

MADISON SHERIDAN

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SUMMARY

Ph.D. in Mathematics with strong expertise in computational physics, high-performance computing, and the design of robust finite element algorithms for Lagrangian hydrodynamics. Adept at implementing and optimizing large-scale simulation codes in C++ and Python for multiphysics applications. Experienced collaborator and communicator with a background in teaching, mentoring, and delivering technical presentations. Open to full-time opportunities beginning January 2026.

EDUCATION

Ph.D., Mathematics, Texas A&M University, College Station, TX Aug 2019 - Dec 2025
Thesis: A Robust Lagrangian Framework for Compressible Flow & Hyperelasticity
Emphasis: Finite Element Methods, Computation Fluid Dynamics, Partial Differential Equations

Bachelor of Science, Mathematics (Computer Science minor), Jan 2015 - Apr 2019
Brigham Young University - Idaho, Rexburg, ID

EXPERIENCE

Graduate Teaching/Research Assistant Aug 2019 - Dec 2025
Texas A&M University *College Station, TX*

- Developed a Lagrangian finite element method, achieving high-order accuracy while preserving essential physical invariants and ensuring robustness in challenging flow regimes.
- Conducted verification and validation studies by comparing simulation outputs against analytical solutions and standard hydrodynamics benchmarks, confirming correctness and numerical stability.
- Instructor of Record for Math 140 (Math for Business and Social Sciences) for 15 students, delivering 7.5 hours of weekly instruction, designing assignments and exams, and evaluating student performance across assessments.

Graduate Student Intern May 2022 - Sep 2023
Lawrence Livermore National Laboratory *Livermore, CA*

- Augmented high-order Lagrangian hydrodynamics codes in C++ with an invariant-domain preserving Lagrangian finite element method, ensuring physics-consistent robustness validated with benchmark tests.
- Modified an existing discontinuous Galerkin advection solver to a continuous finite element discretization, enhancing code capabilities and enabling broader benchmarking.

Graduate Student Intern May 2019 - Apr 2022
Nevada National Security Site *North Las Vegas, NV*

- Developed and trained deep learning models in Python/TensorFlow to reconstruct clipped seismic waveforms, improving signal fidelity and enabling more accurate seismic event detection.
- Designed a Python-based multilateration algorithm using geophone array data to geolocate seismic signal sources with improved accuracy, promoting rapid deployment for field missions.

SKILLS

Programming & Tools: Python, C++, MATLAB, Git, CMake, MPI/OpenMP, Linux/Unix, Docker, LaTeX
Modeling & Simulation: High-Performance Computing (HPC), Finite Element Methods (FEM), Partial Differential Equations (PDE), Numerical Linear Algebra, Compressible Fluid Dynamics, Algorithm Development, Scientific Computing, Validation & Verification, Fusion 360 (CAD)
Data & Analysis: Statistical Analysis, Modeling, ParaView, GLVis, Excel
Communication: Technical Writing, Teaching, Public Speaking, PowerPoint, Word

PUBLICATIONS

Guermond, J.-L., Popov, B., Saavedra, L., Sheridan, M., "Invariant-domain-preserving and locally mass conservative approximation of the Lagrangian hydrodynamics equations," **Computer Methods in Applied Mechanics and Engineering**, 2025

PRESENTATIONS

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

- LANL Center for Nonlinear Studies Seminar Series, Los Alamos, NM. Sep 2025.
- 7th Annual Meeting of the SIAM Texas-Louisiana Section, Baylor University, Waco, TX. Oct 2024.
- Second annual RTG NASC Annual Workshop, Rice University, Houston, TX. Oct 2024.
- 6th Annual Meeting of the SIAM Texas-Louisiana Section, University of Louisiana at Lafayette, Lafayette, LA. Nov 2023.
- Intern Final Presentations, Livermore, CA. Aug 2023.
- 17th U. S. National Congress on Computational Mechanics, Albuquerque, NM. Jul 2023.
- Finite Element Rodeo, Texas A&M University, College Station, TX. Mar 2023.
- SIAM Conference on Computational Science and Engineering (CSE23), Amsterdam, The Netherlands. Feb 2023.

A Brief Introduction to Finite Element Methods

- Applied Mathematics Undergraduate Seminar (AMUSE), Texas A&M University, College Station, TX. Oct 2023.

VOLUNTEER EXPERIENCE

Undergraduate Research Advisor

Texas A&M University College Station, TX

- Guided an undergraduate research project on nonlinear elasticity for the Modeling and Simulation with PDEs summer school, directing problem formulation, implementation, and presentation of results (2024).
- Supervised an undergraduate research project on chemotaxis for the Directed Reading Program, providing one-on-one instruction, feedback, and research direction, culminating in an end of the semester presentation (2022).

Miscellaneous Volunteer

- Mathematics and Statistics Fair, Texas A&M University. Jan 2023
- **GED Prep Instructor**, B/CS Community Education Center, Bryan, TX. Jan 2021 - Jan 2022
- **Proctor**, High School Math Contest, Texas A&M University. Oct 2019

Eagle Scout

Apr 2012

LEADERSHIP

Mini-symposium Organizer

2022 - 2023

- Organized and chaired technical sessions at major computational mechanics conferences.

President, Vice President, and Treasurer

2019 - 2024

SIAM Graduate Student Chapter, Texas A&M University

- Led chapter operations, organized seminars and student engagement events, and managed budgeting and funding activities.

LANGUAGES

English

Native Language

Portuguese

Intermediate Listener, Intermediate Speaker, Advanced Reader, Novice Writer