

Khaled Mosharraf Mukut

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EDUCATION

PhD in Mechanical Engineering (Energy System)

in progress

Marquette University, Wisconsin, USA

Dissertation title: "Fundamental Exploration of Soot Formation and Morphology from a Molecular Modeling Perspective"

Advisor: Dr. Somesh Roy

MS in Mechanical Engineering (Energy System)

Spring 2019

Marquette University, Wisconsin, USA

Thesis title: "Effect of Radiation and EGR on Pollutant Formation in High-Pressure Constant Volume Spray Combustion"

Advisor: Dr. Somesh Roy

BS in Mechanical Engineering

Spring 2016

Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh

Thesis title: "Numerical Investigation on Active Control for Drag Reduction in NACA 4412 Airfoil"

Advisor: Dr. Mohammad Ali

RESEARCH INTERESTS

- [Soot Modeling](#)
- [Molecular Dynamics](#)
- Computational Fluid Dynamics
- Machine Learning
- [Radiative Heat Transfer](#)
- Chemical Kinetics

RESEARCH EXPERIENCE

Graduate Research Assistant

August 2017-Present

Department of Mechanical Engineering

Marquette University

- Conduction reactive molecular dynamics simulations of soot
- Characterizing multiphysics interaction in combustion devices using macro-scale CFD
- Detailed multiscale stochastic modeling of soot.
- Radiation modeling in multiphase combustion systems.

Graduate Assistant

March 2016-August 2017

Department of Mechanical Engineering

Bangladesh University of Engineering & Technology (BUET)

- Molecular Dynamics investigations of explosive boiling characteristics.
- Thermodynamic characterization of the critical heat flux density and inherent metastability in nano-scale boiling heat transfer.
- Studying effects of nano-structures on boiling of liquids.
- Numerical standardization of thermally stratified co-axial jet flow parameters.

TEACHING AND MENTORING EXPERIENCE

Graduate Teaching Assistant

August 2018-Present

Department of Mechanical Engineering

Marquette University

- Conduct lab session on Materials Science (MEEN 2460)
- Prepared and taught several lectures on heat transfer (MEEN 3330) for junior level undergraduates.
- Serving as the grader for fluid mechanics, thermodynamics and heat transfer courses designed for junior level undergraduates.

Graduate Assistant

March 2016-August 2017

Department of Mechanical Engineering

Bangladesh University of Engineering & Technology (BUET)

- Mentored two separate groups totaling seven undergraduate seniors in their undergraduate thesis work. One group worked on linear heating in nano-confinement and the other group worked on numerically modeling a thermally stratified co-axial jet.
- Guided these groups in preparation of their research findings.

PROFESSIONAL EXPERIENCE

Operation Engineer (Export)

2016

PRAN-RFL Group, Dhaka, Bangladesh

- Worked on the "Automatic Conveyor Control System in Production Line" project actively (Hardware and Software)
- Active member of the operation and maintenance team for Injectoin and Blow moulding machines.

Maintenance Engineer (Intern)

2016

Khulna Power Company LTD. (KPCL), Khulna, Bangladesh

- Hands on experience of working with large diesel and HFO based power plant

TECHNICAL SKILLS

Programming language and Mathematical packages: C/C++, Python, Fortran, MATLAB, gnuplot, bash.

CAD/Engineering: AutoCAD, SolidWorks, LAMMPS, Tecplot, [OPENFOAM](#), [CONVERGE CFD](#), [ANSYS](#), COMSOL Multiphysics.

Other: Linux, Mac OS, Windows OS, L^AT_EX etc.

HONORS AND AWARD

Richard W. Jobling Distinguished Research Fellowship

2023-24

Marquette University

Awarded to conduct research on the impact of soot and particulate matter on air quality and climate change.

Outstanding Research Assistant Award from department of mechanical engineering

2021

in Opus College of Engineering Honors Convocation, April 23, 2021

Best Poster Award

2018

In annual graduate poster exhibition at Marquette University

More than 60 graduate student participate in the exhibition

Dean's List Scholarship

2011-2012

In my freshman year in BUET

Awarded to the top three students in each year of undergraduate study.

PEER-REVIEWED PUBLICATIONS

- **K.M.Mukut**, S.P. Roy, and E. Goudeli (2022). "[Molecular arrangement and fringe identification and analysis from molecular dynamics \(MAFIA-MD\): A tool for analyzing the molecular structures formed during reactive molecular dynamics simulation of hydrocarbons](#)" Comput. Phys. Commun., 276, 108325.
- A. Sharma, **K.M.Mukut**, S.P. Roy, and E. Goudeli (2021). "[The coalescence of incipient soot clusters](#)" Carbon, 180, 215-225.
- **K.M.Mukut**, and S.P. Roy, (2020). "[Effect of O₂ concentration in ambient mixture and multiphase radiation on pollutant formation in ECN spray-A](#)" Combust. Theor. Model., 24(3), 549-572.
- M. N. Hasan, S. M. Shavik, K. F. Rabbi, **K.M.Mukut**, and M. M. Alam, (2018). "[Thermal transport during thin-film argon evaporation over nanostructured platinum surface: A molecular dynamics study](#)" Proceedings of the Institution of Mechanical Engineers, Part N: Journal of Nanomaterials, Nanoengineering and Nanosystems.
- M. N. Hasan, S. M. Shavik, **K.M.Mukut**, K. F. Rabbi and A. H. M. Faisal, (2018) "[Atomistic modelling of thin film argon evaporation over different solid surfaces at different wetting conditions](#)", IET Micro & Nano Letters, 13(3), 351-356.
- M. N. Hasan, S. M. Shavik, K. F. Rabbi, **K. M.Mukut**, and A. Morshed, (2017). "[Phase Change Characteristics of Ultra-Thin Liquid Argon Film over different Flat Substrates at High Wall Superheat for Hydrophilic/Hydrophobic Wetting Condition: A Non-Equilibrium Molecular Dynamics Study](#)", Journal Of Chemical Engineering, 29(1), 49-55.
- K.F. Rabbi, S.I. Tamim, A.H.M Faisal, **K. M.Mukut**, M.N. Hasan, (2017) "[A molecular dynamics study on thin film liquid boiling characteristics under rapid linear boundary heating: Effect of liquid film thickness](#)", AIP Conference Proceedings 1851 (1), 020102.

- M.N. Hasan, K.F. Rabbi, **K. M.Mukut**, S.I. Tamim and A.H.M Faisal, (2017) "[Nano scale dynamics of bubble nucleation in confined liquid subjected to rapid cooling: Effect of solid-liquid interfacial wettability](#)", AIP Conference Proceedings 1851 (1), 020100.

CONFERENCE PRESENTATIONS

ORAL PRESENTATION

- **K. M.Mukut**, A. Ganguly, E. Goudeli, G. Kelesidis and S. P. Roy, (2022) "Physicochemical Analysis of Soot Particles Obtained from Molecular Dynamics Simulation of Acetylene Pyrolysis", AAAR 40th Annual Conference (virtual).
- **K. M.Mukut**, A. Sharma, A. Ganguli, E. Goudeli, and S. P. Roy, (2021) "A Reactive Molecular Dynamics-based Exploration of Soot Inception Pathways in Combustion", AAAR 39th Annual Conference (virtual).
- **K. M.Mukut**, A. Sharma, E. Goudeli, and S. P. Roy, (2021) "A Molecular Dynamics Study of Nucleation of Soot", European Aerosol Conference-EAC2021 (virtual).
- **K. M.Mukut**, S. P. Roy, (2019) "Effect of EGR and Radiation on Soot Morphology in ECN Spray-A Combustion Chamber", 17th International Conference on Numerical Combustion, Aachen, Germany.
- **K. M.Mukut**, S. P. Roy, (2019) "An Investigation of Soot Evolution in High-pressure Spray Combustion", 11th U.S. National Combustion Meeting, Pasadena, CA
- M. N. Hasan, **K. M.Mukut**, K.F. Rabbi, M. Alam, Y. Mitsutake, M. Monde, (2018) "Atomistic and Macroscopic Perspectives of Thin Film Boiling", 10th International Conference on Boiling and Condensation Heat Transfer, Nagasaki, Japan.
- **K. M.Mukut**, S. P. Roy, (2018) "A Sensitivity Study on Soot and NO_x Formation in High Pressure Combustion System", CSSCI 2018 Spring Technical Meeting, Minneapolis, MN
- **K. M.Mukut**, M. N. Hasan, M. T. Ali (2017) "Numerical Study of Turbulent Co-Axial Free Jets", ICMEAS 2017, Dhaka, Bangladesh.

POSTER PRESENTATION

- **K. M.Mukut**, S. P. Roy, S.F. Fernandez, D.C. Haworth, M. Modest, (2018) "Soot and Radiation Models in Prediction of Pollutant Formation from Practical Combustion Scenarios", 10th International Aerosol Conference, ST. Louis, MO.