

Employment

- **2025 - , Center for Computational Science and Engineering , Massachusetts Institute of Technology**
Assistant Professor
- **2023 - , Department of Mathematics, University of Wisconsin-Madison**
Assistant Professor (on-leave)
- **2020 - July 2022, Division of Applied Mathematics, Brown University**
Presidential Postdoctoral Fellow,
Prager Assistant Professor of Applied Mathematics

Education

2019 <i>Houston, Texas</i>	Doctor of Philosophy, Computational And Applied Mathematics , Rice University Concentration: High Performance Scientific Computing, Numerical Analysis
2014 <i>Seattle, Washington</i>	Master of Science, Applied Mathematics , University of Washington
2012 <i>Seattle, Washington</i>	Bachelor of Science, Mathematics , University of Washington Concentration: Mathematical analysis.

Awards

2025-	MGB-SIAM Early Career Fellowship
2023-	Fall research competition award, University of Wisconsin
2019-2021	Presidential Postdoctoral Fellow, Brown University
2020	NextProf Nexus Program
2019-2020	SIAM CSE19 Broader Engagement Program
2018	Alan Weiser Memorial Fund for Student Excellence
2018	Microsoft Travel Award for Academic Excellence
2017-2018	Ken Kennedy–ExxonMobil. Graduate Fellowship Endowment
2016-2017	XSEDE Scholar Award
2016	Blue Waters Scholar Award
2015-2016	Ken Kennedy–Cray Inc. Graduate Fellowship Endowment
2014-2015	Rice Graduate Education for Minorities (NSF AGEP)
2013-2014	Engineering Learning Communities Scholarship
2010	NSF (UW MATH REU: Inverse problems)
2008	Student Service Award, UW Engineering Advising & Diversity Center

Selected Publications & Preprints

- S. Liu, M. S. Fabien, “A non-overlapping spectral additive Schwarz method for interior penalty discontinuous Galerkin discretizations of anisotropic elliptic problems”, in preparation, 2025.
- M. S. Fabien, “A bound-preserving multiterminals scheme for steady-state convection–diffusion equations”, Journal of Computational and Applied Mathematics, in review, 2025.

- M. S. Fabien, “A cell centered Galerkin method for miscible displacement in heterogeneous porous media”, *Computer Methods in Applied Mechanics and Engineering*, in review, 2025.
- S. Orizaga, M. S. Fabien, “Comparison of structure preserving methods for sixth order problems”, *Applied Mathematics Letters*, in preparation, 2025.
- A. Liu, M. S. Fabien, “GPU performance analysis for multigrid smoothers”, *Communications in Computational Physics*, in preparation, 2025.
- M. S. Fabien, R. C. Ayala, “Physic-Informed Neural Networks, Empowering a Diverse Computational Mathematics Research Community”, in review, *SIAM News*, 2025.
- M. S. Fabien, “Positivity-preserving discontinuous Galerkin scheme for linear hyperbolic equations”, in review, *Partial differential equations and applications*, 2025.
- M. S. Fabien, “A hybridizable discontinuous Galerkin method for three-phase flow in heterogeneous porous media”, in review, 2025.
- M. S. Fabien, “Positivity-preserving discontinuous Galerkin scheme for linear hyperbolic equations with characteristics-informed augmentation”, accepted, *Results in Applied Mathematics*, 2024.
- S. Orizaga, M. S. Fabien, and M. Millard, “Efficient numerical approaches with accelerated graphics processing unit computations for Poisson problems and Cahn-Hilliard equations”, *AIMS Mathematics, Applications of Partial Differential Equations to Science and Engineering Problems: Numerical Resolution*, 2024.
- G. Awanou, M. S. Fabien, J. Guzman, and A. Stern. “Hybridization and postprocessing in finite element exterior calculus”, *Mathematics of Computation*, 2024.
- M. S. Fabien, J. Guzmán, M. Neilan, and A. Zytoon. “Low-order divergence-free approximations for the Stokes problem on Worsey–Farin and Powell–Sabin splits.” *Computer Methods in Applied Mechanics and Engineering* 390, 2023.
- A. C. Salazar Coariti and M. S. Fabien, and J. Guzman and J. A. McGuire, R. De Vita and K. C. Toussaint. “Fluid mechanics approach to analyzing collagen fiber organization”, *Journal of Biomedical Optics* 27 (1), 016503-016503, 2023.
- M. S. Fabien. “Numerical error analysis for an energy-stable HDG method for the Allen-Cahn equation”, *Journal of Computational and Applied Mathematics*, 2022.
- M. S. Fabien. “A high-order implicit hybridizable discontinuous Galerkin method for the Benjamin-Bona-Mahony equation”, *International Journal for Numerical Methods in Fluids*, 2021.
- A. C. Salazar Coariti and M. S. Fabien, and J. Guzman and K. C. Toussaint. “Quantitative second-harmonic generation imaging analysis based on fluid-dynamics measures”, *Frontiers in Optics*, FW5E. 1, 2020.
- M. S. Fabien, M. G. Knepley, and B. M. Riviere. “Families of interior penalty hybridizable discontinuous Galerkin methods for second order elliptic problems”, *Journal of Numerical Mathematics*, 28(3):161-174, 2020.
- M. S. Fabien, M. G. Knepley, and B. M. Riviere. “A high order hybridizable discontinuous Galerkin method for incompressible miscible displacement in heterogeneous media”, *Results in Applied Mathematics*, 8:100089, 2020.
- M. S. Fabien. “A GPU-accelerated hybridizable discontinuous Galerkin method for linear elasticity”, *Communications in Computational Physics*, 27(2):513-545, 2019.
- J. Chang, M. S. Fabien, M. G. Knepley, and R. T. Mills. “Comparative study of finite element methods using the Time-Accuracy-Size (TAS) spectrum analysis”, *SIAM Journal on Scientific Computing*, 40(6):C779-C802, 2018.
- M. S. Fabien, M. G. Knepley, and B. M. Riviere. “A hybridizable discontinuous Galerkin method for two-phase flow in heterogeneous porous media”, *International Journal for Numerical Methods in Engineering*, 116(3):161-177, 2018.
- M. S. Fabien, M. G. Knepley, R. T. Mills, and B. M. Riviere. “Manycore Parallel Computing for a Hybridizable Discontinuous Galerkin Nested Multigrid Method”, *SIAM Journal on Scientific Computing*, 41(2):C73-C96, 2019.

- M. S. Fabien. “A Radial Basis Function (RBF) Method for the Fully Nonlinear 1D Serre Green-Naghdi Equations”, Preprint, 2014.

Student mentoring

- Austin Anyanwu (UW-Madison undergraduate): Researching finite precision arithmetic. Austin is a part of the Undergraduate Research Scholars Program.
- Alexis Liu (UW-Madison undergraduate, now at Columbia): Researching fast solvers for elliptic PDEs, sparse linear algebra, and GPU acceleration.
- Patrick Li (UW-Madison undergraduate): Researching GPU accelerated adaptive mesh refinement.
- Neer Mehta (UW-Madison undergraduate, now at Cornell): Researching adaptive mesh refinement. Neer is a Undergraduate Research Scholars Fellow.

Conference, Presentations, and Workshop Participation

- “CCG methods for flow and transport”, Syracuse, November , 2025, Syracuse, New York (invited).
- “CCG methods for flow and transport”, WPI, October , 2025, Worcester, Massachusetts (invited).
- “Fast solver for pore scale flows”, SIAM PNW Section, October , 2025, Seattle, Washington (invited).
- “Physics informed neural networks for nonlinear optics problems”, AMS Spring Sectional, Recent Advances in Numerical Methods for PDEs, March , 2025, Hartford, Connecticut (invited).
- “ hp -adaptive coupled finite volume solver for convection diffusion problems”, University of Illinois-Chicago Applied Mathematics Seminar, April 2025 (invited).
- “Fast solvers for flows in porous media”, Oakridge National Lab, February 2025 (invited).
- “Fast solvers for flows in porous media”, OSU Applied Mathematics and Computation Seminar, October 2024 (invited).
- “Machine learning enforced compatible discretizations for nonlinear optics”, ICREM, August 2024 (invited).
- “Structure preserving methods for hyperbolic problems”, AMS Spring Sectional, Recent Advances in Numerical Methods for PDEs, March, 2024, Cincinnati, Ohio (invited).
- SIAM Annual Meeting 2025, Montreal, Canada (invited).
- Cooper Mountain Iterative solver/multigrid conference, April 2025.
- AMS Spring Sectional, Recent Advances in Numerical Methods for PDEs, April , 2025, Hartford, Connecticut (invited).
- UW-Madison Sustainability Research Visioning Event, September 2024.
- Workshop Data-Driven PDE-based inverse problem, in theory and practice, UW-Madison, August 2024.
- Empowering a Diverse Computational Mathematics Research Community, ICERM, July 2024 (invited).
- SIAM Annual Meeting 2024, MS7 Phase Field Models: Theoretical Results, Computational Advances and Applications (invited).
- AMS Spring Sectional, Recent Advances in Numerical Methods for PDEs, April 15th - 16th, 2023, Cincinnati, Ohio (invited).
- StemJazz Colloquium, April, 2022, Brown University.
- Mathematics Colloquium, Carnegie Mellon University, February, 2020.
- Mathematics Colloquium, University of Wisconsin-Madison, February, 2020.
- Structure Preserving Discretizations: FEMS, Splines, and IGA, May 31- June 1, 2019, Pittsburgh, Pennsylvania.

- Blackwell-Tapia Conference, November 9 - 11, 2018, Providence, Rhode Island.
- 15th Copper Mountain Conference On Iterative Methods, March 25 - 30, 2018, Copper Mountain, Colorado (invited by Dr. Raymond S. Tuminaro).
- 2018 Rice Oil & Gas HPC Conference, March 12 - 13, Houston, Texas.
- 2017 Rice Oil & Gas HPC Conference, March 15 - 16, Houston, Texas.
- 2017 Finite Element Rodeo, March 3 - 4, University of Houston, Texas.
- 18th Copper Mountain Conference On Multigrid Methods, March 26 - 30, 2017, Copper Mountain, Colorado.
- 2016 Rice Oil & Gas HPC Conference, March 2 - 3, Houston, Texas.
- Supercomputing 2016, November 14 -17, 2016, Salt Lake City, Utah.
- XSEDE16 Conference, July 17 - 21, 2016, Miami, Florida.
- Petascale Institute Blue Waters Workshop, May 10 - 31, 2016, University of Illinois Urbana Champaign, Illinois.
- 2015 Rice Oil & Gas HPC Conference, March 4 - 5, Houston, Texas.
- 2014 Blackwell-Tapia Conference, November 14 - 15, University of California, Los Angeles.

Outreach Conferences, Presentations, Workshops

Conferences and Workshop Participation

- Empowering a Diverse Computational Mathematics Research Community, ICERM, July 2024.
- Conference for African-American Researchers in the Mathematical Sciences (CAARMS), July, 2023.
- Latinx mathematicians research community (LMRC, NSF & AIM), 2021 - 2022.
- SIAM CSE Broader Engagement Program, 2021.
- NextProf Nexus, September 8-11, 2020.
- EDGE 2020, Enhancing Diversity in Graduate Education, June 1 - July 10, 2020, Providence, Rhode Island, USA. (Recruitment and outreach for women in mathematics, fully online, hosted by Brown University)
- ACM Richard Tapia Celebration of Diversity in Computing, September 19 - 22, 2018, Orlando, Florida, USA. (Recruitment and outreach for underrepresented minorities)
- Noyce teacher professional development workshop, June 15, 2018, Houston, Texas.
- ACM Richard Tapia Celebration of Diversity in Computing, September 20 - 23, 2017, Atlanta, Georgia, USA. (Recruitment and outreach for underrepresented minorities)
- Supercomputing 2016, November 14 - 17, 2016, Salt Lake City, Utah, USA. (Advanced computing for social change)
- NSF Research Experience and Mentoring Program for incoming University of Washington freshmen from underrepresented and underserved populations. June 28 - August 22, 2012, Seattle, Washington, USA.
- Mathematics Academy, July - August, 2013, Seattle, Washington, USA.
- Mathematics Academy, July 8 - August 3, 2012, Seattle, Washington, USA.
- STEM Bridge, August, 2011, Seattle, Washington, USA.
- Mathematics Academy, August - September, 2011, Seattle, Washington, USA.
- Mathematics Academy, August - September, 2010, Seattle, Washington, USA.

Teaching Experience

<i>Fall 2025</i> <i>Boston, MAS</i>	Instructor , C20 (MIT) Instructor for a scientific computing course (40 students).
<i>Spring 2025</i> <i>Madison, WI</i>	Instructor , MATH 715 (UW-Madison) Instructor for a graduate course on numerical methods for differential equations.
<i>Fall 2024</i> <i>Madison, WI</i>	Instructor , MATH 222 (UW-Madison) Instructor for a calculus course (400 students).
<i>Spring 2024</i> <i>Madison, WI</i>	Instructor , MATH 715 (UW-Madison) Instructor for a graduate course on numerical methods for differential equations.
<i>Fall 2023</i> <i>Madison, WI</i>	Instructor , MATH 222 (UW-Madison) Instructor for a calculus course (300 students).
<i>Spring 2023</i> <i>Madison, WI</i>	Instructor , MATH 715 (UW-Madison) Instructor for a graduate course on numerical methods for differential equations.
<i>Fall 2022</i> <i>Madison, WI</i>	Instructor , MATH 320(!) (UW-Madison) Instructor for a honors liner algebra and differential equations course.
<i>Summer 2020</i> <i>MATLAB course instructor</i> <i>Providence, Rhode Island</i>	Instructor , EDGE 2020, Enhancing Diversity in Graduate Education Instructor for a MATLAB course.
<i>APMA 1180, Spring 2022</i> <i>Providence, Rhode Island</i>	Instructor , Brown University, Division of Applied Mathematics Instructor for a course on numerical methods for ordinary differential equations.
<i>APMA 1170, Fall 2021</i> <i>Providence, Rhode Island</i>	Instructor , Brown University, Division of Applied Mathematics Instructor for a course on numerical linear algebra.
<i>APMA 0160, Fall 2020</i> <i>Providence, Rhode Island</i>	Instructor , Brown University, Division of Applied Mathematics
<i>2013</i> <i>Seattle, Washington</i>	Mathematics Instructor , University of Washington, College of Engineering Co-Instructor for the Washington State Academic RedShirt – (STARS) program.
STARS PROGRAM	
<i>2009–2014</i> <i>Seattle, Washington</i>	Mathematics Instructor , University of Washington, College of Engineering Instructor of record for official UW course ENGR 197 (five years continuously)
ENGR 197	
<i>Summer 2013</i> <i>Seattle, Washington</i>	Lead Mathematics Instructor , University of Washington, College of Engineering High-achieving high school juniors from Washington State live on the Seattle UW campus for a four-week, intensive, summer session.
MATHEMATICS ACADEMY	
<i>Summer 2012</i> <i>Seattle, Washington</i>	Lead Mathematics Instructor , University of Washington, College of Engineering NSF Research Experience and Mentoring Program is an eight-week residential program for incoming University of Washington (UW) freshmen from underrepresented and underserved populations.
NSF-REM PROGRAM	

Autumn 2007–2014
Seattle, Washington

Mathematics Tutor, University of Washington, College of Engineering

Served as a tutor, role model, mentor, and friend to countless students

MINORITY SCHOLARS ENGINEER-
ING PROGRAM

- > For 7 years I had held a number of tutoring positions (paid and unpaid) affiliated with the College of Engineering. My specialization is all undergraduate level MATH/AMATH.
- > Programs include Student Academic Services (SAS), Engineering Advising Center (EAC), Alliances for Learning and Vision of Underrepresented Americans (ALVA), STEM Bridge Program, and Mathematics Academy