Sk Mashfiqur Rahman

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Summary of Qualifications

- 4+ years of interdisciplinary research experience in code development for computational studies and data-driven modeling.
- Excellent Python, FORTRAN and MATLAB coding skills. Experienced in using ANSYS-Fluent and COMSOL Multiphysics. Confident in learning new programming language or simulation software fast if needed.
- Experienced in data science and implementing Machine Learning and Artificial Neural Network algorithms.
- Hands on experience on using Fluidnatek LE-50 electrospinning unit, scanning electron microscopy (SEM), high-speed camera, and MCR 302 Rheometer.
- Capable of learning fast, efficient project management, and working under pressure or strict deadlines to deal with problems efficiently.

Education

NORTH CAROLINA STATE UNIVERSITY   Raleigh, NC, USA
Doctor of Philosophy (Ph.D.), Mechanical Engineering. CGPA: 4.00/4.00   **[2021 - Present]**
Dissertation: *Studying Electrospinning via CFD-DEM Modeling and Machine Learning.*

OKLAHOMA STATE UNIVERSITY   Stillwater, OK, USA
Master of Science, Mechanical and Aerospace Engineering.   [2017 - 2019]
Thesis: *Reduced Order Modeling of Geophysical Flows Using Physics-Based and*
Data-Driven Modeling Techniques.

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY   Dhaka, Bangladesh
Bachelor of Science, Mechanical Engineering.   [2011 - 2016]
Thesis: *Numerical Investigation of Conventional Shell-and-Tube Heat Exchanger*
with Segmental Baffles.

Work Experience

Graduate Research Assistant   [2021 - Present]
North Carolina State University - Porous Media and Multiphase Flow lab   Raleigh, NC, USA
The Nonwovens Institute   Raleigh, NC, USA
- Electrospinning Polyurethane fibers, developing models to simulate the spinning process and electrospun fiber mat generation.
- Incorporating modern tools, e.g., AI and ML, in guiding the electrospinning process.
- Simulating multi-needle electrospinning of fibers and particles and comparing the results with experiment for validation and design improvement.
- Improving accuracy of our electrospinning model through coupling with 3-D electrostatic field simulation.
- Mentored high school students with disabilities for Catalyst Summer Internship 2022 and 2023 to provide hands-on lab and research experience in STEM.
- Presented our research in the semi-annual Industrial Advisory Board (IAB) meeting of the Nonwovens Institute at NCSU in Fall 2021, Spring 2022, Fall 2022, Spring 2023, Fall 2023.

Research Assistant   [2021]
Rensselaer Polytechnic Institute   Troy, New York, USA
- Implementation of nonlinear kernel-based data analysis tools to analyze multivariate medical/biomedical application dataset.

Graduate Research Assistant [2017 - 2019]
Oklahoma State University – Computational Fluid Dynamics lab Stillwater, OK, USA

- Conducted research on developing DNS and LES simulation models for turbulent flows using Python and FORTRAN programming languages (NASA-EPSCoR funded project).
- Developed physics-based and data-driven (scientific machine learning) Reduced Order Models for geophysical flows. Performed parallelization of DNS and LES codes.
- Published our research findings in renowned and high impact factor peer-reviewed journals and presented our research on several conferences/symposiums.

Selected Publications (Full list of publications in Google Scholar)

- **Rahman, S. M.,** Gautam, S., Tafreshi, H. V., & Pourdeyhimi, B. (2024). The role of 3D electrostatic field in modeling the electrospinning process. *Journal of Applied Physics*, *135*(1). (**Featured Article**)
- **Rahman, S. Mashfiqur**, Tafreshi, H. V. & Pourdeyhimi, B. (2022). Physics-based deep neural network model to guide electrospinning polyurethane fibers. *Journal of Applied Polymer Science*, e53108.
- **Rahman**, **S. M.**, Pawar, S., San, O., Rasheed, A. & Iliescu, T. (2019). Nonintrusive reduced order modeling framework for quasigeostrophic turbulence. *Physical Review E*, *100*, 053306.
- Pawar, S., **Rahman**, **S. M.**, Vaddireddy, H., San, O., Rasheed, A. & Vedula, P. (2019). A deep learning enabler for nonintrusive reduced order modeling of fluid flows. *Physics of Fluids*, *31*(8), 085101. (**Featured Article**)
- **Rahman**, **S. M.**, Ahmed, S. E. & San, O. (2019). A dynamic closure modeling framework for model order reduction of geophysical flows. *Physics of Fluids*, *31*(4), 046602.

Trainings, Certifications, and Miscellaneous Activities

- Obtained Deep Learning Specialization online certification by deeplearning.ai and Coursera. [2020]
- Obtained Excel Skills for Business Specialization online certification by Coursera. [2020]
- Journal reviewer for Physics of Fluids (AIP Publishing). [2019-Present]
- Mentor of high school students with disabilities for Catalyst Summer Internship at NCSU. [2022, 2023]

Core Skills

- **Coding:** Python, FORTRAN, C++, MATLAB, Mathematica.
- **Simulation:** ANSYS-Fluent, COMSOL Multiphysics, OpenFoam.
- **Machine learning tools:** Keras, Tensorflow.
- **Word Processing and Presentation:** Latex, Microsoft Office
- **Engineering design:** Solidworks, AutoCAD.
- **Experimental equipment:** Fluidnatek LE-50 Electrospinning Unit, MCR 302 Rheometer, Porometer.
- **Analytical characterization instruments:** Scanning electron microscopy (SEM), High-speed camera.

Awards and Scholarships

- **First Place** in the Poster Presentation at NC State's Department of Mechanical and Aerospace Engineering Graduate Research Symposium. [2024]
- **Outstanding Doctoral Student of the year (2022-2023)** at NC State's Department of Mechanical and Aerospace Engineering. [2023]
- University technical scholarship by Department of Mechanical Engineering, BUET. [2011-2015]
- Bangladesh government merit-based scholarships in Secondary (SSC) and High School Certificates (HSC) examination. [2009-2011], [2011-2015]

Reference

Available upon request