

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

- 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.