

SOURAV DUTTA

Research Associate ◇ The University of Texas at Austin, Oden Institute
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EXPERIENCE

The University of Texas at Austin

October 2022 -

Research Associate

Computational Hydraulics Group

[Oden Institute for Computational Engineering & Sciences](#)

US Army Engineer Research & Development Center

September 2017 - 2022

ORISE Postdoctoral Fellow

Hydrologic Systems Branch

Coastal & Hydraulics Laboratory

EDUCATION

Texas A&M University, College Station

August 2010 - 2017

PhD in Mathematics

GPA: 3.89/4.0

Department of Mathematics

Adviser: [Dr. Prabir Daripa](#)

Indian Institute of Technology, Kharagpur

July 2005 - 2010

Integrated B.Sc. & M.Sc. in Mathematics & Computing

GPA: 7.9/10

Department of Mathematics

Adviser: [Dr. G.P. Raja Sekhar](#)

PUBLICATIONS/PREPRINTS

- S. Cai, S. Dutta, M. Loveland, E. Valseeth, P. Rivera-Casillas, C. Trahan, C. Dawson, “Operator learning for surrogate modeling of wave-induced forces from sea surface waves,” (Under Review) *Ocean Engineering*. [Preprint](#)
- Y. Zhang, C. Wichitrunthed, S. Cai, S. Dutta, K. Mandli, C. Dawson, “Learning the exact flux: Neural Riemann solvers with hard constraints,” (Under Review) *Journal of Computational Physics*. [Preprint](#)
- B. Hansen, T. Hall, S. Dutta, P. Rivera-Casillas, N.R. Pradhan, M.W. Farthing, “A Random Forest Regression workflow for groundwater level forecasting”, *ERDC TN*, (In Press).
- P. Rivera-Casillas, S. Dutta, S. Cai, M. Loveland, K. Nath, K. Shukla, C. Trahan, J.H. Lee, M.W. Farthing, C. Dawson, “A neural operator-based emulator for regional shallow water dynamics,” (In Press) *Journal of Geophysical Research: Machine Learning and Computation*, 3, e2025JH000697 (2026). [Article](#)
- O. Cecil, N. Cohn, M.W. Farthing, S. Dutta, A. Trautz, “Examination of analytical shear stress predictions for coastal dune evolution,” *Earth Surface Dynamics*, 13, 1-22 (2025). [Article](#)
- S. Dutta, A. Wagner, T. Hall, N.R. Pradhan, “Data-driven modeling of groundwater level using machine learning”, *ERDC TN-24-3*, (2024). [Article](#)
- A. Collins, P. Rivera-Casillas, S. Dutta, O.Cecil, A. Trautz, M.W. Farthing, “Super-resolution and uncertainty estimation from sparse sensors of dynamical physical systems,” *Frontiers in Water*, 5 (2023) 1137110. [Article](#)
- S. Dutta, P. Rivera-Casillas, B. Styles, M.W. Farthing, “Reduced order modeling using advection-aware autoencoders,” *Mathematical and Computational Applications*, 27 (2022) 34. [Article](#)

- S. Dutta, P. Rivera-Casillas, O. M. Cecil, M.W. Farthing, “pyNIRDM - A suite of python modules for non-intrusive reduced order modeling of time-dependent problems”, *Software Impacts*, 10 (2021) 100129. [Article](#)
- S. Dutta, M.W. Farthing, E. Perracchione, G. Savant, M. Putti, “A greedy non-intrusive reduced order model for shallow water equations”, *Journal of Computational Physics*, 439 (2021) 110378. [Article](#)
- S. Dutta, P. Rivera-Casillas, O. M. Cecil, M.W. Farthing, E. Perracchione, M. Putti, “Data-driven reduced order modeling of environmental hydrodynamics using deep autoencoders and neural ODEs,” *Proceedings of the IXth International Conference on Computational Methods for Coupled Problems in Science and Engineering (COUPLED PROBLEMS 2021)*, 2021. [Article](#)
- S. Dutta, P. Rivera-Casillas, M.W. Farthing, “Neural ordinary differential equations for data-driven reduced order modeling of environmental hydrodynamics,” *Proceedings of the AAAI 2021 Spring Symposium on Combining AI and ML with Physical Sciences*, 2021. [Article](#)
- S. Dutta, M.W. Farthing, G. Savant, “Model order reduction of parametric and time-dependent partial differential equations in computational fluid dynamics”, *ERDC Technical Report*, (2020)
- P. Daripa, S. Dutta, “On the convergence analysis of a hybrid numerical method for multicomponent transport in porous media”, *Applied Numerical Mathematics*, 146 (2019) 199-220. [Article](#)
- P. Daripa, S. Dutta, “Modeling and simulation of surfactant-polymer flooding using a new hybrid method”, *Journal of Computational Physics*, 335 (2017) 249-282. [Article](#)
- J.C. Chrispell, M.W. Farthing, K.R. Fowler, S.E. Howington, E. W. Jenkins, S. Dutta, B. Ji, “Optimization of a managed aquifer recharge network”, *Proceedings of the 2014 SC Water Resources Conference*, Columbia Metropolitan Convention Center, October 2014. [Preprint](#)

RECENT TALKS

- “Neural operators for emulating surface flows in computational hydrology”, [HydroML 2026](#) (Austin, May 2026)
- “Operator learning for multiphysics coastal hydrodynamics”, [SIAM GS 2025](#) (Baton Rouge, September 2025)
- “Operator learning for shallow water hydrodynamics”, [USNCCM 2025](#) (Chicago, July 2025)
- “A novel data-driven, physics-guided neural emulator for predicting coastal hydrodynamics”, [SIAM CSE 2025](#) (Fort Worth, March 2025)
- “Machine learning methods for modeling groundwater level changes using hydro-meteorological data”, [AGU 2024](#) (Washington D.C., December 2024)
- “Deep neural operators for surrogate modeling of multi-physics environmental flow”, [geoENV 2024](#) (Chania, June 2024)
- “Data-driven modeling of multi-physics coastal hydrodynamics using a deep neural operator framework”, [ECCOMAS 2024](#) (Lisbon, June 2024)
- “Data-driven reduced order modeling for applications in computational science and hydrology”, ERDC Computational Physics and Simulation Workshop 2023 (Vicksburg, November 2023)
- “Deep learning methods for modeling advection-dominated and multi-physics environmental hydrodynamics”, ERDC AI/ML Workshop 2023 (Vicksburg, November 2023)
- “Learning coastal hydrodynamics using a deep neural operator framework”, [MMLDE-CSET 2023](#) (El Paso, September 2023)
- “Deep learning methods for reduced order modeling of advection-dominated problems”, [SIAM Annual Meeting 2022](#) (Pittsburgh, July 2022)

- “Physics-aware machine learning model for predicting coastal hydrodynamics”, [SIAM Annual Meeting 2022](#) (Pittsburgh, July 2022)
- “Deep learning methods for reduced order modeling of convection-dominated environmental hydrodynamics”, [CMWR 2022](#) (Virtual, June 2022)
- “Data-driven reduced order modeling for applications in computational hydrology”, Applied Math Seminar, Missouri State University (Virtual, March 2022)
- “Data-driven reduced order modeling for applications in computational hydrology”, Applied Math Seminar, Texas A&M University-Corpus Christi (Virtual, February 2022)
- “Data-driven reduced order modeling for applications in computational hydrology”, Non-linear Mechanics Seminar, University of Texas at Rio Grande Valley (Virtual, November 2021)
- “Non-intrusive reduced order modeling for simulation of ship dynamics in complex environments”, [Mechanistic Machine Learning & Digital Twins 2021](#) (Hybrid, September 2021)
- “Data-driven reduced order modeling of environmental hydrodynamics”, [Dolomites Workshop on Constructive Approximations and Applications 2021](#) (Virtual, September 2021)
- “Data-driven reduced order modeling of environmental hydrodynamics using deep autoencoders and neural ODEs”, [Coupled Problems 2021](#) (Virtual, June 2021)
- “Kernel-based approximation methods for reduced order modeling applications in hydrology”, [OSNA² 2021](#) (Virtual, April 2021)
- “Neural ordinary differential equations for data-driven reduced order modeling of environmental hydrodynamics”, [AAAI MLPS 2021](#) (Virtual, March 2021)
- “Non-intrusive reduced order models for applications in hydrology”, [SIAM CSE 2021](#) (Virtual, March 2021)
- “Data-driven approaches for reduced order modeling of shallow water equations”, [CMWR 2020](#) (Virtual, December 2020)
- “Data-driven approaches for reduced order modeling of free surface flows”, ERDC RD20 Symposium (Virtual, October 2020)
- “Data-driven reduced order modeling in hydrology”, ERDC Data Science Workshop 2020 (Virtual, August 2020)
- “Computational models for coastal and hydraulic applications in the U.S. Army Corps of Engineers”, Applied Math Seminar, United States Naval Academy (Annapolis, January 2020)
- “An optimal RBF-kernel based non-intrusive reduced order model for the shallow water equations”, [ICIAM 2019](#) (Valencia, July 2019)
- “An Efficient Non-intrusive Reduced Order Model for Approximation of Shallow Water Flows”, [Coupled Problems 2019](#) (Sitges, June 2019)
- “An Efficient Non-intrusive Reduced Order Model for Approximation of Shallow Water Flows”, [SIAM Geosciences Meeting 2019](#) (Houston, March 2019)
- “Reduced Order Modeling for Coastal and Hydraulic Applications in the Corps of Engineers”, [Industrial and Applied Math Seminar](#) (Texas A&M, November 2018)
- “Effective model reduction for shallow water flows”, [7th European Conference on Fluid Dynamics](#) (Glasgow, Scotland, June 2018)
- “Comparison of intrusive and non-intrusive projection-based model reduction for approximation of free surface flows”, [Computational Methods in Water Resources XXII](#) (Saint-Malo, France, June 2018)

AWARDS AND HONORS

L.F. Guseman Award, Texas A&M University, 2017. Given each spring semester to a graduate student in math with high scholastic achievement and who has demonstrated outstanding performance in teaching, research or service.

OGAPS Graduate Research and Presentation Travel Award, Texas A&M University, 2017.

Student Travel Award, SIAM Annual Meeting, 2016 & 2017.

Awarded 2nd place for Oral Presentation in “Math, Statistics and Computer Science” subject category at the [Student Research Week](#), 2016, Texas A&M University.

Selected for the SAMSI Industrial Math/Stat Modeling Workshop, June 2013.

Research Assistant, Fall 2010 - Spring 2011, Qatar National Research Foundation (QNRF).

Regent’s Fellowship, Fall 2010, Texas A&M University.

Full scholarship to study with [Dr. Michael Böhm](#) at Zentrum für Technomathematik, Universität Bremen during Summer 2009.

Regional Mathematics Olympiad, Eastern India, 2003.

TEACHING EXPERIENCE

Instructor of Record

- **MATH 166** – *Topics in Contemporary Math II*. *Fall 2015*
Class-size: 63 students.
Course Webpage: <http://www.math.tamu.edu/~sdutta/math166/m166f2015.html>
Responsibilities included preparing and delivering lectures, writing assessments (exams, quizzes etc.) and managing a grader. Earned excellent student evaluations.

Teaching Assistant

- *Recitations & Lab sessions:*
 - MATH 151** – *Engineering Mathematics I* *Fall 2011, Spring 2014*
 - MATH 152** – *Engineering Mathematics II* *Spring 2015*Responsibilities included conducting recitations, writing and grading weekly quizzes, grading exams and MATLAB assignments.
- *Lab sessions:*
 - MATH 417** – *Numerical Analysis I* *Spring 2012*Responsibilities included preparing and grading lab assignments and grading home assignments.
- *Grading: (Undergraduate – U, Graduate – G)*
 - MATH 311(U)** – *Matrix Algebra and Vector Analysis* *Summer I 2012*
 - MATH 641(G)** – *Analysis of Applications I* *Fall 2012*
 - MATH 602(G)** – *Methods and Applications of Partial Differential Equations* *Summer II 2013*
 - MATH 141(U)** – *Business Mathematics I* *Summer I 2014*
 - MATH 412(U)** – *Theory of Partial Differential Equations* *Fall 2014*
 - MATH 601(G)** – *Methods of Applied Mathematics I* *Summer I 2015, Summer I 2016*
 - MATH 401(U)** – *Advanced Engineering Mathematics* *Spring 2016*
 - MATH 617(G)** – *Theory of Functions of a Complex Variable I* *Fall 2016*
- *Help Sessions:*
 - MATH 308** – *Differential Equations* *Summer II 2012, Summer I 2013*

Mentoring

Summer 2014

- Led a preparatory course for graduate students appearing in the Complex Analysis Qualifying Exam.

PROFESSIONAL EXPERIENCE

Reviewer

- Computational Geosciences, Journal of Applied Water Engineering & Research, Dolomites Research Notes on Approximation, IEEE Transactions on Neural Networks and Information Systems, Proceedings of the AAAI MLPS 2021 Symposium.

Co-organizer, *Minisymposium*

- *SIAM GS 2025*: Three sessions on “2D-3D Multiphysics in Hydrological Modeling” with Dr. Elena Bachini, Dr. Marco Berardi, Dr. Matthew Farthing, Dr. Mark Loveland, and Dr. Mario Putti.
- *USNCCM 2025*: Two sessions on “Scientific Machine Learning Methods for Complex Dynamical Systems” with Dr. Matthew Farthing and Dr. Clint Dawson.
- *ECCOMAS 2024*: Two sessions on “Recent Advances in Data-Driven Modeling and Uncertainty Quantification of Complex Dynamical Systems” with Dr. Matthew Farthing.
- *SIAM CSE 2023*: Two sessions on “High-Fidelity and Data-Driven Methods for Multiscale and Multi-Physics Problems” with Dr. Matthew Farthing and Dr. Clint Dawson.
- *SIAM MDS 2022*: Two sessions on “Machine Learning and Data-Driven Methods for Forward and Inverse Problems” with Dr. Dhruv Patel and Dr. Matthew Farthing.
- *SIAM CSE 2021*: Two sessions on “Physics-Guided Machine Learning and Data-Driven Methods in Computational Geoscience” with Dr. Matthew Farthing and Dr. Jonghyun Lee.
- *SIAM Geosciences 2013*: Three sessions on “Theory and Computation of Porous Media Flows” with Dr. Prabir Daripa.

Co-organizer, *Texas A&M University*

Spring 2016

- Initiated and co-organized the **Industrial and Applied Math Seminar** with Dr. Peter Howard.
- Co-organized a **workshop** on “[Scientific Computing with MATLAB at Texas A&M](#)” (April 25, 2016) to mark the maiden visit of Dr. Cleve Moler (Founder of MathWorks) to Texas A&M.

Panelist, *Texas A&M University*

Fall '14, '15 & Summer '15

- Discussion on *PhD Qualifying Exams* in the First Year Graduate Student Seminar.
- Discussion on *Applying for Grad School* in the Summer REU program.

LEADERSHIP/EXTRA CURRICULAR

- **President & Founding Member:** [TAMU Student Chapter of SIAM](#) ['15]
Organized social and professional development events, and research seminars. Organized a campus tour, a workshop and a public lecture to commemorate Dr. Cleve Moler's visit to Texas A&M. Authored an [article](#) in SIAM News. Awarded the SIAM Student Chapter **Certificate of Recognition**.
- **Department Delegate:** Graduate and Professional Student Council (GPSC) ['14, '15, '16]
- **Programming Committee & Outreach Committee** : GPSC ['14, '16]
- **Counselor:** Grad Camp ['15] - Sole representative of the College of Science in the organizing team.
- Volunteer: **Big Event** (*Largest one day community service project in USA*) ['12, '13]
- Volunteer: “[Pi-Day of the Century](#)” event ['15] - Judge of the Pi digit memorization contest and also coordinated with a team of volunteers to make the event a success.

COMPUTER SKILLS

Programming Languages	Python, MATLAB, C
Software & Tools	AdH, OpenFOAM, pyMOR, GMSH, Docker, LaTeX, Office