HASSAN ALAM

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EDUCATION

Master of Science, University of Waterloo, Canada **2020**

Thesis: An off-lattice model of the Sanchez-Lacombe equation of state for polymers with finite flexibility (available at UWSpace: http://hdl.handle.net/10012/15889)

Thesis Supervisor: Dr. Russell Thompson (Associate Professor, Department of Physics, University of Waterloo)

Thesis Co-supervisor: Dr. Chul B. Park (Distinguished Professor, Mechanical & Industrial Engineering Department, University of Toronto)

Scholarships and Awards

- International Master's Student Award, University of Waterloo (CA$13,000)
- Science Graduate Award, University of Waterloo (CA$10,000)
- Marie Curie Graduate Student Award, University of Waterloo (CA$22,000)

Bachelor of Mechanical Engineering, NED University, Pakistan **2015**

Achievements and Awards

- Two gold medals awarded by NED University and Toyota Indus Motor Company in recognition of the first position out of 226 students of mechanical engineering batch 2010-2011

PUBLICATION

- Alam, H., Park, C.B. and Thompson, R.B., 2020. An off-lattice model of the Sanchez-Lacombe equation of state for polymers with finite flexibility. Polymer. https://doi.org/10.1016/j.polymer.2020.123334

CONFERENCE PRESENTATIONS

- Alam, H., Park, C.B. and Thompson, R.B., 2020. An off-lattice Sanchez-Lacombe related equation of state extensible to polymeric foams. Paper presented at the Virtual APS March Meeting. http://meetings.aps.org/Meeting/MAR20/Session/S33.4.
- Alam, H., Park, C.B. and Thompson, R.B., 2020. An off-lattice Sanchez-Lacombe related equation of state extensible to polymeric foams. Paper presented at Virtual APS Division of Soft Matter (DSOFT) Session.
- Alam, H., Park, C.B. and Thompson, R.B., 2020. An off-lattice Sanchez-Lacombe related equation of state extensible to polymeric foams. Paper presented at March Meeting North Mini-Symposium, Institute for Quantum Computing, University of Waterloo, ON, CA. (Video: https://www.youtube.com/watch?v=EeWDSOs5fcs&t=1s)
- Alam, H., Park, C.B. and Thompson, R.B., 2019. A mathematical model for equation of state effects relevant to nano-cellular polymeric foams. Paper presented at the V AMMCS International Conference, Waterloo, Ontario, Canada.

RELEVANT EXPERIENCE

Tutor, One Step Forward, Ontario, Canada **January 21 – May 21**

- Tutored an advanced engineering mathematics course to university students
- Course topics were ordinary differential equations, Laplace transforms, and numerical methods

Research Assistant, University of Waterloo **May 18 – December 20**

- Identified problems in lattice-based models of polymer systems that are used to predict glass transition temperatures of polymers
- Proposed an off-lattice model of polymer systems by including finite flexibility in polymer molecules to predict glass transition temperatures of polymers
- Proved that the criterion for glass transition temperature calculations used by lattice-based models is incorrect and proposed a new criterion
- Derived equations of state of polymer systems by using statistical mechanics
- Developed programs to regress phenomenological parameters of the off-lattice model
- Demonstrated that the predictions of glass transition temperature versus pressure behaviors by a lattice-based model are flawed and identified new types of glass transition temperature versus pressure behaviors
- Predicted retrograde vitrification in a binary polymer-solvent mixture

Teaching Assistant, University of Waterloo **May 18 – December 20**

- Delivered tutorials by utilizing various teaching tools including the use of computer-aided design (CAD) software to clarify 3D diagrams
- Asked thought-provoking questions to expand the critical thinking skills of students
- Polished MATLAB coding skills of students by marking 900 lab reports
- Coached students via online meetings in MS Teams

OTHER EXPERIENCE

Assistant Manager, Hub Power Services Limited, Pakistan **June 15 – April 18**

- Identified the root cause of the repetitive failure of a heat exchanger by analyzing its performance trends, engineering drawings, and maintenance history
- Co-worked with teams involving various departments to overhaul the power plant
- Performed modeling and motion simulation of Turbine Control Valve in CAD software and delivered a presentation to the technicians of Hub Power Plant by using the model
- Planned and managed modification projects by estimating their cost and time.
- Developed maintenance schedules and introduced quality control standards by analyzing gaps in maintenance activities.

Project Leader, NED University, Karachi, Pakistan **January 14 – December 14**

- Title: Design and Fabrication of Robotic Arm with Six Degrees of Freedom
- Managed the project as the leader of a four-member team
- The robot was designed to do a repetitive pick and place task
- Used Turbo C++ language to program servo motors on Arduino controller
- Calculated torques at joints of the robotic arm to select joint mounted servo motors
- Modeled frame of the robotic arm in NX Unigraphics (CAD software)

EXTRACURRICULAR ACTIVITIES

Cultural Exchange Programs, University of Waterloo **May 19 – November 20**

- Shared culture of Pakistan and learned about Canadian culture
- Explored the Mennonite community and visited their farms to understand their values
- Visited festivals, parks, and waterfalls in different cities of Canada

CERTIFICATES

- Student Leadership Certificate, University of Waterloo, Canada **August 19**
  - Completed 12 workshops on leadership skills
- Fundamentals of University Teaching, University of Waterloo, Canada **April 19**
  - Delivered 3 teaching sessions and completed 6 workshops on teaching skills
- Certificate of Merit in Academics, Dehli Government College, Pakistan **August 10**
  - Among the top 10 students in the class of 600 students

SKILLS

- Programming and Software Skills: Python, MATLAB, Turbo C++, NX Unigraphics (CAD)
- Language Skills: Urdu (Native) and English