

Ali Asgarian, PEng

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Education

Doctor of Philosophy – Materials Science and Engineering, University of Toronto, Canada	2020
Thesis: <i>Physical and Mathematical Modeling of Water Atomization for Metal Powder Production</i>	
Master of Engineering Science – Mechanical and Materials Engineering, Western University, Canada	2011
Thesis: <i>Natural Convection in a Slot Subject to a Long Wavelength Heating</i>	
Master of Science – Mechanical Engineering, Amirkabir University of Technology, Iran	2007
Thesis: <i>A Numerical Simulation of Flow and Mixed Convection inside Vertical Eccentric Annuli</i>	
Bachelor of Science - Mechanical Engineering, K. N. Toosi University of Technology, Iran, (1st rank)	2004

Professional Experience

Mechanical Engineer and Technology Development Specialist	2012 - 2017
Hatch Ltd., Mississauga, ON, Canada	
<ul style="list-style-type: none">❖ Basic and detailed design of mineral and metallurgical processes, power and process plants, and material handling❖ Technology development for slag atomization, metal powder production, and paste backfill❖ Clients include Rio Tinto, Stelco, ArcelorMittal Dofasco, Barrick, EGA, Vale, OPG, Bruce Power, and Sasol	
Technical Associate Engineer – Research and Development	2008 - 2009
Monenco Iran Consulting Engineers (a subsidiary of Wood Group), Tehran, Iran	
<ul style="list-style-type: none">❖ Head of Cooling System Group (with 6 members)❖ Managed an Air Cooled Condenser technology transfer project from INNOSPIN, a Swiss company, to Monenco Iran	

Research Interests

Powder Metallurgy – Metal Powder Production
Metal Additive Manufacturing (Metal AM)
Process Metallurgy- Physical Modeling and Computational Simulation
Computational Fluid Dynamics (CFD)
Multiphase Flow, Turbulence, Heat Transfer, and Phase Change

Awards and Scholarships

1. NSERC Postgraduate Scholarship-Doctoral (PGS D)	2018 – 2020
2. AIST Foundation Steel Scholarship – Smith Graduate (AIME)	2018
3. University of Toronto, School of Graduate Studies (SGS) Conference Grant	2018
4. Ontario Graduate Scholarship (OGS) – Doctoral	2017
5. U.S. Steel Canada Fellowship	2017
6. 2 × ‘Merit a Poster’ Awards, POWDERMET 2017 International Conference, USA	2017
7. Hatch Ltd. Safety Recognition Award	2015
8. Hatch Ltd. Gold Quality Award	2014
9. Recognized as an ‘Elite Scholar’ by the National Elites Foundation of Iran	2008
10. First Rank Award in Bachelor’s Studies, K. N. Toosi University of Technology, Iran	2004

Journal Articles

Published:

1. Asgarian, A., Tang, Z., Bussmann, M., Chattopadhyay, K., Water Atomization of Metal Powders: Effect of Water Spray Configuration, *Journal of Powder Metallurgy*, 63:4, 288-299, 2020
2. Asgarian, A., Heinrich, M., Schwarze R., Bussmann, M., Chattopadhyay, K., Experiments and Modeling of the Breakup Mechanisms of an Attenuating Liquid Sheet, *International Journal of Multiphase Flow*, 130:103347, 2020
3. Asgarian, A., Yang, Z., Tang, Z., Bussmann, M., Chattopadhyay, K., An Image Feature Consolidation Technique (IFCT) to Capture Multi-Range Droplet Size Distribution in Atomizing Liquid Sheets, *Experiments in Fluids*, 61:14, 1-22, 2020
4. Asgarian, A., Hossain, M. Z., and Floryan, J. M., Rayleigh-Bénard Convection Driven by a Long Wavelength Heating, *Theoretical and Computational Fluid Dynamics*, 30: 313-337, 2016
5. Nobari, M.R.H. and Asgarian, A., A Numerical Investigation of Flow and Mixed Convection inside a Vertical Eccentric Annulus, *Numerical Heat Transfer: Applications*, 55:1, 77-99, 2009

Submitted:

6. Asgarian, A., Morales, R., Bussmann, M., Chattopadhyay, K., Water Atomization of Molten Metals: A Mathematical Model for a Water Spray, under review by the *Journal of Powder Technology*
7. Meratian, M., Asgarian, A., Valido, A., Chattopadhyay, K., Barati, M., A Mathematical Model for Air Atomization of Molten Slag Based on Integral Conservation Equations, under review by the *Journal of Applied Thermal Engineering*
8. Asgarian, A., Meratian, M., Barati, M., Chattopadhyay, K., Numerical Bifurcation for Dray Slag Atomization, under review by the *Journal of ISIJ International*

In Preparation:

9. Perminov A., Asgarian, A., Bartzsch, G., Chattopadhyay, K., Volkova, O., Utilization of Laser Powder Bed Fusion (L-PBF) Process for Manufacturing an In-situ Fe-TiC Metal Matrix Composite

Conference Publications

10. Wu, C., Asgarian, A., Konar, B., Bussmann, M., Chattopadhyay, K., Demystifying the Mechanism of Liquid Metal Disintegration: A 3D CFD Analysis of Water Droplet Impingement on Melt Stream, *POWDERMET 2019*, June 23-26, Phoenix, USA, 2019
11. Asgarian, A., Wu, C., Tang, Z., Bussmann, M., Chattopadhyay, K., Lemieux, S., Girard, B., Lavalée, F., Imaging the Interaction of Multiple Water Sprays to Demystify the Atomization Zone During Ferrous Metal Atomization, *POWDERMET 2019*, June 23-26, Phoenix, USA, 2019
12. Wu, C., Asgarian, A., Bussmann, M., Chattopadhyay, K., Demystifying the Mechanism of Liquid Metal Disintegration: Application to Metal Powder Production, *APMA 2019*, Feb. 19-21, Pune, India, 2019
13. Konar, B., Wu, C., Asgarian, A., Alicandri, R., Chattopadhyay, K., Metal Atomization: The effects of Thermochemistry on the Physical Properties of Molten Iron and Ferroalloys, *APMA 2019*, Feb. 19-21, Pune, India, 2019
14. Asgarian, A., Heinrich, M., Chattopadhyay, K., Bussmann, M., Computational Modelling of Water Sprays in Molten Metal Atomization Process, *Euro PM2018*, Oct. 14-18, Bilbao, Spain, 2018
15. Asgarian, A., Alicandri, R., Chattopadhyay, K., Bussmann, M., Initial development of an Industrial Tool to Model Water Atomization of Metals, *WORLDDPM 2018*, Sep. 16-20, Beijing, China, 2018
16. Asgarian, A., Wu, C., Li, D., Bussmann, M., Chattopadhyay, K., Experimental and Computational Analysis of a Water Spray; Application to Molten Metal Atomization, *POWDERMET 2018*, June 17-20, San Antonio, USA, 2018
17. Wu, C., Asgarian, A., Chatterjee, S., Girard, B., Paserin, V., Lavalée, F., Bussmann, M., Chattopadhyay, K., Understanding Water Jet and Metal Stream Interactions During Water Atomization of Steel Powders Using Analytical and CFD Modelling Techniques, *POWDERMET 2017*, June 13-16, Las Vegas, USA, 2017

18. Jiao, Z., Li, D., Asgarian, A., Chatterjee, S., Girard, B., Paserin, V., Lavallee, F., Chattopadhyay, K., Influence of Apex Angle and Nozzle Design on Energy and Momentum Transfer During the Water Atomization Process, *POWDERMET 2017*, June 13-16, Las Vegas, USA, 2017
19. Sabeti, J. and Asgarian, A., Stress Analysis of Underground Pipelines with Flexible Couplings – Unrestrained Approach, *Proceedings of 18th International Seminar on Paste and Thickened Tailings*, pp. 277-290, May 5-7, Cairns, Australia, 2015
20. Asgarian, A., Bussmann, M., and Park, C. B., Comparison of the Mixing Performance of Two Cooling Screw Extruders, *20th Annual Conference of the CFD Society of Canada*, May 9-11, Canmore, Canada, 2012
21. Asgarian, A., Hossain, M. Z., and Floryan, J. M., Natural Convection Due to a Long Wavelength Heating, *American Physical Society (APS): 64th Annual Meeting of the APS Division of Fluid Dynamics*, November 20-22, Baltimore, United States of America, 2011
22. Asgarian, A., Hossain, M. Z., and Floryan, J. M., Numerical Bifurcation Study of Natural Convection in a Layer of Fluid Subject to Spatially Distributed Heating, *Proceedings of American Institute of Physics (AIP) Conference*, Volume 1368: International Conference on Applied Mathematics, Modeling and Computational Science (AMMCS), pp. 33-36, July 25-29, Waterloo, Canada, 2011
23. Asgarian, A., Hossain, M. Z., and Floryan, J. M., Rayleigh-Bénard Convection and Thermal Bifurcation in a Fluid Layer Subject to a Long Wavelength Heating, *19th Annual Conference of the CFD society of Canada*, April 27-29, Montreal, Canada, 2011
24. Nobari, M.R.H., Asgarian, A., A Numerical Simulation of Flow and Mixed Convection inside a Vertical Eccentric Annulus, *2nd International Conference on Experimental/ Process/ System Modeling/ Simulation & Optimization*, July 4-7, Athens, Greece, 2007
25. Nobari, M.R.H., Behzadi, J., Asgarian, A., A Numerical Investigation of Developing Flow in Curved Pipe, *2nd International Conference on Experimental/ Process/ System Modeling/ Simulation & Optimization*, July 4-7, Athens, Greece, 2007

Books

26. Contributor of a chapter in “Elementary Design of Thermal Power Plants”, in Persian, Published by Shiveh in Iran (2010), ISBN:978-964-7214-74-2

Workshops

One of the main speakers at the following workshops:

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| 1. Modelling of Steel Making Processes, hosted by Indian Institute of Technology Kanpur, India | 2019 |
| 2. Iron and Steel Processing, hosted by National Polytechnic Institute of Mexico and AIST-Mexico | 2019 |
| 3. 3D Printing in Action, hosted by Additive Manufacturing Innovation Centre, Mohawk College, Canada | 2018 |

Research Experience

Postdoctoral Research Fellow 2020 - Present

Process Metallurgy Research Lab (PMRL), University of Toronto, Canada

- ❖ Optimization of an Industrial-scale Water Atomization Process to Produce Finer and More Globular Metal Powders

Doctoral Researcher 2017 - 2020

Process Metallurgy Research Lab (PMRL), University of Toronto, Canada

- ❖ Debottlenecking and process improvement for **Rio Tinto Metal Powders** to enhance powder quality
- ❖ CFD simulation of molten metal atomization to improve energy efficiency and reduce carbon footprint
- ❖ Design, procurement, and construction of a lab-scale molten metal water atomizer
- ❖ Small-scale metal powder production and parametric study

Research Engineer	2011 - 2012
Micro-cellular Plastic Manufacturing Laboratory (MPML), University of Toronto, Canada	
❖ CFD simulation and process optimization for a micro-cellular plastic foam extrusion process	
Graduate Research Assistant	2009 - 2011
Laboratory for Complex Flow Systems, University of Western Ontario, Canada	
❖ Intensification and control of heat transfer in heat exchangers, electronic components and chemical vapor deposition	
Graduate Research Assistant	2004 - 2007
Department of Mechanical Engineering, Amirkabir University of Technology, Tehran, Iran	
❖ CFD simulation and thermal improvement of heat exchangers, nuclear reactors, and solar heating systems	

Teaching and Mentoring Experience

Course Instructor	2020
Department of Materials Science & Engineering, University of Toronto, Canada	
❖ MSE 455 - Process Simulation and Computer Design	
Teaching Assistant	
Department of Materials Science & Engineering, University of Toronto, Canada	
2017- 2019	
❖ MSE 455 - Process Simulation and Computer Design	
❖ MSE 490 - Professional Ethics and Practices	
Department of Mechanical and Materials Engineering, Western University, Canada	
2009- 2010	
❖ MME 4485 - Fluid Machinery	
❖ MME 3307 - Heat Transfer	
Mentor	
Process Metallurgy Research Labs (PMRL), University of Toronto, Canada	
2017- Present	
❖ Mentored 3 MEng and 3 undergraduate students during my PhD program	
❖ Training topics: powder metallurgy, process metallurgy, metal 3D printing, hands-on experience in the water-modelling laboratory, high-speed optical imaging, and Particle Image Velocimetry (PIV)	
❖ Guided the students in preparation and presentation of research findings	
Hatch Ltd., Canada	
2012- 2017	
❖ Mentored four Hatch junior engineers on technology development and design projects	

Professional Development

Application of Machine Learning in Metals , University of South Alabama, USA	2019
Summer Research School on Fluid Dynamics , University of Maryland, USA	2019
OpenFOAM Advanced Training , ESI North America and OpenFOAM	2019
Managing Projects the Hatch Way , ESI International	2015
Introduction to ASME Boiler and Pressure Vessel Codes and Canadian Regulations , CASTI	2013
Professional Practice and Ethics , Ontario Society of Professional Engineers	2012

Volunteer and Extracurricular Activities

"Hatching a Dragon" Team , Hatch Ltd., Mississauga, ON, Canada	Since 2014
Participated in Hatch's dragon boat practices, races, and charity events; Received several medals from local competitions	
Lunch and Learn Events , Hatch Ltd., Mississauga, ON, Canada	2012 - 2017
Invited and hosted industrial vendors for technical sessions and to present their products for Hatch employees	
Member of the Board / Teacher , EhsanYar Charity, Tehran, Iran	2000 - 2005

Launched a charity to financially support poor people, and to teach their children