# Md Elius

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## EDUCATION

**University of California Berkeley** — Berkeley, CA
PhD in Civil and Environmental Engineering / GPA: 3.93 — Aug 2023 – Present
**University of Massachusetts Dartmouth** — North Dartmouth, MA
MSc in Mechanical Engineering / GPA: 3.97 — Aug 2021 – Aug 2023
**Bangladesh University of Engineering & Technology** — Dhaka, Bangladesh
BSc in Mechanical Engineering / GPA: 3.79 — Feb 2015– April 2019

## PEER-REVIEWED PUBLICATION

- **M. Elius**, P. Yang , H. Gamarro, F.K. Chow, Fixed Point Methane Monitoring for Landfill Emissions Detection (under-construction)
- **M. Elius** and Hangjian Ling, Effect of hologram plane position on particle tracking using digital holographic microscopy, in *Applied Optics*, vol. 61, pp. 9415-9422, 2022.s
- **M. Elius**, K. Boyle, W.S. Chang, P. H. Moisander, H. Ling, Comparison of 3D motion of bacteria with and without wall accumulation. *Physical Review E* 108 (1): 014409 (2023)
- **M. Elius**, S. Richard, K. Boyle, W.S. Chang, P. H. Moisander, H. Ling, Impact of gas bubbles on bacterial adhesion on super-hydrophobic surfaces. *Results in Surfaces and Interfaces* vol. 15, 100211(2024)

## CONFERENCE & PRESENTATIONS

- **Md Elius(Presenter)**, P. Yang , H. Gamarro, F.K. Chow, "Fixed Point Methane Monitoring for Landfill Emissions Detection" 10th Global Waste Management Symposium, February 22 – 25, 2026 at the Grand Hyatt Indian Wells Resort & Villa, CA(abstract accepted)
- **Md Elius(Presenter)**, Kenneth Boyle, Pia Moisander, Hangjian Ling "Study of 3D bacterial motion and biofilm formation by digital holographic microscopy" APS DFD 75$^{th}$ Annual Meeting November 20-22, 2022, Indianapolis, Indiana, USA
- **Md Elius**, Md. Mahmudul Hasan, and A. B. M. Toufique Hasan, "Underexpanded Supersonic Jet in Imposed Oscillating Condition", 16th Asian Congress of Fluid Mechanics (16ACFM), Bengaluru, India, 13-17 December 2019

## AWARD AND HONORS

- **Environmental Research & Education Foundation (EREF) PhD Scholar 2025:** Awarded EREF PhD Scholarship for research on landfill methane emissions
- **Dean's Scholarship** (awarded for GPA>3.75 in any year) for all four years of undergraduate study at BUET
- **University Technical Scholarship:** awarded consecutive eight terms based on merit position at BUET.

## SKILLS

**Artificial Intelligence & Data Science:** Supervised & Unsupervised Learning Algorithms; Deep Learning (CNN, PINN, Genetic Algorithms. TensorFlow); Model Performance Evaluation

**Programming & Computational Scripting:** Python (Data Science & Geospatial Libraries); MATLAB; Fortran; Bash/Linux Shell Scripting

**High-Performance & Cloud Computing:** HPC Job Scheduling & Workflow Management

**Computational Fluid Dynamics (CFD) & Finite Element Analysis (FEA):** WRF-Chem, 3D CAD Modeling (SolidWorks) & Simulation; Finite Element Analysis (FEA), ANSYS(FLUENT), COMSOL Multiphysics

**Collaboration & Research Tools:** Version Control (Git/GitHub); Scientific Computing Platforms; Office Productivity Suites

## WORK EXPERIENCE

**University of California, Berkeley — Graduate Student Researcher** — Berkeley, CA / Aug 2023 – Present

- Conducting 30 m-resolution Large Eddy Simulations (LES) using the WRF-Chem model to generate four-dimensional methane ($CH_4$) plume datasets over landfill sites, enabling detailed analysis of dispersion dynamics under complex atmospheric conditions.
- Developing a Python- and GIS-based toolkit (Xarray, SciPy, Rasterio, QGIS) for statistical comparison of WRF-Chem outputs with stationary, mobile, and remote-sensing $CH_4$ observations, supporting optimized sensor network design and identification of measurement biases.

## WORK EXPERIENCE

**University of Massachusetts Dartmouth — Research Assistant** North Dartmouth, MA / Aug 2021– Aug 2023

- Fabricated super-hydrophobic surfaces (SHS) (Materials: Al, PDMS) by sandblasting, chemical etching, soft-lithography, sprayed coating, etc.
- Performed the anti-biofouling test of various SHS samples in collaboration with biologists.
- Characterized SHS by using a Scanning Electron Microscope (SEM), water contact angle measurement, and total-internal reflection.
- Worked on Digital Holographic Microscopy (DHM) to track the 3D motion of bacteria and biofilm growth.

**Bangladesh University of Engineering & Technology — Research Assistant** Dhaka, BD / April 2018 – May 2019

- Developed a 2D computational model with shear stress transport (SST) and T-$\omega$ two equation model to predict the flow pattern of the shock-cell structure of a converging nozzle using ANSYS(Fluent) simulation software.
- Investigated the under-expanded supersonic jet behavior by determining the static pressure and axial velocity at different positions of nozzle exit by varying the inlet pressure while back pressure remained constant and analyzed the hysteresis behavior of the system.

## TEACHING EXPERIENCE

**University of California, Berkeley — Graduate Student Instructor (GSI)** Berkeley, CA / Fall 2025

- Leading weekly discussion sections reinforcing lecture material of Environmental Fluid Mechanics (Graduate level class)
- Holding office hours to support student learning and problem-solving
- Designing and grading quizzes to assess understanding

**University of California, Berkeley — Graduate Student Instructor (GSI)** Berkeley, CA / Spring 2024

- Led discussion classes and guided students in applying programming concepts (E7: Introduction to programming for scientists and engineers)
- Assisted in developing problem-solving exercises for course material

**Daffodil International University — Lecturer** Dhaka, Bangladesh / Jan 2021 – May 2021

- Delivered lectures on core mechanical engineering concepts
- Mentored students on projects and fostered critical thinking through interactive teaching

## KEY COURSES

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| UC Berkeley | STAT 243: Introduction to Statistical Computing, ME249: Machine Learning Tools for Modeling Energy Transport and Conversion Processed, ME260 A & B Advanced Fluid Mechanics & ME248: Experimental Method in Single and Multiphase Flow, CE200A(Fall 2024) & B: Environmental Flow Modeling, CE218A: Air Quality Engineering(Fall 2024), EPS 181: Atmosphere, Ocean and Climate Dynamics(Fall 2024), CE203: Surface Water Hydrology |
| UMassD | High-Performance Scientific Computing, Advanced Mechanics of Fluid, Numerical Methods, Continuum Mechanics, Convective Heat Transfer, Heat Transfer with Phase Change |
| BUET | Advanced Engineering Mathematics, Theory of Structure, Microfluidics, Aerodynamics, Mechanical Engineering Drawing, Refrigeration and Building Mechanical Systems, Undergraduate Level Fluid Mechanics, Heat Transfer, Thermodynamics, Numerical Analysis, and Engineering Mechanics Courses, Undergraduate Level Mathematics, Physics and Chemistry Courses |

## REFERENCES

1. Fotini (Tina) Katopodes Chow
   PhD Advisor
   Professor of Civil & Environmental Engineering
   University of California Berkeley
   Email: tinakc@berkeley.edu

2. Hangjian Ling
   MS Advisor
   Assistant Professor of Mechanical Engineering
   University of Massachusetts Dartmouth
   Email: hling1@umassd.edu