# Seth Gerberding

Mathematics Ph.D. Student

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## Education

**Texas A&M University** — *College Station, TX*

Ph.D. in Mathematics: Advised by Dr. Jean-Luc Guermond — *August 2026 (Anticipated)*

**University of South Dakota** — *Vermillion, SD*

Bachelor of Science in Mathematics and Philosophy, *Summa Cum Laude* — *May 2020*

Honors Program University Scholar, Pi Mu Epsilon

## Research Experience

**Graduate Research Assistant (Mentors: Jeff Peterson & Jim Ferguson)** — *Los Alamos, NM*

Los Alamos National Laboratory (LANL) — *October 2023- Present*

- Developed verification methods for simulations using an arbitrary equation of state.
- Implemented a python program that computes a semi-analytic solution that is agnostic to the equation of state; code was integrated into the *ExactPack* software library.
- Applied the method to verify the *singularity-eos* equation of state library developed by LANL.
- Results were complied in a technical report and published in a peer-reviewed journal (see publications below).

**Summer Fellow, XCP Computational Physics Workshop (Mentors: Jeff Peterson, Daniel Holladay, and Eric Tovar)** — *Los Alamos, NM*

Los Alamos National Laboratory (LANL) — *June 2023- August 2023*

- Developed analytic solutions for special cases of the Euler equations
- Wrote python code to analyze and plot the solution
- Ran problems using the Eulerian code, xRAGE
- Results were compiled in an internal LANL report (see publications below)

**Student Intern (Mentor: Matthew Farthing, Senior Reserach Scientist)** — *Vicksburg, MS*

United States Army Corps of Engineers — *May 2022- May 2023*

- Developed an implicit-explicit (IMEX) finite element method for the linear Korteweg-De Vries (KdV) equation.
- Implemented method using python.
- Wrote a report detailing the method and numerical results.

**Undergraduate mathematics researcher (Mentor: Dr. Anne Shiu)** — *College Station, TX*

Texas A&M University — *May 2019 - July 2019*

- Four undergraduates selected through competitive application process. Awarded $4,400 to conduct new research in the area of computational biology.
- Proved three significant theorems.
- Wrote a twenty-six-page report on the findings in LaTeX.
- Results have been published. (See publications below.)

**UDisover Scholar (Mentor: Dr. Catalin Georgescu)** — *Vermillion, SD*

USD Center for Academic and Global Engagement — *May 2018 -August 2018*

- Eight undergraduates selected through competitive, application-interview process. Awarded $3,000 to conduct new research and creative scholarship.
- Developed MAPLE code for numerical experiments.
- Proved two significant theorems.

## Teaching Experience

**Teaching Assistant (Aggregate Experience)** — *College Station, TX*

Texas A&M University Department of Mathematics — *August 2020 - May 2022*

- Facilitated recitations and labs for Calculus I and Calculus II courses, managing grading and structured learning for over 100 students.
- Graded homework and quizzes for “Introduction to Proofs”, “Combinatorics,” and “Differential Equations”.

### Math Circle Facilitator

*College Station, TX*

Texas A&M University

*January 2021 - May 2021*

- Facilitated problem solving sessions for gifted K-12 Students.
- Volunteered on weekends.

### Tutor

*Vermillion, SD*

USD Academic and Career Planning Center

*January 2017 - May 2020*

- Tutored students individually or in groups in courses ranging from pre-college Algebra, Differential Equations, Calculus 3, and logic, among others.
- Help facilitate good study habits for students.
- Assist in time management and study planning.

## Service

### Texas A&M Strategic Budgeting Council

*Texas A&M University*

Graduate Student Representative

*October 2025-present*

- Advocate for graduate and professional students in the university's budgeting process.
- Appointed by the Graduate and Professional Student Government President.
- Work with the council to craft recommendations for the university's multi-billion dollar budget.

### Graduate and Professional Student Government

*Texas A& M University*

Parliamentarian

*October 2025-present*

- Advise student leaders on parliamentary procedure and the organization's bylaws and constitution.
- Serve as the acting Speaker/Executive Vice President when the Speaker is unavailable.

*Texas A&M University*

Speaker and Executive Vice President

*April 2024-April 2025*

- Elected by the Graduate and Professional Student Senate.
- Led a rewriting of the organization's constitution and bylaws.
- Serve as chair of Graduate and Professional Student Senate.
- Advocate on behalf of over 16,000 graduate and professional student at Texas A&M University.
- Assist student senators in writing legislation.
- Craft and disseminate meeting agendas.
- Doubled number of senators through a coordinated recruitment effort.
- Engage with university, state, and federal leaders to improve graduate and professional student experiences.

*Texas A&M University*

Senator, Department of Mathematics

*September 2023- April 2024*

- Advocated for graduate and professional student interests in student government.
- Successfully wrote legislation for an election reform that allowed graduate student organizations more control in their elections. Legislation was overwhelmingly passed.
- Worked with a team of student leaders to organize a professional development seminar, setting the stage for a large annual event for graduate students.

### Texas A&M SIAM (Society of Industrial and Applied Mathematics) Graduate Student Chapter

*College Station, TX*

Liason: May 2023-Present; President: May 2022 - May 2023; Secretary: May 2021- May 2022

*May 2021 - Present*

- Coordinated the Industrial and Applied Mathematics Seminar.
- Managed and updated the chapter website using html code.
- Organized and facilitated events for students and the mathematics department.
- Organized and facilitated the Industrial and Applied Math Seminar.

### USD IdeaFest Committee

*Vermillion, SD*

Student Representative

*November 2018-May 2020*

- Organized the annual undergraduate/graduate research symposium on campus.
- Acted as a social media ambassador to promote the event.

### USD Council for Undergraduate and Creative Scholarship

*Vermillion, SD*

Student Representative

*October 2018-May 2020*

- One of three undergraduates selected to sit on council.
- Manage research opportunities for undergraduates.
- Member of the IdeaFest subcommittee to organize the annual undergraduate/graduate research symposium.

**USD Math Club** *Vermillion, SD*

President, May 2018-2020 Treasurer Secretary, May 2017-May 2018 *October 2018-May 2020*

- Promoted mathematics and related sciences on campus by coordinating events and speakers.
- Brainstorm events to recruit new members.

## Other relevant experience

**Student Ambassador** *Vermillion, SD*

USD Office of Admissions *May 2017-May 2020*

- Facilitated efficient visit days by assisting visitors with directions, information, and support.
- Provided a high-quality customer service by guiding prospective students and their families across campus.

**Opinion Editor** *Vermillion, SD*

The Volante USD student newspaper *September 2017-May 2018*

- Managed a collection of column writers, including editing six columns per week multiple times, brainstorming topics for columns, and providing feedback on edits and topics.
- Designed and produced opinion page using InDesign.

**Congressional Intern** *Washington, D.C.*

Senator Steve Daines, Washington, D.C. *January 2016-May 2016*

- Assisted staff members with various projects.
- Developed strong teamwork skill with members of the staff to complete projects as a team.

**Congressional Intern** *Washington D.C.*

Senator John Thune, Washington, D.C. *September 2015- December 2015*

- Assisted staff members with various projects.
- Developed strong teamwork skill with members of the staff to complete projects as a team.

## Awards and Scholarships

*Guseman Award*. 2025. Awarded by the Texas A&M Graduate and Professional Student Government. Awarded "in recognition of outstanding contributions to the success and prosperity of the welfare of the Graduate and Professional Student Government, and to the graduate and professional student body at Texas A&M University."

*30 Under 30, Class of 2023*. 2023. Awarded by University of South Dakota Alumni Association. Awarded to young alumni who "are making an impact in their professional and personal lives. Alumni are recognized for academic & professional achievements, leadership and/or university engagement."

*Thesis with High Distinction*. 2020. Undergraduate award for outstanding honors thesis. Awarded by the USD Honors Committee. (See publications below.)

*Eagle Scout*. 2015. Highest rank granted by the Boy Scouts of America. Member for twelve years. Included hundreds of hours of community service.

## Publications

*Peer-Reviewed*

Gerberding, Seth, Jeff Peterson, Jim Ferguson, and Scott Ramsey. "Semi-Analytic Solutions to the Noh Problem with a Black Box Equation of State." Physics of Fluids. *Accepted* 2025.

Gerberding, Seth. "A High Order IMEX Method for Generalized Korteweg de-Vries Equations." Journal of Computational and Applied Mathematics 475, (2026):

Gerberding, Seth, Nida Obatake, and Anne Shiu. "Identifiability of linear compartmental models: the effect of moving inputs, outputs, and leaks." Linear and Multilinear Algebra 70, no. 14 (2022): 2782-2803.

*Technical Reports*

Seth Gerberding. ”Black Box Equations of State: Creating Semi-analytic Solutions to the Noh Problem and Verifying Equation of State Interfaces.” Technical Report. Los Alamos National Laboratory, 2024. LA-UR-29056.

Seth Gerberding and Benjamin Musick. ”Verification & Validation of a New Equation of State Framework in xRAGE.” Technical Report. Los Alamos National Laboratory, 2023. LA-UR-23-29866.

*Theses*

Seth Gerberding. “Plato’s Ban: Why the Poets are Exiled.” Bachelors Thesis, University of South Dakota, 2020. Awarded with High Distinction.

Seth Gerberding. “Groups of Divisibility.” Bachelors Thesis, University of South Dakota, 2020.

## Presentations

Gerberding, S. A Robust IMEX Method for the Serre-Green Naghdi Equations with Partial Topography. SIAM Geosciences, Lousiana State University, Baton Rogue, LA, October 2025.

Gerberding, S. A Robust IMEX Method for the Serre-Green Naghdi Equations with Partial Topography. SIAM TX-LA Sectional, University of Texas at Austin, Austin, TX, September 2025.

Gerberding, S. Finite Element approximation of scalar dispersive PDEs. Finite Element Rodeo, Rice University, Houston, TX, 2024.

Gerberding, S. Verification: The Euler equations, the Noh Problem, and the mathematics behind reliable simulations in extreme conditions. University of South Dakota Department of Mathematics Seminar, Vermillion, SD, November 2023.

Gerberding, S. and Guermond, J.-L. Finite Element approximation of dispersive PDEs. SIAM TX-LA Sectional Meeting, Lafayette, LA, October 2023.

Gerberding, S. and Guermond, J.-L. Finite Element approximation of dispersive PDEs. USNCCM, Albuquerque, NW, July 2023.

Gerberding, S. IMEX Methods for third order PDEs. Finite Element Rodeo, College Station, TX, March 2023.

Gerberding, S. Preserving Identifiability in Linear Compartmental Models: Moving Leaks, Outputs, and Inputs. IdeaFest, Vermillion, SD, 2020.

Gerberding, S. Identifiability of linear compartmental models: The effect of moving inputs, outputs, and leaks. Joint Mathematics Meeting, Denver, CO, 2020.

Gerberding, S. Preserving Identifiability in Linear Compartmental Models by moving Leaks, Outputs, and Inputs. University of South Dakota Department of Mathematical Sciences Seminar Series, Vermillion, SD, 2019.

Gerberding, S. Plato’s Dialectic. Upper Midwest Honors Conference, University of Wisconsin-Stout, WI, 2019.

Gerberding, S. Patterns Generated by Barycentric Subdivision of Triangles. Upper Midwest Honors Conference, University of Wisconsin-Stout, WI, 2019.

Gerberding, S. Patterns Generated by Barycentric Subdivision of Triangles. Poster Presentation, IdeaFest, University of South Dakota, SD, 2019

Gerberding, S. Plato and Freedom of Speech: Censorship protecting Truth. Minnesota Philosophical Society, Rochester, MN, 2018

## Posters

Gerberding, S. and Guermond, J.-L. Finite element approximation of dispersive PDEs. Time Integration Methods for Multi-Physics Applications, Los Alamos National Laboratory, NM, August 2023.

Gerberding, S. and Guermond, J.-L. A $C^0$ finite element method for dispersive PDEs. KUMUNU-ISU Confernece in PDE, Dynamical systems, and Applications, Iowa State University, IA, April 2023.

Gerberding, S. Patterns Generated by Barycentric Subdivision of Triangles. Poster Presentation, IdeaFest, University of South Dakota, SD, 2019.