

Md Badrul Hasan

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[Google Scholar](#) | [Website](#)

WORKSHOPS & TRAINING

- *Structure-Preserving Scientific Computing & Machine Learning: Summer School & Hackathon*, University of Washington, Seattle — NSF/PIMS supported cohort of 40 graduate students (June 2025).

AWARDS & SCHOLARSHIPS

- AIAA Professor Kirti “Karman” Ghia Memorial Award — Best Student Paper (Jan 2025).
- Graduate Student Association (GSA) Professional Development Grant, UMBC (May 2025; Dec 2024).
- University Technical Scholarship, BUET (2013–2017).

TECHNICAL SKILLS

- Programming: Python, MATLAB, Fortran
- CFD & Modeling: WRF, NUMA, Ansys Fluent, COMSOL; LES/SGS modeling; HPC/GPU computing
- Data/ML: PyTorch; geospatial/remote sensing analysis; model validation
- Tools: SolidWorks, AutoCAD, Linux, Git

MEDIA & RECOGNITION

- Research featured in UMBC News: [“Modeling Hurricanes with Machine Learning”](#) (Jan 2025).

EDUCATION

Ph.D., Mechanical Engineering

University of Maryland Baltimore County (UMBC), Baltimore, MD
Jan 2019 – Present

M.S., Mechanical Engineering

University of Maryland Baltimore County (UMBC), Baltimore, MD
Dec 2022

B.Sc., Mechanical Engineering

Bangladesh University of Engineering and Technology (BUET)
2017

EXPERIENCE

Graduate Research Assistant, Computational Mechanics Lab, UMBC (Jan 2020 – Present)

- A posteriori tests of invariance-embedded ML SGS models for hurricane boundary layers; integrating ML closures into in-line simulations (UMBC COEIT Interdisciplinary Proposal Award, 2025).
- Developed ML backscatter-admitting sub-grid stress models for mesoscale hurricane LES.
- Physics-informed neural networks for detecting stealthy long-term cyber attacks on wind energy assets (UMBC Cybersecurity Leadership Grant, 2024).

Graduate Research Assistant, Joint Center for Earth Systems Technology (JCET), UMBC (Jan 2020 – June 2022)

- Quantified numerical dissipation in WRF and NUMA; compared model behavior for hurricane intensification studies (NSF AGS-2121366).
- Processed radar/remote sensing (IWRAP) datasets for NOAA/AOML/HRD.

Graduate Teaching Assistant, UMBC (Jan 2019 – May 2024)

- ENME-432L (Fluids/Energy Lab); ENME-423 (HVAC Design) — labs, instruction, and assessment.

SELECTED PUBLICATIONS

- **Hasan, M. B.**, Guimond, S. R., Yu, M., Reddy, S., Giraldo, F. X. (2022). The Effects of Numerical Dissipation on Hurricane Rapid Intensification with Observational Heating. *Journal of Advances in Modeling Earth Systems (JAMES)*, 14, e2021MS002897
- **Hasan, M. B.**, Yu, M., Oates, T. (2025). Invariance-embedded Machine Learning Sub-grid-scale Stress Models for Meso-scale Hurricane Boundary Layer Flow Simulation: Model Development and a priori Studies. *arXiv:2504.14473* (Under Review).

LEADERSHIP & SERVICE

- **Treasurer, Bangladesh Student Association, UMBC (2019–2020)** — Managed association funds and coordinated social events in collaboration with UMBC Graduate Student Association.
- **Vice President, BUET Photographic Society (2017)** — Organized national-level photography exhibitions and inspired interdisciplinary student participation.