MADISON SHERIDAN

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SUMMARY

Ph.D. in Mathematics with strong background in **rigid body dynamics, finite element modeling, and structural analysis**. Experienced in developing **physics-based simulation frameworks** and performing **validation and correlation studies** using test data. Skilled in **Python, MATLAB, and C++** for modeling, automation, and data reduction. Adept at analyzing mechanical systems under transient loading, impact, and separation events. U.S. citizen seeking to contribute to structural dynamics and multi-body simulation efforts for advanced space systems.

EXPERIENCE

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

- Developed and implemented **finite element formulations** for Lagrangian mechanics and nonlinear dynamics in C++ and Python, applied to compressible flow and solid deformation.
- Modeled multi-body systems using **continuum mechanics and rigid body frameworks**, verifying conservation laws and motion coupling.
- Conducted **validation studies and data correlation** between computational and benchmark test cases to ensure physical accuracy.
- Created automated **post-processing and data reduction scripts** in Python and MATLAB to evaluate stress, strain, and displacement fields.
- Presented dynamic modeling results and verification findings to technical teams and conference audiences.

Graduate Student Intern - Computational Dynamics May 2022 - Sep 2023
Lawrence Livermore National Laboratory *Livermore, CA*
Mentor: Vladimir Tomov

- Contributed to the development of **Lagrangian dynamic solvers** for multi-physics simulations, emphasizing accuracy and stability of time integration.
- Collaborated with engineers to improve **mechanical response prediction under dynamic loads**, including impact and material deformation scenarios.
- Designed **automated testing workflows** to verify dynamic consistency and correlate results against analytic solutions and test data.
- Performed numerical analysis of **mesh motion and contact interactions**, supporting dynamic response studies relevant to spacecraft design.

Graduate Student Intern - Signal & Vibration Analysis May 2019 - Apr 2022
Nevada National Security Site *North Las Vegas, NV*
Mentors: Cleat Zeiler, Marylesa Howard, Daniel Champion

- Developed **Python-based vibration analysis tools** to identify, reconstruct, and filter high-frequency dynamic responses in sensor data.
- Implemented **time-series processing algorithms** for transient waveform reconstruction and dynamic event detection.
- Validated computational predictions with experimental datasets, improving system identification accuracy.

EDUCATION

PhD, Mathematics, Texas A&M University, College Station, TX — Aug 2019 - Dec 2025
Thesis: A Robust Lagrangian Framework for Compressible Flow & Hyperelasticity
Emphasis: Finite Element Analysis, Systems Verification, Computation Fluid Dynamics, Partial Differential Equations

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

SKILLS

- **Modeling & Simulation:** Multi-Body Dynamics (MBD), Rigid/Flexible Body Modeling, Structural Dynamics, Finite Element Methods, Nonlinear Mechanics
- **Software & Tools:** MATLAB, Python, C++, MSC Adams, Abaqus, LS-Dyna, Nastran, CREO, Mathcad
- **Analysis:** Modal, Vibration, Shock, Impact, Acoustic, and Separation Dynamics Testing
- **Programming:** Python, MATLAB, C++, Git/GitLab, CMake, Linux/Unix
- **Validation:** Test Correlation, Data Reduction, Post-Processing, Dynamic Load Evaluation

OUTREACH & SERVICE

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, supporting 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)

Volunteer

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

Eagle Scout — Apr 2012

LEADERSHIP

Organizer — Jul 2023
Mini-symposium on "Invariant-Domain Preserving Hydrodynamics: From Euler to Navier-Stokes"
17th U.S. National Congress on Computational Mechanics, Albuquerque, NM, USA

Organizer — Nov 2022
Mini-symposium on "High Order Methods for Computational Hydrodynamics"
5th Annual Meeting of the SIAM Texas-Louisiana Section, Houston, TX, USA

President, Vice President, Treasurer — 2019 – 2024
Society for Industrial and Applied Mathematics (SIAM) Graduate Student Chapter, Texas A&M University

LANGUAGES

English — Native Language
Portuguese — Intermediate Listener, Intermediate Speaker, Advanced Reader, Novice Writer