Madison Sheridan

Curriculum Vitae

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Research Interests

Numerical methods for PDEs, Hyperbolic systems of conservation laws, Computational fluid dynamics, Compressible Euler equations, Lagrangian hydrodynamics.

Education

2019–2025 **PhD, Mathematics**, *Texas A&M University*, College Station, TX.

2015 - 2019 **Bachelors of Science, Mathematics (Computer Science minor)**, *Brigham Young University – Idaho*, Rexburg, ID.

Experience

2019–2025 **Graduate Teaching/Research Assistant**, *Texas A&M University*, College Station, TX.
Advisor: Jean-Luc Guermond

- Invariant-Domain-Preserving and Exactly Conservative Approximation of the Lagrangian Hydrodynamics Equations

2024 **Instructor of Record**, *Texas A&M University*, College Station, TX.

- Mathematics for Business and Social Sciences

2022 - 2023 **Graduate Student Intern**, *Lawrence Livermore National Laboratory*, Livermore, CA.
Mentor: Vladimir Tomov

- Implemented a first order invariant domain preserving lagrangian finite element method
- Implemented a first order invariant domain preserving robust finite element method

2019 - 2022 **Graduate Student Intern**, *Nevada National Security Site*, North Las Vegas, NV.
Mentors: Cleat Zeiler, Marylesa Howard, Daniel Champion, Jesse Adams

- Created Deep Learning model to reconstruct clipped seismic waveforms
- Developed a multilateration program utilizing a surface geophone array to geolocate a seismic signal source

Publications

2025 Guermond, J.-L., Popov, B., Saavedra, L., Sheridan, M., "Invariant-domain-preserving and locally mass conservative approximation of the Lagrangian hydrodynamics equations"

2021 Zeiler, C., McLin, K., Champion, D., Scalise, Michelle., Sheridan, M., White, R., Jensen, R., Smith, K., Plank, G., "The Monte Cristo Range Mw 6.5 Nodal Geophone Rapid Deployment"

Talks

2024 Invariant-Domain-Preserving and Exactly Conservative Approximation of the Lagrangian Hydrodynamics Equations, 7th Annual Meeting of the SIAM Texas-Louisiana Section, Baylor University, Waco, TX, USA. October 2024.

2024 Invariant-Domain-Preserving and Exactly Conservative Approximation of the Lagrangian Hydrodynamics Equations, Second annual RTG NASC Annual Workshop, Rice University, Houston, TX, USA. October 2024.

2023 Invariant-Domain-Preserving and Exactly Conservative Approximation of the Lagrangian Hydrodynamics Equations, 6th Annual Meeting of the SIAM Texas-Louisiana Section, University of Louisiana at Lafayette, Lafayette, LA, USA. November 2023.

2023 A Brief Introduction to Finite Element Methods, Applied Mathematics Undergraduate SEminar (AMUSE), Texas A&M University, College Station, TX, USA. October 2023.

2023 Invariant-Domain-Preserving and Exactly Conservative Approximation of the Lagrangian Hydrodynamics Equations, Intern Final Presentations, Livermore, CA, USA. August 2023.

2023 Invariant-Domain-Preserving and Exactly Conservative Approximation of the Lagrangian Hydrodynamics Equations, 17th U. S. National Congress on Computational Mechanics, Albuquerque, NM, USA. July 2023.

2023 Invariant-Domain-Preserving and Exactly Conservative Approximation of the Lagrangian Hydrodynamics Equations, Finite Element Rodeo, Texas A&M University, College Station, TX, USA. March 2023.

2023 Invariant-Domain-Preserving and Exactly Conservative Approximation of the Lagrangian Hydrodynamics Equations, SIAM Conference on Computational Science and Engineering (CSE23), Amsterdam, The Netherlands. February 2023.

2022 Invariant Domains and a First-Order Continuous Finite Element Approximation, Intern Final Presentations, Livermore, CA, USA. August 2022.

2021 Invariant Domain Preserving IMEX Methods, SIAM TX-LA Meeting, University of Texas Rio Grande Valley, South Padre Island, TX, USA. November 2021.

Posters

2023 Invariant-Domain-Preserving and Exactly Conservative Approximation of the Lagrangian Hydrodynamics Equations, Intern Poster Presentations, Livermore, CA, USA. August 2023.

2023 Invariant-Domain-Preserving and Exactly Conservative Approximation of the Lagrangian Hydrodynamics Equations, 7th KUMUNU-ISU Conference in PDE, Dynamical Systems and Applications, Iowa State University, Aimes, IA, USA. April 2023.

2019 Seismic Clipped Waveform Reconstruction and Noise Attenuation Using Deep Learning, American Geophysical Union Fall Meeting, San Francisco, CA, USA. December 2019.

Leadership

2023 **Organizer**, *Mini-symposia on "Invariant-Domain Preserving Hydrodynamics: From Euler to Navier-Stokes"*, 17th U. S. National Congress on Computational Mechanics, July 2023.

2022 **Organizer**, *Mini-symposia on "High Order Methods for Computational Hydrodynamics"*, 5th Annual Meeting of the SIAM Texas-Louisiana Section (TXLA22), November 2022.

2019-present **President, Vice President, Treasurer**, *Society for Industrial and Applied Math Graduate Student Chapter, Texas A&M University*.

Outreach/Mentorship

2024 **Mentor**, Advised an undergraduate research project on nonlinear elasticity for the Modeling and Simulation with PDEs summer school, Texas A&M University

2023 **Volunteer**, Mathematics and Statistics Fair, Texas A&M University

2022 **Mentor**, Advised an undergraduate research project studying chemotaxis for the Directed Reading Program, Texas A&M University

2021-2022 **GED Prep Instructor**, B/CS Community Education Center, Bryan, TX

2019 **Proctor**, High School Math Contest, Texas A&M University

2011 **Eagle Scout**, El Dorado Hills, CA.

Membership

American Mathematical Society (AMS)

Society for Industrial and Applied Mathematics (SIAM)

Computer Languages

Proficient in: C++, Python, LaTex, Git, Lisp, Mathematica

Knowledgeable in: Java, JavaScript, Fortran2003, Matlab

Languages

English Native Language

Portuguese Intermediate Listener, Intermediate Speaker, Advanced Reader, Novice Writer