

# Afsoon Amirzadeh Goghari

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## EDUCATION

- Ph.D.** (University of Toronto, Department of Mechanical and Industrial Engineering (MIE)) 2010  
Thesis: *Producing small droplets of aqueous solutions and molten metals using a pneumatic droplet generator*  
Advisor: Professor Sanjeev Chandra
- M.A.Sc.** (University of Toronto, Dept. of MIE) 2006  
Thesis: *Producing droplets smaller than the nozzle diameter by using a pneumatic droplet generator*  
Advisor: Professor Sanjeev Chandra
- B.Sc.** (University of Tehran, Department of Mechanical Engineering) 1999  
Thesis: *Optimization and enhancing the efficiency of heat exchangers used in condensers*  
Advisor: Professor Ali Akhavan

## TEACHING EXPERIENCE

### University of Massachusetts, Dartmouth

#### Lecturer

- EGR242 - Engineering Mechanics II (Dynamics) Spring semesters 2011 to 2018
- PHY111- Physics for Science and Engineering I Spring 2011 and 2012
- MNE391 - Mechanical Systems Spring semesters 2013 to 2018
- EGR301 - Applied Engineering Mathematics Fall 2012
- EGR102 - Introduction to Engineering & Applied Science II Fall 2011, 2014
- MNE381 - Design of Machine Element Fall 2013 and 2014, Spring 2016
- EGR241 - Engineering Mechanics I (Statics) Fall semesters 2013 to 2017, Spring 2014
- EGR131 - Introduction to Design Fall 2014
- MNE101 - Introduction to Mechanical Engineering Spring semesters 2015 to 2017
- EGR111 - Introduction to Engineering and Computing Fall semesters 2015 to 2017

University of Toronto, Department of MIE

**Invited Lecturer**

**Dynamics**

Winter 2009 (90 students)

Taught the following topics to a class of 90 sophomore students:

- Planar kinetics of a rigid body
- Linear and angular momentum
- Conservation of momentum and energy

**Teaching Assistant**

**Heat and Mass Transfer** (~120 students each year)

2006 – 2008

- Designed several heat transfer lab projects that involved experiments and numerical analyses using MATLAB programming.
- Demonstrated the general project procedure to the class. Supervised students throughout the course, and graded the project reports.

**Dynamics** (~90 students each year)

2006 – 2010

- Administered tutorials, demonstrated solutions to selected problems, and assisted students with problem sets and with understanding the concepts.
- Designed problems for midterm exams and quizzes.

**Fluid Mechanics III** (25 graduate students)

2008

- Assisted students with understanding the concepts, problem sets, and term projects.

**RESEARCH EXPERIENCE**

**Graduate Research Assistant**

2004 – 2010

University of Toronto, Dept. of MIE, Center for Advanced Coating Technologies (CACT)

- Designed a pneumatic drop-on-demand droplet generator for producing micro-droplets (< 100 microns) of aqueous solutions and molten metals, with applications in bioengineering, rapid prototyping, and micro-soldering.
- Developed a novel methodology to produce droplets smaller than the nozzle diameter by application of controlled pressure pulses.
- Theoretical analysis of the flow and droplet formation in order to predict the pressure pulse required for obtaining a desired droplet size.
- Experimentally investigated the effects of nozzle geometry on droplet formation and size.
- Optimization of the on-demand droplet generator for upward shooting of droplets in micro-soldering applications.
- Designed a special droplet generator with a secondary airflow for producing droplets of highly viscous fluids.

## PUBLICATIONS

### Peer-reviewed journal papers

1. **A. Amirzadeh**, M. Raessi, and S. Chandra, *Producing molten metal droplets smaller than the nozzle diameter using a pneumatic drop-on-demand generator*, *Exp. Therm. Fluid Sci.*, Vol. 47, pp. 26-33 (2013).
2. **A. Amirzadeh** and S. Chandra, *Small droplet formation in a pneumatic drop-on-demand generator: Experiments and analysis*, *Exp. Therm. Fluid Sci.*, Vol. 34, pp. 1488-1497 (2010).
3. **A. Amirzadeh** and S. Chandra, *Producing droplets smaller than the nozzle diameter by using a pneumatic drop-on-demand droplet generator*, *Exp. Fluids*, Vol. 44, pp. 105-114 (2008).

### Publication in refereed conference proceedings (\* indicates the presenter)

1. **A. Amirzadeh\*** and S. Chandra, *Analytical and experimental study of small droplet formation in a pneumatic drop-on-demand generator*, International Conference on Liquid Atomization and Spray Systems ICLASS, Vail, CO, July 26-30 2009.
2. **A. Amirzadeh\*** and S. Chandra, *Producing small molten tin droplets by using a pneumatic droplet generator*, Proceedings of the 20<sup>th</sup> Annual ILASS-Americas Conference, Chicago, IL, May 15-18, 2007.
3. **A. Amirzadeh\*** and S. Chandra, *Producing droplets smaller than the nozzle diameter by using a pneumatic droplet generator*, Proceedings of the 19<sup>th</sup> Annual ILASS-Americas Conference, Toronto, ON, May 23-26, 2006.

## ACADEMIC SERVICE

Advised senior design teams (each team 4 or 5 students) and engineering internship projects in the Mechanical Engineering Department at the University of Massachusetts, Dartmouth. Some projects include:

Spring 2014:	Wave Energy Converter
Academic year 2014-2015:	1) Plug insertion Fixture/Tooling    2) AFC Work Station
Academic year 2015-2016:	1) Seal Redesign    2) Miniature Manufacturing    3) Boiler Life Extension 1)
Academic year 2016-2017:	Time-Out Safety Valve    2) Dual-Reel Take-Up
Academic year 2017-2018:	1) Wheel Flange Lubrication System    2) Automated Small Part Orientation
3) Stylet Cap Automation	4) Redesign and standardization of elastic coupling

## APPLIED ENGINEERING EXPERIENCE

**Mechanical Engineer** (full-time position) 1999 – 2002

Iran Auto Test and Research Co. (ITRAC), Tehran, Iran

- Established a climatic simulation lab, and performed thermal shock and climatic tests on automobile parts according to international standards such as Chrysler, Peugeot, and JASO.
- Analyzed and studied test results and recommended technical improvements to the part manufacturers.
- Trained and supervised lab technicians.

### Engineering Intern

Summer 1997

Supplying Automotive Parts Co. (SAPCO), Tehran, Iran

Designed various testing devices according to international automobile standards for testing rubber materials used in automobile parts.

## **VOLUNTEER SERVICE**

"All Science Challenge Event", Toronto, Ontario	May 2007
Conducted and explained Aerodynamics and Fluid Mechanics experiments to students in grades 6-8.	
"Society of Women Engineers Outreach Event", Umass-Dartmouth	April 2013
Conducted and explained Pneumatic experiments to students in grades 5-8.	
"College of Engineering Open House", Umass-Dartmouth	2013 -2018
Events are held in October, November and April every year	
"Engineering Accepted Students Day", Umass-Dartmouth	March 2015
Explained the experiments conducted in the Robotics lab	
"Freshman Orientation", Umass-Dartmouth	June and August 2016

## **AWARDS**

- *Ontario Graduate Scholarship*, Government of Ontario (2008 and 2009).
- *Ontario Graduate Scholarship in Science and Technology*, Government of Ontario, University of Toronto, DuPont Canada (2006 and 2007).
- *University of Toronto Open Fellowship*, University of Toronto (2004 and 2005).

## **PROFESSIONAL AFFILIATIONS**

American Society for Mechanical Engineering (ASME)  
Institute of Liquid Atomization and Spray Systems (ILASS)