Darsh K. Nathawani

Computational and Data-Enabled Sciences
University at Buffalo, Buffalo, NY 14260, USA

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EXPERIENCE

High-Performance Computing Instructor, University at Buffalo *January 2024 – Present*

- Teaching High-Performance Computing to graduate students in an in-person classroom setting.
- Guiding students to accelerate project-based learning through discussion and collaboration.
- Mentoring students by designing curriculum and creating resources.
- Preparing assignments and tests to facilitate learning.

Postdoctoral Research Associate, University at Buffalo *August 2023 – Present*

- Implementing a posteriori error estimation to optimize adaptive mesh refinement.
- Developing a computational model to simulate satellite droplet formation in a jet breakup.
- Investigating fixed-mesh approaches for free surface flows using Basilisk and OpenFOAM.

Graduate Researcher, University at Buffalo *June 2019 – May 2023*

Research Engineering Laboratory for Advanced Computational Science (RELACS)
Center for Hybrid Rocket Exascale Simulation Technology (CHREST)

- Constructed a mathematical model for droplet formation with an accurate curvature.
- Developed a numerical model using finite elements to simulate droplet pinch-off.
- Expanded the mathematical model for shear-induced atomization.
- Developed a computational model using the PETSc toolkit for numerical simulations.
- Contributed to the annual reports for PSAAP-III CHREST center.
- Collaborated with multiple labs involved in the CHREST center.
- Contributed to a grant proposal writing and preparation.
- Mentored undergraduate and graduate students.

EDUCATION

University at Buffalo *Buffalo, NY, USA*

PhD, Computational and Data-enabled Sciences *2019-2023*
Advisor: Dr. Matthew Knepley

University at Buffalo *Buffalo, NY, USA*

MS, Mechanical Engineering *2017-2019*
Advisor: Dr. Francine Battaglia

Gujarat Technological University *Ahmedabad, GJ, India*

BE, Mechanical Engineering *2013-2017*

PUBLICATIONS

- G. Georgalis, **D. Nathawani**, M. Knepley, and A. Patra. "Uncertainty Quantification of Shear-induced Paraffin Droplet Pinch-off in Hybrid Rocket Motors". In: *AIAA SCITECH 2024 Forum*. 2024, p. 1021.
- **D. K. Nathawani**. "Droplet Formation: One-Dimensional Mathematical Model and Computations". PhD thesis. State University of New York at Buffalo, 2023.
- **D. K. Nathawani** and M. Knepley. "A one-dimensional mathematical model for shear-induced droplet formation in co-flowing fluids". In: *arXiv preprint arXiv:2307.01308* (2023).
- **D. K. Nathawani** and M. G. Knepley. "Simulating paraffin wax droplets using mixed finite element method". In: *International Conference on Computational Fluid Dynamics (ICCFD 11)*. 2022.
- **D. K. Nathawani** and M. G. Knepley. "Droplet formation simulation using mixed finite elements". In: *Physics of Fluids* 34.6 (2022), p. 064105. DOI: 10.1063/5.0089752.
- V. Joshi, **D. K. Nathawani**, and F. Battaglia. "Impact of a diffuser on solar chimney power plant output". In: *ASTFE Digital Library*. Begel House Inc. 2021.
- **D. K. Nathawani**. "Computational Analysis and Design Exploration of Solar Updraft Towers". MS Thesis. State University of New York at Buffalo, 2019.

REVIEWER

- International Journal of Fluid Mechanics & Thermal Sciences
- SIAM Journal on Scientific Computing

NEWSLETTER ARTICLES

- "Dynamics of Droplet Formation and Pinch-off with a One-dimensional Mathematical Model", SIAM News, August 29, 2023. [Read here]

CONFERENCES PRESENTATIONS

- APS March Meeting, Las Vegas, USA, March 2023.
- SIAM CSE conference, Amsterdam, Netherlands, February 2023.
- International Conference on CFD, Maui, Hawaii, July 2022.
- Parallel CFD Conference, Alba, Italy, May 2022.
- PSAAP III - AST Review, University at Buffalo, Buffalo, NY, October 2022. (Poster presentation)
- UB SIAM Applied Math Workshop, Buffalo, NY, April 2022.
- IAD Days, University at Buffalo, Buffalo, NY, [April 2023, April 2022].

WORKSHOPS

- SIAM Graduate Student Mathematical Modeling Camp (GSMMC), 2022. [Report]
- SIAM Mathematical Problems in Industry (MPI) Workshop, 2022. [Report]

AWARDS

- Student Travel Awards for the SIAM Conference on Computational Science and Engineering 2023.
- University at Buffalo CSE Best Graduate Student Research award for 2022-2023.