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| **Ahmed Elatar PhD, E.I.T.**R&D Associate StaffBuilding Equipment Research GroupEnergy & Transportation Science Division | 11711 Highland Run Lane, Knoxville, TN,37932865- 361-3993elataraf@ornl.goveng.elattar@gmail.com |

**PROFILE**

* Proficiency in fluid mechanics and heat transfer fundamental and applied research
* Proficiency in experimental fluid mechanics (e.g. PIV, Stereo-PIV)
* Proficiency in computational fluid dynamics (CFD) simulation using commercial software and in-house codes
* Proficiency in mentoring undergraduate and graduate students

**EDUCATION**

**Doctor of Philosophy in Mechanical Engineering**  2009 -2013

*The University of Western Ontario, London, On., Canada*

Thesis: Channel flow behaviour during mixed convection at low Reynolds numbers

**Master of Science in Mechanical Engineering** 2006-2008

*Alexandria University, Alexandria, Egypt*

Thesis: Numerical investigation of laminar natural convection inside square enclosure with single horizontal fin.

**Bachelor of Science in Mechanical Engineering** 1998-2004

*Alexandria University, Alexandria, Egypt*

**WORK EXPERIENCE**

1. **Research experience**

 **R&D Associate Staff** 2019- Current

*Oak Ridge National Laboratory*

* Lead research endeavors in building equipment technology
* Support research efforts in the building equipment group
* Seek collaboration opportunities and research grants
* Publish scientific articles and disseminate knowledge

# Postdoctoral Research Associate 2016-2019

*Oak Ridge National Laboratory*

* Conducting research in improving the energy efficiency of thermal equipment
* Investigating separate latent and sensible cooling
* Investigating wrapped coil tank water heater
* Investigating new alternative low global warming potential (GWP) refrigerants as a drop-in replacement
* Investigating the flammability risk of low GWP refrigerants
* Fundamental investigation of frost/defrost on hydrophobic and hydrophilic surfaces
* Improvement of heat pump water heater
* Developing pressure exchanger for energy recovery in VC cycles
* Investigation of novel Radiation defrosting techniques

# Postdoctoral Fellow 2014-2016

WindEEE Research Institute

*The University of Western Ontario, London, On., Canada*

* Investigating the wind loads on solar panel array
* Characterizing the wind flow across solar panel array
* Aerodynamic optimization of solar panels design to mitigate the wind load
* Investigating the effect of wind on the roof-top concrete paver system
* Studying wind-assisted natural ventilation inside atrium building

# Research Assistant 2009-2013

# Faculty of Engineering, Mechanical and Materials Engineering

*The University of Western Ontario, London, On., Canada*

* Investigating the effect of mixed convection on channel flow structure at low Reynolds numbers
* Investigating the channel flow development during mixed convection at low Reynolds numbers
* Detecting and characterizing coherent structures in low Reynolds numbers channel flow during mixed convection
* Conducting experimental measurements using Planar and Stereo-PIV

 **Research Assistant** 2006 - 2008 2006 -2008

 Faculty of Engineering, Mechanical Engineering

 *Alexandria University, Alexandria, Egypt*

* Investigating natural convection inside differentially heated square enclosure with single horizontal fin
* Parametric study of heat transfer based on fin characteristics and dimensions
* Numerical modeling using in-house code
1. **Industrial experience**

 Research and Design Associate (Four month contract) 2013

#  *s2e Technology Incorporation, London, On., Canada*

#  Working as energy storage team leader leading a team of seven engineers

* Conducting technical analysis on several thermal and electrical storage systems for a net-zero energy community

 **Mechanical Engineer** 2008 -2009

*Dr. Abdel-Hamid Elsayed Consulting Firm Alexandria, Egypt*

* Conducting building loads calculations (Heat load, ventilation and water requirements)
* Sizing and selecting of equipment (HVAC, plumbing and related components)
* CAD drafting and preparation of mechanical design drawings
* Organizing meetings with clients, contractors and architects to ensure progress, coordination and on time delivery of projects
* Performing site visits and reviewing existing site conditions
1. **Teaching experience**

# Teaching Assistant 2009-2013

# Faculty of Engineering, Mechanical and Materials Engineering

*The University of Western Ontario, London, On., Canada*

* Preparing and instructing labs for undergraduate and graduate students
* Conducting tutorial sessions and preparing assignments
* Marking reports, quizzes and evaluating final projects
* Worked as a teaching assistant for:
	+ Experimental measurements in fluid mechanics (graduate course) (Fall 2011)
	+ Thermodynamics II (Winter 2011)
	+ Engineering experimentation (Winter 2010, 2012,2013)
	+ Fluid Mechanics II (Fall 2012)

# Teaching Assistant 2004-2008

Faculty of Engineering, Mechanical Engineering

*Alexandria University, Alexandria, Egypt*

* Instructing labs for undergraduate students
* Conducting tutorial sessions and preparing assignments
* Marking reports, quizzes and exams
* Worked as a teaching assistant for:
	+ Heat Transfer
	+ Thermodynamics I and II
	+ Energy equipment

**PROFESSIONAL DEVELOPMENT**

**COURSES, WORKSHOPS AND TRAINING**

*Teaching support center, Western University, London, On., Canada*

* **Western certificate in university teaching and learning**  2015

The goal of the Western Certificate in University Teaching and Learning program is to enhance the quality of teaching by graduate students and to prepare them for a future faculty career. The presentation and group facilitation skills gained while completing the Certificate will not only benefit graduate students in pursuit of a faculty position, but are also valued by employers in business, industry and other non-academic fields.

* **Teaching mentor program** 2014

In this program, four graduate students who have similar teaching duties observed one another in a classroom, laboratory or a tutorial.

* **The teaching assistant training program (TATP)** 2009

The TATP is a hands-on, two-and-a-half- day session designed for new TAs embarking on their teaching careers. The program focuses on teaching the fair grading, diversity in the classroom, lecturing, and evaluating students on their written work. The sessions are designed to meet TAs specific discipline-related teaching needs.

* **The Language of teaching in Engineering** 2009

The workshop provides TAs with an opportunity to practice describing assignments, defining concepts, explaining lab activities, answering student questions and describing their approach to teaching clearly and concisely.

* **Workshops in Future Professor Series** 2014
* Citation Management: Supporting Your Undergraduate Students
* Putting Together a Teaching Dossier
* Writing a Teaching Philosophy Statement
* Encouraging Critical Thinking
* Proctoring Survival Kit
* How do you know what you do in your classroom makes a difference? An Intro to SoTL
* **Communicating with Journal Editors** 2010
* **Fall Perspectives on Teaching Conference** 2014
* Becoming a Skillful Teacher
* How to Get and Use Student Feedback to Improve Learning During the Term
* Skillful Teaching: Students' Perspective

*MITACS Step workshops*  2014

* + Practice the presentation skills
	+ Skills of communication
	+ Effective networking
	+ Project management I and II

**INTERNSHIPS**

**Friedrich-Alexander University, Erlangen, Germany** Summer 2003

* Conducting failure tests on wave drive gear
* Compiling and analyzing results

**Abu Qir Fertilizers and Chemical Industries (Alexandria, Egypt)** Summer 2002

* Completed training for bulk plant operation

**SKILLS**

* Experience in team leadership, mentoring, supervision and coordination
* Excellent communication, organization, planning and problem solving skills
* Excellent technical writing and presentations skills
* Proficient in PIV and Stereo-PIV measurements
* Proficient in thermo-fluid measurements using state of the art tools
* Proficient in conducting wind tunnel experiments using pressure transducers, strain gauges, force balances and accelerometers.
* Proficient in:
	+ Fortran
	+ MatLab
	+ Davis software
	+ AutoCAD
	+ Starccm+
	+ ANSYS Fluent
	+ CONVERGE
	+ EnSight
	+ Tecplot
	+ LabVIEW
	+ Microsoft Excel, Word and PowerPoint

**AWARDS AND SCHOLARSHIPS**

**Western Graduate Research Scholarship (WGRS)**  2009-2013

*The University of Western Ontario, London, On., Canada*

**Top ten students’ paper**20132012

*CSME International congress, Winnipeg, Canada*.

**Rank 1st in Mechanical Engineering 2004 class (410 students)** 2004

*Alexandria University, Alexandria, Egypt*

**SOCIAL AND LEADERSHIP ACTIVITIES**

**Councilor, Society of Graduate Student (SOGS)** 2009-2010 & 2011-2012

*Western University, London, On., Canada*

* Worked as an elected Engineering councilor in the society of graduate students (SOGS)

**Councilor**, **Graduate Engineering Society (GES)** 2011-2012

*Western University, London, On., Canada*

**Physical science division Chief steward, Graduate Teaching Union (GTA)** 2012-2013

*Western University, London, On., Canada*

* Supervised the physical science division stewards (30 stewards)

**PROFESSIONAL MEMBERSHIPS**

* Engineering Intern (EIT), Professional Engineers of Ontario (PEO)
* Member at the American Society for Mechanical Engineering (ASME)
* Member at the Canadian Society for Mechanical Engineering (CSME)
* Member at the Canadian Society for Civil Engineering (CSCE)
* Member of ASME TC Heat Transfer Equipment committee (K10)
* Member of ASHRAE technical committees

1. heat transfer and fluid flow (TC.1.03)

2. global climate change (TC.2.05)

3. solar and other renewable energies (TC.6.07)

4. thermal storage (TC.6.09)

5. Air-to-Refrigerant heat transfer equipment (TC. 8.04)

6. Liquid-to-Refrigerant heat transfer (TC. 8.05)

**PUBLICATIONS**

JOURNAL PAPERS

1. **Elatar, A**., Abu-Heiba, A., Patel, V., Zhang, M., Baxter, V., Edwards, k. D., Abdelaziz, O., “Evaluation of flammable volume in the case of a catastrophic leak of R-32 from a rooftop unit”, International Journal of Refrigeration 91 (2018) 39-45
2. **Elatar, A**., Siddiqui, K., “The influence of bottom wall heating on the mean and turbulent flow behavior in low Reynolds number channel flows”, Int. Journal of Thermal Science 77 (2014) 233-243.
3. **Elatar, A.**, Siddiqui, K., “The effect of mixed convection on the structure of channel flows at low Reynolds numbers”, Int. Journal of Heat and Fluid Flow 46 (2014) 29-42.
4. **Elatar, A.**, Siddiqui, K., “Flow development during low Reynolds number mixed convection”, Int. Journal of Thermal Science, 90 (2015) 351-369.
5. **Elatar, A.**, Siddiqui, K., “The characteristics of coherent structures in low Reynolds number mixed convection flows”, Fluid Dyn. Res. 47 (2015) 035509.
6. **Elatar, A.**, Teamah, M. A., Hassab, M. A., “Numerical study of laminar natural convection inside square enclosure with single horizontal fin”, Int. Journal of Thermal Science 99 (2016) 41-51
7. Greig, D., Siddiqui, K., Karava, P., **Elatar, A.**, “Investigation of fundamental flow mechanisms over a corrugated waveform using proper orthogonal decomposition and spectral analysis”, Int. Journal of Thermal Science 96 (2015) 160-172.
8. Shen, B., Nawaz, K., Baxter, V., **Elatar, A.**, “Development and validation of Quasi-state Heat Pump Water Heater Model Having Stratified Water Tank and Wrapped-Tank Condenser”, International Journal of Refrigeration International Journal of Refrigeration 87, 78-90
9. Nawaz, K., Shen, B., **Elatar, A.**, Baxter, V., Abdelaziz, O., “R-1234yf and R1234ze(E) as low GWP Refrigerants for residential Heat Pump Water Heaters”. International Journal of Refrigeration, 82 (2017) 348-365
10. Nawaz, K., Shen, B., **Elatar, A.**, Baxter, V., “R290 (Propane) and R600a (Iso-butane) as natural Refrigerants for residential Heat Pump Water Heaters”. Applied Energy 127 (2017) 870-883
11. Nawaz, K., Shen, B., **Elatar, A.**, Baxter, V., Abdelaziz, O., “Performance Optimization of CO2 HPWH System”. International Journal of Refrigeration, International Journal of Refrigeration 87, 106-117
12. Elawady, A., Aboshosha, A., Bitsuamlak, G., Hangan, H., **Elatar, A.**, “Aero-Elastic Testing Of Multi-Spanned Transmission Line Subjected To Downbursts” Journal of Wind Engineering and Industrial Aerodynamics, [169](http://www.sciencedirect.com/science/journal/01676105/169/supp/C) (2017) 194-216
13. Shen, B., Abdealaziz, O., Shrestha, S., **Elatar, A.**, “Model-Based Optimizations of Packaged Rooftop Air Conditioners using Low Global Warming Potential Refrigerants”. International Journal of Refrigeration 87, 106-117
14. Abu-Heiba, Patel, V., M., Baxter, V., A., Abdelaziz, O., **Elatar, A**., “Flammable Refrigerant Charge Limits: Can or Should These Limits Be Higher?” ASHRAE Journal 60 (2018) 40-46
15. Shen, B., Nawaz, K., Baxter, V., **Elatar, A.**, “Hydrodynamic behavior of wrapped coil water heater tank”. Thermal Science and Engineering Progress 20 (2020), 100741

REFEREED CONFERENCE PAPERS

1. **Elatar, A.**, Siddiqui, K., “Effect of low Reynolds number mixed convection on channel flows structure”, ASME 2012 Fluids Engineering Summer Meeting, Puerto Rico, USA, July 2012.
2. **Elatar, A.**, Siddiqui, K., “Wall heating effects in low Reynolds number channel flows”, CSME International congress 2012, Winnipeg, Canada, June 2012.
3. **Elatar, A.**, Siddiqui, K., “Three dimensional flow structure during low Reynolds number mixed convection”, CANCAM 2013, Saskatoon, Canada, June 2013.
4. **Elatar, A.**, Siddiqui, K., “Effect of low Reynolds number mixed convection on the flow development inside channel”, ASME 2013 Fluids Engineering Summer Meeting, Inclined Valley, Nevada, USA, July 2013.
5. **Elatar, A.**, Siddiqui, K., “Characteristics of coherent structures in channel flows during low Reynolds number mixed convection”, ASME 2014 4th Joint US-European Fluids Engineering Division Summer Meeting, Chicago, Illinoi, USA, August 2014.
6. Chowdhury, J., **Elatar, A.**, Hangan, H., “Pressure Distribution on a low-rise building in a laboratory simulated downburst”, 8th International Colloquium of bluff body Aerodynamics and Applications, Boston, Massachusetts, USA, June 2016.
7. Refan, Maryam, **Elatar, A.**, Hangan, H., “Pressure Distribution over a Typical Low-rise Building under Laboratory Simulated Tornado Vortices", EACWE, Liege Belgium, July 2017.
8. **Elatar, A.**, Nawaz, K., Shen, B., Baxter, V., Abdelaziz, O., “Characterization of Wrapped Coil Tank Water Heater during Charging/Discharging”, IMECE, Tampa, FL, November, 2017.
9. **Elatar, A.**, Abu-Heiba, A., Patel, V., Zhang, M., Abdelaziz, O., “Investigation of low GWP Flammable Refrigerant Leak from Rooftop Units” ASHRAE Winter Conference, Chicago, IL, January 2018
10. **Elatar, A.**, Nawaz, K., Shen, B., Baxter, V., “Effect of Insulation on the Performance of Wrapped-Coil-Tank Heat Pump Water Heater Deploying Low GWP Refrigerants” 17th International Refrigeration and Air Conditioning Conference, West Lafayette, IN, July 2018
11. **Elatar, A.**, Abu-Heiba, A., Patel, V., Baxter, V., Edwards, k. D., Abdelaziz, O., Zhang, M., “Risk assessment of catastrophic leak of R452B from packaged unit into a residential space” 1st IIR HFO Conference, Birmingham, UK, September 2018
12. Nawaz, K., Shen, B., **Elatar, A.**, Baxter, V., Abdelaziz, O., “Hydrocarbons as Natural Refrigerants for Heat Pump Water Heating Applications” 13th IIR-Gustav Lorentzen conference on natural refrigerants, Valencia, Spain 2018
13. Nawaz, Kashif; Shen, Bo; Elatar, Ahmed F; Baxter, Van D; Abdelaziz, O., “Hydrofluoroolefins as Refrigerants for heat pump water heating applications” 17th International Refrigeration and Air Conditioning Conference, West Lafayette, IN, July 2018
14. Nawaz, K., **Elatar, A.**, Jacobi, A., Fricke, B., “Impact Geometrical Characteristics on The Condensate Retention and Frost Formation on Metal Foams” 16th international heat transfer conference Beijing, China 2018
15. Nawaz, K., **Elatar, A.**, Jacobi, A., Fricke, B., “Metal Foams: Novel Materials for Air Cooling and Heating Application- Performance under Dry, Wet and Frosting Conditions” 16th international heat transfer conference Beijing, china 2018
16. Nawaz, K., Jacobi, A., **Elatar, A.**, Fricke, B., Impact of Surface Treatment on The Condensate Retention and Frost Formation On Metal Foams” 17th International Refrigeration and Air Conditioning Conference, West Lafayette, IN, July 2018
17. Abu-Heiba, A., Edwards, k. D., **Elatar, A**., Finney, C., Patel, V., M., Baxter, V., A., Abdelaziz, O., Stoyanov, M., “Flammable Refrigerants Charge Limits Estimation” AHRTI Flammable Refrigerants Research & Planning Conference, IL, USA, 2018
18. Elatar, Ahmed; Nawaz, Kashif; Fricke, Brian; Sharma, Vishaldeep,” Modeling of Pressure Exchanger for Energy Recovery on Trans Critical CO2 Refrigeration Cycle”, ASME International Mechanical Engineering Congress and Exposition (IMECE), Salt Lake City, UT, November, 2019.

REPORTS

1. Nawaz, K., Shen, B., **Elatar, A.**, Baxter, V., “Max Tech Efficiency Electric HPWH with low-GWP Halogenated Refrigerant”, ORNL, 2016
2. Abdelaziz, O., Shrestha, S., Shen, B., **Elatar, A.,** Linkous, R., Goetzler, W., Guernsey, M., Bargach, Y., “Alternative Refrigerant Evaluation for High-Ambient-Temperature Environments: R-22 and R-410A Alternatives for Rooftop Air Conditioners”, ORNL, 2016.
3. Nawaz, K., Shen, B., **Elatar, A.**, Baxter, V., “Feasibility analysis of a commercial HPWH with co2 refrigerant”, ORNL, 2017.
4. Shen, B., Abdelaziz, O., Shrestha, S., **Elatar, A.,** “Compare optimized performance results for packaged RTU using all alternative refrigerants – FY17 1st Quarter Milestone Report”, ORNL, 2017.
5. Nawaz, K., **Elatar, A.**, Fricke, B., “A Critical Literature Review of Defrost Technologies for Heat Pumps and Refrigeration Systems” ORNL, 2018.
6. V., Baxter, Abdelaziz, O., Abu-Heiba, A., Edwards, k. D., **Elatar, A.**, Finney, C., Patel, V., Zhang, M., “Milestone Report BTO 3.2.2.25 – Methodology for Estimating Safe Charge Limits of Flammable Refrigerants in Hvac&R Applications – Part 1” ORNL, 2018.
7. Elatar, Ahmed; Abuheiba, Ahmad; Patel, Viral K; Edwards, K; Baxter, Van D; Abdelaziz, Omar; Zhang, Mingkan, “Risk Assessment of Catastrophic Leak Of R-452b From Package Unit into A Residential Space” ORNL, 2019.
8. Abdelaziz, Omar; Abu-Heiba, Ahmad; Baxter, Van D; Edwards, Dean; Elatar, Ahmed; Finney, Charles EA; Patel, Viral K; Stoyanov, Miroslav K; Zhang, Mingkan, “Methodology for Estimating Safe Charge Limits of Flammable Refrigerants in HVAC&R Applications-Part 2”, ORNL, 2019.
9. Shen, Bo; Nawaz, Kashif; Elatar, Ahmed; Baxter, Van D, “A hardware-based heat pump water heater design model for quasi-steady-state simulation”, ORNL, 2019.
10. Fricke, Brian A; Nawaz, Kashif; Elatar, Ahmed; Sharma, Vishaldeep,” Increasing the efficiency of a carbon dioxide refrigeration system using a pressure exchanger”, ORNL, 2019.
11. Edwards, K; Abuheiba, Ahmad; Stoyanov, Miroslav K; Zhang, Mingkan; Elatar, Ahmed; Patel, Viral K; Baxter, Van D; Finney, Charles; Abdelaziz, Omar,” Reduced-order model to estimate safe flammable refrigerant charge limits for a one-room air conditioner:, ORNL, 2019.

PRESENTATIONS

1. **Elatar, A.,** Siddiqui, K., “Investigation of the flow and heat transfer behavior in low Reynolds number channel flow”, Graduate seminar series, Department of Mechanical and Materials Engineering, Western University*,* March 2011, London, ON, Canada
2. **Elatar, A.,** Siddiqui, K., “Wall heating effects in low Reynolds number channel flow”, Graduate seminar series, Department of Mechanical and Materials Engineering, Western University, March 2012, London, ON, Canada
3. **Elatar, A.,** Siddiqui, K., “Three dimensional flow structure during low Reynolds number mixed convection”, Graduate seminar series, Department of Mechanical and Materials Engineering, Western University, Feb. 2013, London, ON, Canada
4. **Elatar, A**, Bitsuamlak, G., “Aerodynamic Mitigation of Roof Mounted Solar Panels”, Structures Congress, Portland, Oregon, 2015
5. Bitsuamlak, G., **Elatar, A**., “Numerical Evaluation of Net Wind Pressure on Loosely Laid Roof Pavers”, Structures Congress, Portland, Oregon, 2015
6. Nawaz, K., Shen, B., **Elatar, A.**, Baxter, V., “Hydroflouroolefins (HFOs) as Low GWP Refrigerants for Residential Heat Pump Water Heaters”, ACEEE Hot Water Forum, Portland, 2017.
7. Shen, B., Nawaz, K., **Elatar, A.**, Baxter, V., “A Hardware-Based Modeling and Design Tool for Heat Pump Water Heaters –ORNL Heat Pump Design Model”, ACEEE Hot Water Forum, Portland, 2017.
8. **Elatar, A.**, Abu-Heiba, A., Patel, V., Zhang, M., Baxter, V., Edwards, k. D., Abdelaziz, O., “Leak of R452B from Packaged Heat Pump Unit in a Residential Application” IMECE, Pittsburg, PI, November 2018.
9. **Elatar, A.**, Abu-Heiba, A., Patel, V., Baxter, V., Edwards, k. D., Abdelaziz, O., Zhang, M., “Risk assessment of catastrophic leak of R452B from packaged unit into a residential space” 1st IIR HFO Conference, Birmingham, UK, September 2018
10. M., Baxter, V., A., Abdelaziz, O., **Elatar, A**., Abu-Heiba, Patel, V., “Workshop on Flammable Refrigerant Charge Limits in a Low-GWP World – Can/should they be Higher?” ASHRAE HQ, 2016, Atlanta, Georgia
11. Nawaz, K., Shen, B., **Elatar, A.**, Baxter, V., “CO2 as refrigerant for heat pump water heating systems” Carbon Capture, Utilization & Storage: A Gordon Research Conference, New Hampshire, 2017

GRANT PROPOSALS

1. Member of awarded (ARPA-E INTEGRAETE) :

• A Natural-gas based High Efficiency Combined Thermo-chemical Affordable Reactor (NECTAR)

1. Submitted proposal for SETO Solar desalination FOA (1778\_1560):

• Novel direct solar thermal energy storage system

1. Submitted two proposals for BTO open lab call :

• Low grade exhaust gases heat pump for efficient heat recovery (1624)

• A novel distributor design eliminating the need of a header to solve refrigerant mal-distribution problem (1629)