition of Images," and Spray Modeling". 6<sup>th</sup> Annual Conference on Liquid Atomization and Spray Systems Institute for Liquid Atom. & Spray Sys., Worcester, MA, 5/(17-19)/1993.
- Session Chairman, session on "Hazardous Materials Combustion, The Combustion Institute Columbus, OH, The Central States Section Meeting. 4/(26-28)/1992.
- Review Panel for Small Business Innovative Research Chemical and Thermal Division National Science Foundation Washington, D.C. 10/14/1992.
- Session Organizer and Chairman, Session on Combustion of Solids and Liquids ASME Winter Annual Meet San Francisco, CA 12/10/1989
- Organizer of the Gallery of Fluid Motion, Conference Organizing Committee and Session Chairman American Physical Society Buffalo, NY. 41st Annual Meeting of the APS, Division of Fluid Dynamics. 11/20/1988.
- ASME K-11 Committee on "Heat Transfer in Fire and Combustion Systems." American Society of Mechanical Engineers, 1987-199.

- Session Organizer and Chairman , Session on: Waste Incineration ASME Winter Annual Meeting Chicago, IL 12/2/1988

### **Areas of Competence**

- Spray Systems
- Fluid Dynamics
- Thermal Systems
- Computational Fluid Dynamics
- Combustion
- Patent and Trademarks

### **Professional Societies**

- Member, Institute for Liquid Atomization and Spray Systems (ILASS) (1989-present).
- Member of CFD Society of Canada, (2002-present).
- Member, American Society of Mechanical Engineers (ASME) (1980-1990).
- Member, American Institute of Aeronautics and Astronautics (1984-1990, 2003-present).
- Member, The Combustion Institute (1980-present).
- Member, Society of Automotive Engineers (SAE)(1985-1990).

### **Reviewer**

- McGraw Hill Book Co.
- Wiley and Sons
- MacMillan Publishing Company.
- National Science Foundation
- U.S. Department of Defence
- National Research Council of CANADA
- Department of Energy
- National Aeronautics and Space Agency



- Journal of Fluid Mechanics
- AIAA Journal
- Combustion and Flame
- Combustion Science and Technology
- Physics of Fluids
- Chemical Engineering Communication
- Review of Scientific Instruments
- Journal of Computational Physics
- International Journal of Numerical Methods in Fluids
- Journal of Engineering Mathematics
- Journal of Atomization and Sprays
- Energy Combustion and Environment
- Journal of Non-equilibrium Thermodynamics
- Metallurgical Transactions
- ASME Annual Meeting Papers.

### **Graduate Courses Taught**

- Advanced Thermodynamics
- Hypersonic Vehicles
- Emissions and Environment
- Multiphase Flows
- Combustion

### **Undergraduate Courses Taught**

- Introduction to Engineering
- Thermodynamics
- Physics

- Introduction to Aerospace Engineering
- Heat Transfer Laboratory
- Engineering Materials
- Energy Systems Thermodynamics II
- Propulsion
- Combustion
- Mechanical Engineering Design

### **Independent Study Courses Taught**

- Design and Development of a Human Long Model. 2001.
- Shock Drop Interactions. 2000.
- Measurements of Laminar Burning Velocity of Premixed Flames. 1999.
- The Effect of Temperature Variation on Biological Compounds. 1997
- Construction of a Singing Flame Facility. 1996.
- Electric Field Effect on the Combustion of Droplets. 1995.
- Installment and Operation of the Ricardo Test Engine. 1994.
- Impingement of Jet Diffusion Flames on a Solid Surface. 1993.
- A Comprehensive Review of Digital Storage Oscilloscope, Digital Graphics Plotter, and Thermocouples. 1992.
- Interactive Droplet Vaporization. 1990.
- Design and Construction of a Flat Flame Burner. 1989.
- Measurement of the Liquid Jet Diameter Variation as a Function of the Reynolds Number. 1988.
- Visualization of Drop Collision Phenomena. 1987.
- Measurement of Damping Rates of a Liquid Column. 1986.
- Liquid Jet Breakup Lengths as a Function of Reynolds Number. 1985.
- Measurement of Impact Parameter in Drop Collisions. 1984.

## Postdoctoral and Visiting Scientists

- Serguei Savtchenko, postdoctoral research associate, May 2003- present. “Instability analysis of liquid jets.”
- Mofid Gorgi, visiting professor from Mazandaran University, Iran, Jan-Aug, 2004. “Perturbation analysis on turbulent interfaces.”
- Reza Kamali, visiting associate from Shiraz University, Shiraz, Iran, Jan-Aug, 2004, “Lattice Boltzman analysis of Droplet collision.”
- Vahid Madani, research associate, Sept. 2002-Dec. 2003, “Liquid jet instability subject to high amplitude perturbations.”
- Ebrahim Shirani, visiting professor from Isfahan University, Isfahan, Iran, 2002-2003. “Effect of Turbulence on Liquid-Gas Interfaces.”
- Amgad Elgowainy postdoctorate research associate, 1994-95. “Bubble interaction, Drop impactions, Micro-explosion”. Presently Assistant Professor at Purdue University, Calumet, Indiana.

## Doctoral Dissertations Directed

- Ri Li, “Effect of droplet interaction and the drawback effect in the inkjet printing,” Expected gradation date May 2008.
- Morteza Eslamian, “Production of nano-size particles using a novel Atomization Technique.” Expected gradation date May 2006.
- Amirreza Golpayegan, “Water management and Droplet mobility in Fuel Cells,” Expected gradation date May 2006.
- Ali Jafari, “Turbulent Interface Interactions.” Expected gradation date May 2006.
- Mazlan A. Wahid, “Rotating Flame Characteristics.” January 2003, Presently professor at Technical University of Malaysia (UTM).
- Yousik Hong, “Bubble Dynamics on a Microheater Induced by Pulse Heating,” March 2004.
- C-F Hsu, “Impaction of Liquid Drops on Perforated Plates.” January 2001. Presently at
- Marry D. Saroka, “Numerical Simulation of Collision of Liquid Drops.” December 2000. Presently at United Technologies.
- Tiberiu Barbat, “Nonlinear Bubble Interactions in Acoustic Pressure Fields.” June 1998. Presently at Fluent Corporation.
- W.H. Zhuang, “Impaction of a Liquid Drop on a Surface.” June 1996.
- Amgad Elgowainy, “Nonlinear Analysis of the Rayleigh-Taylor Instability of Viscous Finite Fluid Layers.” August 1994. Presently Assistant Professor at Purdue University, Calumet, Indiana.

- Farzad Mashayek, “Numerical Study of Capillary and Thermocapillary jets and Drops.” May 1994. Presently Full Professor at Department of Mechanical Engineering, University of Illinois at Chicago.
- Darren J. Mollot, “Flow Visualization of Liquid Drops and Bridges.” May 1993. Presently Technical Liaison to Industry, the U.S. Department of Energy, Power Systems Development Facility, Wilsonville, AL.
- William J. Stry, “The Combustion of Free Flowing Droplets of Chlorinated Benzenes, Alkanes, and Their Mixtures.” September 1992. Presently at Jamestown Radiator Co., Jamestown, NY.
- J.Y. Poo, “Experimental and Numerical Investigation of Binary Liquid Drop Collision.” December 1989. Presently Professor at Taiwan University.

### **Masters Theses Directed**

- Ri Li, “Breakup Mechanisms in Impinging Liquid Jets.” April 2004.
- Bian Hongbin, “Multi-Bubble Interaction in an Acoustic Field.” June 2001.
- Joel Rak, “Production of Metal Matrix Composites by Spray Forming.” Presently at Moog Corporation. July 1999.
- S. Stankovic, “Moisture Separation in an Intercooler.” April 1997.
- B. Hackmann, “Droplet Separation from Heat Exchanger Systems.” August 1996.
- L. Wei, “Influence of Surfactants and Polymer Additives on Flame Propagation Over Oil-In-Water Emulsions.” February 1996.
- B.M. Ortiz, “Centrifugal Atomization for Production of Aluminum Particles.” January 1996.
- A. Blatter, “Flame Propagation Across Fuel Emulsions.” October 1995.
- Y. Guo, “Instability of a Capillary Liquid Column with Interface Mass Transfer.” June 1995.
- J. Tischledler, “Flame Propagation Velocity of Highly-Concentrated Alkane-In-Water Emulsions.” December 1994.
- H. Huynh, “Satellite Control in Capillary Jet Breakup by Modulated Surface Disturbances.” May 1994.
- R. Washburn, “Impinging Jet Spray Characterization and Correlation.” May 1993.
- B. Rolls, “Shock Impaction on a Liquid Drop.” May 12, 1992.
- C. Oberle, “Spray Sizing by Tomographic Imaging.” November 1992.
- J. Lee, “Combustion of Chlorinated Hydrocarbons.” June 1991.
- A. Tunis, “Design and Development of Rocket Injector Testing System.” May 1991.

- P. F. Vassallo, "Liquid Propellant Rocket Spray Characterization." August 1990.
- M. Hammoud, "Spreading of Liquid Masses on Surfaces." May 1990.
- S. Wehe, "Combustion Characterization of Hazardous Liquid Wastes." May 1990.
- J. Seet, "Flow Behavior in Compact Cooled Structures." January 1990.
- M. Mostajar, "Mixing in Supersonic Turbulent Reacting Jets." November 1988.
- D.J. Mangra, "Numerical Modeling of a Liquid Jet Emitting from an Orifice: Influence of Surface Tension." May 1987.
- J. Stassinopoulos, "Measurement of Interacting Droplet Burning Rates in Convective Environment." May 1987.
- J.Y. Poo, "An Experimental Study of the Drag Coefficient of a Monosized Liquid Droplet Stream in a Turbulent Gas Field." August 1986.
- C.H. Chiang, "Flame Propagation Through a One-dimensional Air/Fuel Spray Mixture with Interactive Vaporization Between Droplets." August 1986.

### **Summary of Publications**

- Books and Book chapters: 5
- Journal Articles: 60
- Conference proceedings, papers and abstracts: 59
- Seminars Invited Lectures: 46

## List of Publications

### Books and Book chapters

1. Computational Fluid Dynamics, N. Ashgriz and J. Mostaghimi. Chapter 24 in "Fluid Flow Handbook" McGraw Hill Publishing, ISBN 0-07-136372-6, 2002.
2. A First Book In Thermodynamics, N. Ashgriz, Publisher: John Wiley & Sons, ISBN 0-471-37822-4, 1999.
3. A Flux Method for Tracking Convolutd Premixed Flame Fronts, F. Mashayek, N. Ashgriz, F.A. Jaber, and P. Givi. Chapter in "Advanced Computation & Analysis of Combustion." Editors: G.D. Roy, S.M., Frolov, and P. Givi, ENAS Publishers, Moscow, Russia, 1997.
4. Numerical Simulation of Capillary Driven Flows in Liquid Drops and Films, J.Y. Poo and N. Ashgriz. A section in "Colloquium on Drops and Bubbles" (1988). Editor: Taylor J. Wang, American Institute of Physics Press, N.Y.
5. Gallery of Flames, a reference book including significant photographs of flames and combustion processes, under preparation.

### Journal Publications

1. Shirani, E., Ashgriz, N. and Mostaghimi, J., "Interface Pressure Calculation Based on Conservation of Momentum for Front Tracking Methods, accepted for publication in *Journal of Computational Physics*.
2. Barbat, T. and Ashgriz, N., "Planar Dynamics of Two Interacting Bubbles in an Acoustic Field," accepted for publication in the *Journal of Applied Mathematics and Computations*.
3. Hong, Y., Ashgriz, N., and Andrews, J., "Numerical Simulation of Growth and Collapse of a Bubble Induced by a Pulsed Micro-Heater," *Journal of Microelectromechanical Systems*, in press.
4. Hong, Y., Ashgriz, N., and Andrews, J., "Experimental Study of Bubble Dynamics on Micro Heaters Induced by Pulse Heating," *ASME Journal of Heat Transfer*, Vol. 126, No. 2, pp: 259-271, April 2004.
5. Saroka, M.D., and Ashgriz, N., "Numerical Investigation of Head-on Binary Drop Collisions in a Dynamically Inert Environment," accepted for publication in *Journal of Atomization and Sprays*.
6. Hsu, C.F., and Ashgriz, N., "Impaction of a Droplet on an Orifice Plate," accepted for publication in *Physics of Fluids*, Vol 16, No. 2, pp: 400-411, February 2004.
7. Ashgriz, N., Barbat, T., and Wang, G., "A Computational Lagrangian-Eulerian Advection Remap for Free Surface Flows," *Int. Journal of Numerical Methods in Fluids*, Vol. 44, pp. 1-32, 2004
8. Hsu, C.F., and Ashgriz, N., "Nonlinear Penetration of Liquid Drops into Capillaries," *Journal of Colloid and Interface Science*, Vol. 270, pp. 146-162, 2004.
9. Lee, J.C.Y., Felske, J.D., and Ashgriz, N., "Flame Propagation Across Gelled Alkane-in-Water Emulsions," *Spill Science & Technology Bulletin*, Vol. 8, No. 4, pp. 391-389, 2003.

10. Stry, W.J., Felske, J.D., and Ashgriz, N., "Droplet Combustion of Chlorinated Benzenes, Alkanes, and their Mixtures in a Dry Atmosphere," *Environmental Engineering Science*, Vol. 20, No. 2, pp. 125-133, MAR-APR, 2003.
11. Mashayek, F., Ashgriz, N., Minkowycz, W.J., and Shotorban, B., "Coalescence Collision of Liquid Drops," *Int. Comm. in Heat and Mass Transfer*, Vol. 46, Issue 1, January, 2003, pp. 77-89.
12. Saroka, M., Guo, Y., and Ashgriz, N., "Nonlinear Instability of an Evaporating Capillary Jet," *AIAA Journal*, Vol. 39, No. 9, pp. 1728-1734, September, 2001.
13. Hsu, C.F., and Ashgriz, N., "Impaction of a Droplet on an Orifice Plate," submitted to *Physics of Fluids*.
14. Ashgriz, N., Barbat, T., and Wang, G., "A Computational Lagrangian-Eulerian Advection Remap for Free Surface Flows," submitted to *Int. Journal of Numerical Methods in Fluids*.
15. Hsu, C.F., and Ashgriz, N., "Azimuthal Instability of a Thin Ferrofluid Layer," submitted to *Physical Review E*.
16. Hsu, C.F., and Ashgriz, N., "Penetration of a Liquid Droplet in a Radial Capillary," submitted to *Journal of Colloid and Interface Science*.
17. Lee, J.C.Y., Felske, J.D., and Ashgriz, N., "Flame Propagation Across Gelled Alkane-in-Water Emulsions," submitted to *Spill Science & Technology Bulletin*.
18. Saroka, M.D., and Ashgriz, N., "Numerical Investigation of Off-axis Binary Drop Collisions," submitted to *Computers and Fluids*.
19. Hong, Y., Ashgriz, N., and Andrews, J., "Experimental Study of Bubble Dynamics on Micro Heaters Induced by Pulse Heating," submitted to *ASME Journal of Heat Transfer*.
20. Saroka, M.D., and Ashgriz, N., "Numerical Investigation of Head-on Binary Drop Collisions in a Dynamically Inert Environment," submitted to *Journal of Atomization and Sprays*.
21. Mashayek, F., Ashgriz, N., Minkowycz, W.J., and Shotorban, B., "Coalescence Collision of Liquid Drops," submitted to *Int. Comm. in Heat and Mass Transfer*.
22. Stry, W.J., Felske, J.D., and Ashgriz, N., "Droplet Combustion of Chlorinated Benzenes, Alkanes, and their Mixtures in a Dry Atmosphere," accepted for publication in *Journal of Environmental Engineering Science*.
23. Saroka, M., Guo, Y., and Ashgriz, N., "Nonlinear Instability of an Evaporating Capillary Jet," *AIAA Journal*, Vol. 39, No. 9, 2001.
24. Ashgriz, N., Talley, D., and Brocklehurst, B., "On the Mixing Mechanisms in a Pair of Impinging Jets," *AIAA Journal of Propulsion and Power*, Vol. 17, No. 3, 2001.
25. Barbat, T., Ashgriz, N., and Liu, C. "Dynamics of Two Interacting Bubbles in an Acoustic Field," *Journal of Fluid Mechanics*, Vol. 389, pp. 137-168, 1999.
26. Zhuang, W.H., Etemadi, K., Benenson, D.M., and Ashgriz, N., "Sensitivity of the Spreading Rate of a Liquid Droplet on a Surface to the Approximation of the Contact Angle." *International Journal of Modeling & Simulation*, Vol. 19, No 3, 1999.

27. Mashayek F., and Ashgriz, N., "Nonlinear Oscillation of Liquid Drops With Internal Circulation," *Physics of Fluids*, Vol. 10, Issue 5, pp. 1071-1082, May 1998.
28. Elgowainy, A., and Ashgriz, N., "The Rayleigh-Taylor Instability of Viscous Fluid Layers," *Physics of Fluids*, Vol. 9, Issue 6, pp. 1635-1649, June 1997.
29. Ashgriz, N., Washburn, R., and Barbat, T., "Segregation of Drop Size and Velocity in Jet Impinging Splash-plate Atomizers," *International Journal of Heat and Fluid Flow*, Vol. 17, No. 5, pp. 509-516, 1996.
30. Huynh, H., Ashgriz, N., and Mashayek, F., "Instability of a Liquid Jets Subject to Disturbances Composed of Two Wavenumbers," *Journal of Fluid Mechanics*, Vol. 320, pp. 185-210, August 1996.
31. Farzad, H., Mashayek, F., and Ashgriz, N., "Solid Propellant Grain Design by the Volume Fraction Technique," *Journal of Aerospace Engineering*, Part G., Proc. Inst. Mech. Engrs., Vol. 210, No. 3, pp. 209-220, 1996.
32. Mashayek, F., and Ashgriz, N., "A Spine-Flux Method for Simulating Free Surface Flows," *Journal of Computational Physics*, Vol. 122, pp. 367-379, 1995.
33. Mashayek, F., and Ashgriz, N., "Instability of Liquid Coatings on Cylindrical Surfaces," *Physics of Fluids*, Vol. 7, pp. 2143-2153, 1995.
34. Mashayek, F., and Ashgriz, N., "A Hybrid Finite Element - Volume of Fluid Method for Simulating Free Surface Flows and Interfaces," *Int. Journal of Numerical Methods in Fluids*, Vol. 20, No. 10, pp. 1363-1380, 1995.
35. Mashayek, F., and Ashgriz, N., "Advection of Axisymmetric Interfaces by Volume of Fluid Method," *Int. Journal of Numerical Methods in Fluids*, Vol. 20, No. 10, pp. 1337-1361, 1995.
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37. Oberle, C., and Ashgriz, N., "Whole Field Spray Sizing By Tomographic Imaging," *Journal of Atomization and Sprays*, Vol. 6, pp. 45-73, 1995.
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44. Vassallo, P., Ashgriz, N., and Boorady, F.A., "Effect of Flow Rate on the Spray Characteristics of Impinging Water Jets," *AIAA Journal of Propulsion and Power*, Vol. 8, No. 5, pp. 980-986, 1992.
45. Vassallo, P., and Ashgriz, N., "Satellite Formation and Merging in Liquid Jet Breakup," *Proceedings of the Royal Society of London A*, Vol. 433, pp. 269-286, 1991.
46. Ashgriz, N., and Poo, J. Y. "FLAIR: Flux Line-segment Advection and Interface Reconstruction," *Journal of Computational Physics*, Vol. 93, No. 2, pp. 449-46, 1991.
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#### **Conference Proceedings, Papers & Abstracts**

1. Jafari, A., Ashgriz, N., Andrews, J., Drappel, S., "Simulation of Droplet Drawback in Inkjet Printing, Canadian Society of Mechanical Engineering, June 1-4, 2004, London, Ontario, Canada.
2. Golpaygan, A., Jafari, A., Ashgriz, N., "Mobility of Water Droplets in the Channels of PEM Fuel Cells," Canadian Society of Mechanical Engineering, June 1-4, 2004, London, Ontario, Canada.
3. Savtchenko, S., Ashgriz, N., "Instability of a Capillary Liquid Jet with a Mass Source," Canadian Society of Mechanical Engineering, June 1-4, 2004, London, Ontario, Canada.
4. Fard, M.P., Ashgriz, N., Mostaghimi, J., Levesque, D.M., and Morrison, S., "Computational Characterization of Splashplate Atomizers," ILASS America, 17<sup>th</sup> Annual Conference on Liquid Atomization and Spray Systems, Arlington, VA, May 16-19, 2004.

5. Shirani, E., Ashgriz, N., and Mostaghimi, J., "A New Surface Tension Force Model for Volume Tracking Methods." The 10<sup>th</sup> Asian Congress of Fluid Mechanics, May 17-21, 2004, Peradeniya, Sri Lanka.
6. Jafari, A. and Ashgriz, "Turbulence Generated Primary Breakup: Spreading of a Liquid Jet," ILASS America, 17<sup>th</sup> Annual Conference on Liquid Atomization and Spray Systems, Arlington, VA, May 16-19, 2004.
7. Fard, M.P., Ashgriz, N., and Mostaghimi, J., "A Numerical Model for Flow Simulation in Spray Nozzles," AIAA Winter Annual Meeting, January 2004, Reno, Nevada.
8. Shirani, E., Jafari, A., and Ashgriz, N., "Numerical Simulation of the Primary Atomization of a Turbulent Jet," AIAA Winter Annual Meeting, January 2004, Reno, Nevada.
9. Fard, M.P., Ashgriz, N., Mostaghimi, J., Levesque, D.M., and Morrison, S., "Film Thickness and Velocity Distribution in a Splash-Plate Atomizer: Comparison between Simulations and Experiments," ICLASS July 13, 2003, Sorrento, Italy.
10. Shirani, E., Ashgriz, N., and Mostaghimi, J., "New Turbulence Models for Interfacial Flows and Their Applications in Kelvin-Helmholtz Instability," ILASS America, 16<sup>th</sup> Annual Conference in Liquid Atomization and Spray Systems, May 18 - 21, 2003, Monterey, California.
11. Fard, M.P., Ashgriz, N., Mostaghimi, J., Prociw, L.A., Hu, T.C.J., "Modeling Liquid Film Formation and Breakup in an Industrial Spray Nozzle," ILASS America, 15<sup>th</sup> Annual Conference on Liquid Atomization and Spray Systems, May 14 - 17, 2002, Madison, Wisconsin.
12. Hsu, C. F., Ashgriz, N., "Droplet-on-Orifice Impacting Droplet Generator", ILASS America, 14<sup>th</sup> Annual Conference on Liquid Atomization and Spray Systems, May 20 - 23, Dearborn, Michigan, 2001.
13. Elgowainy, A., and Ashgriz, N., "Microexplosion of Emulsified Fuel Drops," Proceeding of the National Energy Conference, Energex 2000. Presented in the National Energy Conference, Las Vegas, Nevada, pp. 32-37, July 23-28, 2000.
14. Saroka, M., and Ashgriz, N., "Stretching Separation in the Binary Collision of Liquid Drops," ILASS America, 12<sup>th</sup> Annual Conference on Liquid Atomization and Spray Systems, May 21 - 24, Indianapolis, Indiana, 1999.
15. Ashgriz, N., and Barbat, T., "Advection of Interfaces in Unstructured Grids," Annual Meeting of the Division of Fluid Dynamics of American Physical Society, Philadelphia, PA, Nov. 23-25, 1998.
16. Barbat, T., and Ashgriz, N., "Planar Dynamics of Two Bubbles Interacting Through Secondary Bjerknes Forces," ASME paper presented at ASME/FEDSM'98, Washington, DC. 21-25 June 1998.
17. Ashgriz, N., and Saroka, M., "Drop Collisions: Influence of Shape and Internal Circulation," Annual Meeting of the Division of Fluid Dynamics of American Physical Society, San Francisco, CA, Nov. 23-25, 1997.
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21. Barbat, T., Ashgriz, N., and Liu, C.S., "Dynamics of Two Interactive Bubbles in An Acoustic Field - Part II: Experiments," Annual Meeting of the Division of Fluid Dynamics of American Physical Society, Syracuse, New York, Nov. 20-22, 1996.
22. Barbat, T., Ashgriz, N., and Liu, C.S., "Dynamics of Two Interactive Bubbles in An Acoustic Field - Part I: Theory," Annual Meeting of the Division of Fluid Dynamics of American Physical Society, Syracuse, New York, Nov. 20-22, 1996.
23. Barbat, T., Ashgriz, N., and Liu, C.S., "Nonlinear Bubble Interactions in Acoustic Pressure Fields," Third Microgravity Fluid Physics Conference, Cleveland, Ohio, June 13-15, 1996.
24. Barbat, T., and Ashgriz, N., "Dancing Bubbles and Drops," 9th Annual Conference on Liquid Atomization and Spray Systems, San Francisco, CA, May 19th-22nd, 1996.
25. Farshchi, M., Rahimian, M.H., and Ashgriz, N., "Chemically Reacting Liquid Droplet Flow Field Calculation," 8th International Symposium on Transport Phenomena in Combustion, July 17-20, San Francisco, CA 1995.
26. Ashgriz, N., Talley, D., Brocklehurst, B., and Christensen, T., "On the Mixing Mechanisms in a Pair of Impinging Jets," AIAA Joint Propulsion Conference, July 10-13, San Diego, CA, 1995.
27. Farzad, H., and Ashgriz, N., "Effects of Cracks on a Solid Fuel in the Rockets," Proceedings of the Third Fluid Dynamics Conference, Sharif University of Technology, Jan. 9-11, Tehran, Iran, 1995.
28. Mashayek, F., and Ashgriz, N., "Thermocapillary Instability of Liquid Jets," Proceedings of the 7th Annual Conference on Liquid Atomization and Spray Systems, May 31 - June 3, Bellevue, Washington, 1994.
29. Huynh, H., Mashayek, F., and Ashgriz, N., "Satellite Size Control in Liquid Jets Using Modulated Amplitude Disturbances," Proceedings of the 7th Annual Conference on Liquid Atomization and Spray Systems, May 31 - June 3, Bellevue, Washington, 1994.
30. Elgowainy, A., and Ashgriz, N., "Rayleigh-Taylor Instability of Fluid Layers," Annual Meeting of the Division of Fluid Dynamics of American Physical Society, Vol. 38, No. 12, 1993, p. 2208, 1993.
31. Ashgriz, N., "Impaction of Liquid Drops," Proceedings of the 2nd Fluid Dynamics Conference, Isfahan, Iran, July 6-8, 1993.
32. Ashgriz, N., Sadeghipour, M.S., and Farzad, H., "Numerical Simulation of the Solid Propellant Grain Design," Proceedings of the 2nd Fluid Dynamics Conference, Isfahan, Iran, July 6-8, 1993.
33. Ashgriz, N., and Oberle, C., "Spray Sizing by Tomographic Imaging," Proceedings of the 6<sup>th</sup> Annual Conference on Liquid Atomization and Spray Systems, Worcester, Massachusetts, pp. 147-151, May 17-19, 1993.

34. Mashayek, F., and Ashgriz, N., "A Hybrid Finite Element - Volume of Fluid Method for Simulating Liquid Atomization," Proceedings of the 6<sup>th</sup> Annual Conference on Liquid Atomization and Spray Systems, Worcester, Massachusetts, pp. 225-229, May 17-19, 1993.
35. Poo, J.Y., and Ashgriz, N., "Numerical Simulation of Collision of Two-Dimensional Drops," Proceedings of the 5th Annual Conference on Liquid Atomization and Spray Systems, San Ramon, California, pp. 110-115, May 18-20, 1992.
36. Washburn, R., and Ashgriz, N., "Impinging Jet Spray Characteristics," Proceedings of the 5th Annual Conference on Liquid Atomization and Spray Systems, San Ramon, California, pp. 79-84, May 18-20, 1992.
37. Elgowainy, A., and Ashgriz, N., "Numerical Simulation of the Hydrodynamics of Microexplosion in Two Dimensional Drops," Combustion Fundamentals and Applications, Central States Section Technical Meeting, The combustion Institute, pp. 228-233, April, 1992.
38. Mashayek, F., and Ashgriz, N., "Solid Propellant Grain Design by an Interface Reconstruction Scheme," Combustion Fundamentals and Applications, Central States Section Technical Meeting, The combustion Institute, pp. 25-30, April, 1992.
39. Molloy, D.J., and Ashgriz, N., "Effect of Internal Fluid Motion on Drop Combustion," Combustion Fundamentals and Application, Central States Section Technical Meeting, The combustion Institute, pp. 198-203, April, 1992.
40. Washburn, R., Ashgriz, N., Tunis, A., and Boorady, F.A., "Effect of the Spray Characteristics on the Performance of a Bipropellant Liquid Rocket Engine," Combustion Fundamentals and Applications, Central States Section Technical Meeting, The combustion Institute, pp. 31-36, April, 1992.
41. Stry, W., Felske, J.D., and Ashgriz, N., "Combustion Characteristics of Chlorobenzene and Its Mixtures with Decane and Dodecane," Combustion Fundamentals and Applications, Central States Section Technical Meeting, The combustion Institute, pp. 133-138, April, 1992.
42. Lee, J.C.Y., Felske, J.D., and Ashgriz, N., "Flame Propagation Across Alkane-in-Water Emulsions," Combustion Fundamentals and Applications, Central States Section Technical Meeting, The combustion Institute, pp. 174-179, April, 1992.
43. Ashgriz, N., and Felske, J.D., "Combustion Characteristics of Hazardous Liquid Waste," Department of Mechanical and Aerospace Engineering, State University of New York at Buffalo, Report No. LHWC-CRL-100300-91.
44. Felske, J. D., Ashgriz, N., and Seet, J. P., "Development and Application of Flow Visualization Techniques for Cooled Structures," Final Report to Bell Aerospace Company, Department of Mechanical and Aerospace Engineering, State University of New York, Report No. FVCS-30001-89, January, 1989.
45. Mani, N., and Ashgriz, N., "Optimum Design of an Internal Combustion Engine Based on Interactive Kinematic-Combustion Modeling," Department of Mechanical and Aerospace Engineering, State University of New York, Report No. ICE-50009-89, September 1989.
46. Ashgriz, N., and Poo, J. Y., "Collision Dynamics of Liquid Drops," 41st Annual Meeting of the Division of Fluid Dynamics of American Physical Society, Buffalo, New York, Nov. 20-22, 1988.
47. Ashgriz, N., and Wehe, S. D., "Ignition and Flame Propagation in Dense Sprays," AICHE Meeting, Washington D. C., 1988.

48. Mollot, D. J., Soumekeh, M., and Ashgriz, N., "Application of Diffraction Tomography to Flame Imaging," Chemical and Physical Processes in Combustion, twenty-second Fall Technical Meeting of the Eastern Section of the Combustion Institute, 1988.
49. Poo, N., and Ashgriz, N., "Numerical Simulation of Breakup of a Liquid Jet," 41st Annual Meeting of the Division of Fluid Dynamics of American Physical Society, Buffalo, New York, Nov. 20-22, 1988.
50. Ashgriz, N., and Givi, P., "Fuel Droplet Collision in Reactive Environments," Twenty-Second Symposium (Int.) on Combustion, Poster Session, The Combustion Institute, Seattle, Washington, August 14-19, 1988.
51. Chiang, C.H. and Ashgriz, N., "Flame Propagation Through a one Dimensional Air/Fuel Spray Mixture with Interactive Vaporization Between Droplets," ASME National Heat Transfer Conference, Pittsburgh, PA, 1987.
52. Wehe, S.D., Ashgriz, N., and Chiang, C.H., "Effect of Droplet Interaction on the Flame Propagation Rate in Sprays," Chemical and Physical Processes in Combustion, The Combustion Institute, Nov. 1987.
53. Ashgriz, N., and Givi, P., "Coalescence Collision of Fuel Droplets," AIAA 25th Aerospace Sciences Meeting, Paper AIAA-87-0138, Reno, Nevada, January 12-15, 1987.
54. Pascasio, W., and Ashgriz, N., "Collision of two droplet streams in burning and non-burning conditions," AIAA north East regional conference, April 12-14, 1986.
55. Ashgriz, N., "Observations of the collision of two non-burning and burning monodispersed droplet streams," Chemical and Physical Processes in Combustion, The Combustion Institute, Nov. 4-6, 1985.
56. Ashgriz, N., and Yao, S. C., "Mechanisms of the Flame Propagation in Sprays," Chemical and Physical Processes in Combustion, The Combustion Institute, p. 70-1, Dec. 1984.
57. Ashgriz, N., and Yao, S.C., "Impulsed Spray Generator for Heterogeneous combustion Experiments," Chemical and Physical Processes in Combustion, The Combustion Institute, p. 61, Dec. 1982.
58. Ashgriz, N., and Yao, S.C., "Radiative Heating and Evaporation of Droplets in Cylindrical Combustion Chambers," Fall Technical Meeting of the Combustion Institute, Eastern States Section, Pittsburgh, PA, Oct. 1981.
59. Yao, S. C., and Ashgriz, N., "Effect of Thermal Radiation on the Droplet Pre-evaporation in Spray Combustion," Chemical and Physical Processes in Combustion, The Combustion Institute, p. 41.1, Nov. 1980.
60. Ashgriz, N., and Yao, S.C., "Progress on Impulse Jet Droplet Generator for Laminar Spray Combustion Experiments," Chemical and Physical Processes in Combustion, The combustion Institute, p. 39.1, Nov. 1980.

### **Seminars and Invited Lectures**

1. Ashgriz, N., "Droplet Drawback in Ink-jet Printing," Xerox Research Center, Toronto, Ontario, May 13, 2004.

2. Ashgriz, N., "A computer code for the design of the fuel Spray Nozzles," IEA Annex XV, Biomass and Gasification Meeting, February 10-13, 2003, Atlanta, Georgia.
3. Ashgriz, N., "Numerical Simulation of the Fluid Processes in Ink-Jet Printers: Jets, Drops and Bubbles," Canadian Network of Computational Material Science (CNCMS), McMaster University, May 27, 2003.
4. Fard, M., Mostaghimi, J., and Ashgriz, "Numerical Simulation of the Coating Processes," Canadian Network of Computational Material Science (CNCMS), McMaster University, May 27, 2003.
5. "Impaction and Solidification of Liquid Drops on Solid Surfaces," Xerox Corporation, Webster, NY, December 12<sup>th</sup>, 2002.
6. "Numerical Simulation of the Atomization Process," Department of Mechanical Engineering, University of Pittsburgh, Pittsburgh, PA, Nov. 15<sup>th</sup>, 2002.
7. "Atomization of Melts", Department of Mechanical and Industrial Engineering, University of Toronto, Toronto, Canada, February, 16, 2001.
8. "Impaction of Ink Drops on Paper," XEROX Corp., Webster, NY, April 6, 1999.
9. "CLEAR-VOF: An Algorithm for Advection of Interfaces in Unstructured Grids," ANSYS, Inc., Southpointe, PA, July 21, 1998.
10. "Collision Dynamics of Liquid Drops," Institute of Fluid Mechanics, Friedrich-Alexander-University, Erlangen-Nuremberg, Germany, May 28, 1998.
11. "Interface Modeling," ANSYS, Inc., Southpointe, PA, Sept. 29, 1997.
12. "Dynamics of Bubble Clouds," presented at Nucleation Phenomena: Implications for Decompression Bubbles," Symposium/Workshop satellite of the Annual Meeting of the Great Lakes Chapter of the UHMS, DCIEM, North York, Ontario, October 24, 1997.
13. "Dancing Bubbles," Department of Mechanical Engineering, University of Rochester, Rochester NY, March 21, 1997.
14. "Droplet Collisions and Dancing Bubbles," Institute of Physics, National University of Mexico, Mexico City, October 11, 1996.
15. "Dancing Bubbles," Department of Mechanical Engineering, The State University of New York at Buffalo, Buffalo, NY, Sept. 10, 1996.
16. "Dancing Bubbles," Department of Mechanical Engineering, The University of British Columbia, Vancouver, Canada, May, 16, 1996.
17. "Dancing Bubbles," Department of Mechanical Engineering, University of Victoria, Victoria, CANADA, May, 15, 1996.
18. "Mixing in Impinging Jet Injectors," Phillips Laboratory, Edwards Air Force Base, California, August 5, 1994.
19. "Mechanisms of the Liquid Atomization," presentation at the Panel on the Liquid Atomization Modeling at the 7th Annual Conference on Liquid Atomization and Spray Systems, May 31 - June 3, Bellevue, Washington, 1994. Washington, 1994.

20. "Capillary and Thermocapillary Instability of Liquid Jets," Sibley School of Mechanical and Aerospace Engineering Seminar Series, Cornell University, Ithaca, New York, February 1, 1994.
21. "Combustion Behavior of Emulsified Hydrocarbon Droplets," 1993 Conference on Innovative Remedial Technology, Albany, New York, October 12-14, 1993.
22. "Impaction of Liquid Drops," Keynote speaker at the Second Fluid Dynamics Conference, Isfahan, Iran, July 6-8, 1993.
23. "Collision Dynamics of Liquid Drops," Department of Mechanical Engineering Guest Lecture Series, Carnegie-Mellon University, April 14, 1993.
24. "Advance Techniques in Turbulent Reacting Flows," Jet Propulsion Laboratories, Tehran, Iran, July 7, 1992.
25. "Physico-Chemical Processes in Sprays," Department of Mechanical and Aerospace Engineering, University of Toronto, April, 1992.
26. "Spray Atomization," Department of Mechanical Engineering, Rutgers University, New Brunswick, New Jersey, March, 1992.
27. "Physico-Chemical Processes in Liquid Sprays," Department of Mechanical Engineering, University of Hamedan, Hamedan, Iran, April 15, 1991.
28. "Physico-Chemical Processes in Liquid Sprays," Department of Mechanical Engineering Graduate Seminar Series, Polytechnic University of Tehran, Tehran, Iran, March 30, 1991.
29. "Physico-Chemical Processes in Liquid Sprays," Department of Mechanical Engineering Graduate Seminar Series, University of Tehran, Tehran, Iran, October 10, 1990.
30. "Spray Combustion Phenomena: An Experimental and Numerical Study," Department of Mechanical Engineering Graduate Seminar Series, San Diego State University, San Diego, CA, February 14, 1990.
31. "Physico-Chemical Processes in Liquid Sprays," Department of Mechanical Engineering, University of Utah, Salt Lake City, Utah, March 10, 1990.
32. "Physico-Chemical Processes in Liquid Sprays," Department of Mechanical and Aerospace Engineering Graduate Seminar Series, State University of New York at Buffalo, Buffalo, NY, December 7, 1989.
33. "Application of Diffraction Tomography to the Supersonic Reacting Jets," Hypersonic Grant Review Conference, State University of New York at Buffalo, Buffalo, NY, June 1989.
34. "Combustion of Hazardous Liquid Waste," Department of Civil Engineering Graduate Seminar Series, State University of New York at Buffalo, Buffalo, NY, April 21, 1989.
35. "Collision Among Reactive Droplets," 3rd International Colloquium on Drops and Bubbles, Monterey, CA, September 18-21, 1988.
36. "Numerical Modeling of Viscous Damping of Drop Oscillations," 3rd International Colloquium on Drops and Bubbles, Monterey, CA, September 18-21, 1988.
37. "Ignition and Flame Propagation in Dense Sprays," 5th Annual Iroquois Fluids Conference, Casawasco Conference Center, Lake Owasco, NY, March 25-27, 1988.

38. "Engineers Path for Success", Tau Beta Pi annual invited speaker, State University of New York, Buffalo, NY, December 1988.
39. "Coalescence Collision of Fuel Droplets," AIAA 25th Aerospace Sciences Meeting, Reno, Nevada, January 12-15, 1987.
40. "Observations of the Collision of Two Non-burning and Burning Monodispersed Droplet Streams," Fall Technical Meeting of the Combustion Institute, Eastern States Section, Philadelphia, PA, Nov. 1985.
41. "Flame propagation in Laminar Premixed Sprays," Mechanical Engineering Department, State University of New York at Buffalo, Buffalo, NY, May 1984.
42. "Idealized Spray Combustion Experiments," Department of Mechanical and Aerospace Engineering, Princeton University, Princeton, NJ, May, 1984.
43. "Experimental Study of combustion of Mono-dispersed Sprays," Mechanical Engineering Department, West Virginia University, Morgantown, WV, April, 1984.
44. "Combustion of Mono-dispersed premixed Sprays," Chrysler Corporation, Detroit, MI, March, 1984.
45. "Mechanism of Flame Propagation in Sprays," Fall Technical Meeting of the Combustion Institute, Eastern States Section, Clearwater Beach, FL, Dec. 1984.
46. "Flame Propagation in Sprays," Bennet Price Award Contest Seminars, Carnegie-Mellon University, Pittsburgh, PA, 1983.
47. "Radiative Evaporation of Droplets in Sprays," Mechanical Engineering Seminar Series, Carnegie-Mellon University, Pittsburgh, PA 1981.



## Referee in Other Examinations:

1. Ph.D. Thesis Seminar, David Erickson, June 13<sup>th</sup>, 2003, "Micro-Fluidic, Thermal and Transport Analysis in the Development of DNA Biochips," Supervisor: Professor Li.
2. Ph.D. Departmental Oral Examination, Vala Mehdi-Nejad, August 5<sup>th</sup>, 2003, "Modeling Flow and Heat Transfer in Two-Fluid Interfacial Flows, with Applications to Drops and Jets." Supervisor: Professors Mostaghimi and Chandra.
3. M.A.Sc. Oral Examination, German Cardenas, August 6<sup>th</sup>, 2003, "Large Eddy Simulation using Tetrahedral Finite Elements." Supervisor: Professor Paraschivoiu.
4. Ph.D. Qualifying Examination, Amirreza Golpaygan, August 7<sup>th</sup>, 2003, "Numerical Study of White Blood Cells Biomechanics: Rolling, Cell-surface Adhesion and Deformability under Shear Flow." Supervisor: Professor Ashgriz.
5. Ph.D. Departmental Oral Examination, Ali Keshavarz, August 20<sup>th</sup>, 2003, "Where Adsorption Affects Contact Angle; Wetting and Condensation." Supervisor: Professor Ward.
6. Ph.D. Thesis Seminar, Wanlin Chen, August 20<sup>th</sup>, 2003, "The Relationship between Rheological Properties and Morphology of Polyolefin Blends,." Supervisor: Professor James.
7. Ph.D. Qualifying Examination, Ali Jafari, August 21<sup>st</sup>, 2003, "Numerical Simulation of Primary Atomization." Supervisor: Professor Ashgriz.
8. Ph.D. Qualifying Examination, Ali Jafari, August 22<sup>st</sup>, 2003, "Multicomponent Droplet Evaporation in the Non-Continuum Regime." Supervisor: Professor Ashgriz.
9. Ph.D. Final Oral Examination, Vala Mehdi-Nejad, September 26<sup>th</sup>, 2003, "Modeling Flow and Heat Transfer in Two-Fluid Interfacial Flows, with Applications to Drops and Jets." Supervisor: Professors Mostaghimi and Chandra.
10. Ph.D. Qualifying Examination, Morteza Eslamian, November 3<sup>st</sup>, 2003, "Investigation of Droplet Evaporation and Particle Evolution in Low Pressures, with Application to Nanopowder Production by Spray Pyrolysis." Supervisor: Professor Ashgriz.
11. Ph.D. Qualifying Examination, Tao Xu, December 12<sup>st</sup>, 2003, "Large Eddy Simulation using a Parallel Solver." Supervisor: Professors Paraschivoiu and Sullivan.
12. Ph.D. Thesis Seminar, Hossein Tavana, December 18<sup>th</sup>, 2003, "Contact Angles: Measurement and Interpretation." Supervisor: Professor Neumann.
13. Ph.D. Thesis Seminar, Zhenjin Zhu, December 19<sup>th</sup>, 2003, "Numerical Simulation of Capillary-Driven Flow in Microcellular Open-celled Foams." Supervisor: Professor Park.
14. M.A.Sc. Oral Examination, Ri Li, January 27<sup>th</sup>, 2004, "Breakup Mechanism in Impinging Liquid Jets." Supervisor: Professor Ashgriz.
15. Ph.D. Departmental Oral Examination, Yanguang Shan, February 3<sup>th</sup>, 2004, "A Stochastic Spray Model for Radio Frequency Inductively Coupled Plasma." Supervisor: Professors Mostaghimi.
16. Ph.D. Qualifying Examination, Ala Moradian, February 6<sup>th</sup>, 2004, "Measuring Surface Tension of High Melting Point Materials." Supervisor: Professor Mostaghimi.