Curriculum Vitae

Sanghyun Lee

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Employment

Aug. 2023 – present **Associate Professor**,
Department of Mathematics, Florida State University, Tallahassee, Florida, USA

Aug. 2017 – Aug. 2023 **Assistant Professor**,
Department of Mathematics, Florida State University, Tallahassee, Florida, USA

Joint Appointments

2026 - **Global Joint Appointment Faculty**,
Department of Mathematics, Kyungpook National University, South Korea

2023 - 2029 **Ewha Global Fellow**,
Ewha Womans University, South Korea

2024 - **Associate**,
Data Science, Florida State University, Tallahassee, Florida, USA

2018 - **Associate**,
Geophysical Fluid Dynamics Institute, Florida State University, Tallahassee, Florida, USA

Research Experiences

Apr. 2016 - Aug. 2017 **Research Associate**,
The Center for Subsurface Modeling, (Director: Mary F. Wheeler), The Oden Institute for Computational Engineering and Sciences, The University of Texas at Austin, USA

Sep. 2014 - Mar. 2016 **Postdoctoral Fellow**,
The Center for Subsurface Modeling, (Director: Mary F. Wheeler), The Oden Institute for Computational Engineering and Sciences, The University of Texas at Austin, USA

Sep. 2010 - Aug. 2014 **Research Assistant**,
Department of Mathematics, (Research advisor: Andrea Bonito), Texas A&M University, USA

Education

Aug. 2014 **Ph.D. in Mathematics**
Department of Mathematics, Texas A&M University, Texas, USA

Mar. 2002 - Feb. 2008 **Bachelor in Mathematics**
Department of Mathematics, Sogang University, Seoul, Korea

Bachelor in Computer Science
Department of Computer Science, Sogang University, Seoul, Korea

Research Visits

Dec 2024 **Visiting Researcher**,
Technical University of Dortmund, Dortmund, Germany, Hosted by Dmitri Kuzmin

May 2024 **Visiting Researcher**,
Institute of Applied Mathematics Leibniz University, Hannover, Germany, Hosted by Thomas Wick

Summer 2022 **J.T. Oden Visitors Program**,
The Center for Subsurface Modeling, The Oden Institute for Computational Engineering and Sciences, The University of Texas at Austin

Dec. 2012 & Dec. 2013 **Visiting Researcher**,
High-Speed Fluids Imaging Lab, Mechanical Engineering, KAUST, Saudi Arabia, Experimental studies for the Kaye Effect, Hosted by Sigurdur Thoroddsen

Research Interests

- Numerical analysis, design, and implementation of structure-preserving finite element methods for partial differential equations, including enriched and discontinuous Galerkin methods, adaptive methods, a posteriori error estimation, and locally conservative, locking-free, and bound-preserving discretizations.
- Scientific machine learning for PDEs, including operator learning, finite element operator networks, physics-informed learning, inverse problems, data assimilation, uncertainty quantification, and reduced-order modeling.
- PDE-constrained optimization and optimal control, including state- and control-constrained problems, nonsmooth optimization, and scalable computational methods for heterogeneous and multiphysics systems.
- Multiscale and multiphysics computation with high-performance computing for coupled thermo-hydro-mechanical and thermo-hydro-mechanical-chemical systems, poromechanics, transport, phase-field fracture, subsurface energy systems, and emerging applications in superconducting and fusion-energy systems.
- Emerging hybrid quantum–classical computing for PDEs, including variational quantum linear solvers, coarse-to-fine and multilevel finite element strategies, and rigorous assessment of accuracy and computational efficiency for heterogeneous systems.

Contracts and Grants

2026-2029 **DOE The Office of Advanced Scientific Computing Research (AI4 Science)**. *From Uncertainty to Trust: A Scalable Stochastic Computing Framework for Uncertainty Reduction in Artificial Intelligence*; PI: Feng Bao (Florida State University), Co-PIs: Sanghyun Lee, Bryan Quaife, Hristo Chipilski (Florida State University). Total budget $1 million

2026-2027 **DOE GENESIS Mission**. *AI-Powered Manufacturing of High Temperature Superconductors for Fusion Energy*; PI: F. Kametani (Florida State University), Co-PIs: Sanghyun Lee (Florida State University) High Temperature Superconductors, Inc., Lawrence Berkeley National Laboratory, Aixia Xu, Yan Xin, Jeseok Bang, and Chris Segal (National High Magnetic Field Laboratory), David Larbalestier (MagLab Chief Materials Scientist). Total budget $0.75 million

2026 **NSF DCL Supplemental Award DMS- 2621992**. *Non-Academic Research Internships for Graduate Students in Geothermal Energy Supplemental Funding Opportunity (Geothermal INTERN)*; PI: Sanghyun Lee, Co-PI: Hongkyu Yoon (Sandia National Lab), Student: Jonathan Valyou. Total budget $41,112

2026-2029 **Basic Science Research Program / Basic Research Lab. NRF RS-2026-25505849, Ministry of Science and ICT / National Research Foundation**. *Operator-Composition Based Theoretical Analysis of Deep Neural Networks: Focusing on the Transformer (the Core Architecture of LLM)*; PI: Sunghwan Moon (Kyungpook National University, South Korea), Co-PIs: B. Kim, J. Kang (Kyungpook National University, South Korea), Sanghyun Lee (Florida State University). Total budget: 1.5 billion Won.

2025-2030 **Global Matching Lab, Kyungpook National University**. PI: Sunghwan Moon (Kyungpook National University, South Korea), Sanghyun Lee (Florida State University).

2024-2027 **REU Site: DMS- 2349382**. *Applied Mathematics in Real World Problems*; PI: A. Farhat (former), A. Fahim, Senior Personnel: Sanghyun Lee, B. Karamched, M. Asllani; Lee is leading project titled *Data Assimilation and Parameter Prediction Algorithms for Subsurface Flows and simplified models in Fluid Dynamics*; Total budget $371,974

2024 **NSF DCL Supplemental Award DMS- 2419267**. *Non-Academic Research Internships for Graduate Students in Geothermal Energy Supplemental Funding Opportunity (Geothermal INTERN)*; PI: Sanghyun Lee, Co-PI J. White (Lawrence Livermore National Lab), Student: Seungmin Lee; Total budget $41,334

2023-2026 **DOE Science Foundations for the Energy Earthshots**. *Advanced Multi-Physics Machine Learning for Subsurface Energy Systems Across Scales*; PI: S. Yi (University of Texas at El Paso), Co-PIs: Sanghyun Lee, F. Bao (Florida State University), P. Newell (University of Utah), H. Yoon (Sandia National Lab), J. Kubicki (University of Texas at El Paso). Total budget $4.9 million, FSU budget $0.85 million

2023 **NSF DCL Supplemental Award DMS- 2327841**. *Non-Academic Research Internships for Graduate Students in Geothermal Energy Supplemental Funding Opportunity (Geothermal INTERN)*; PI: Sanghyun Lee, Co-PI: H. Yoon (Sandia National Lab), Student: Yi-Yung Yang; Total budget $41,284

2022 - 2025 **NSF DMS- 2208402**, *Collaborative Research: Physics-preserving adaptive finite element methods for thermo-poroelasticity*; PI: Sanghyun Lee. Total budget $240,220

2020 - 2021 **Florida State University, The Multidisciplinary Support (MDS- 045490)**. *Studies for Degradation of Lignin-based Biodegradable Plastics to Prevent Marine Debris*; PI: H. Chung (Florida State University) Co-PI: Sanghyun Lee, Total budget $25,000

2019 - 2022 **NSF DMS- 1913016**. *Fluid-filled Fracture Propagation with a Phase Field Approach in Subsurface by Employing Nonlinear Strain Limiting Models and Enriched Galerkin Methods*; PI: Sanghyun Lee, Total budget $100,000

2018 **Florida State University CRC- 041950** (First Year Assistant Professor Award). *Optimal error estimate of flow problems with Dirac sources in the subsurface for discontinuous and enriched Galerkin methods* PI: Sanghyun Lee.

Scholarships and Awards

2025 Nominated for a Developing Scholar Award, Florida State University

2024 Nominated for a Developing Scholar Award, Florida State University

2024 Nominated for an Outstanding Graduate Teaching Award, Florida State University

2022 Nominated for a University-level Excellence in Teaching Award, Florida State University

Fall 2019 The Funding Agency Travel (FAT) program, Florida State University

Spring 2019	Provost's Travel Award, Florida State University
Fall 2018	Dean's Travel Award, Florida State University
Summer 2018	The First Year Assistant Professor (FYAP) Award, Florida State University
June 2015	SIAM Travel Award
June 2013	Innovation Award for "the Kaye Effect"; Institute for Applied Mathematics and Computational Science (IAMCS-TAMU).
Feb 2012	Institute for Applied Mathematics and Computational Science (IAMCS-TAMU)-KAUST Graduate Fellow.
2010	Houston A&M Mother's Club Outstanding TA Award.

Postdoctoral and Doctoral Mentoring

Postdoctoral Fellows

2025–present	Kapil Chawla, Ph.D., Department of Mathematics, Indiana University Bloomington.
2023–2025	Seonghee Jeong, Ph.D., Department of Mathematics, Louisiana State University.

Ph.D. Chair/Co-Chair

Thomas Kuiper, Department of Mathematics, Florida State University.

Latria Campbell, Doctoral Candidate, Department of Mathematics, Florida State University.

Seungmin Lee, Doctoral Candidate, Department of Mathematics, Florida State University.

Jonathan Valyou, Doctoral Candidate, Department of Mathematics, Florida State University.

2026	Ruth Lopez, Ph.D., Department of Mathematics, Florida State University.
2026	Sanjeeb Poudel, Ph.D., Department of Scientific Computing, Florida State University.
2026	Yi-Yung Yang, Ph.D., Department of Mathematics, Florida State University.
2026	Alan Sze, Ph.D., Biomedical Engineering, Duke University.
2024	Julian Roth, Ph.D., Institute of Applied Mathematics, Leibniz University Hannover.

Joshua Gonzalez, Ph.D., Department of Mathematics, Florida State University.

Publications

77. Jeseok Bang, Fumitake Kametani, Sanghyun Lee; Physics-Guided Machine Learning for Quantitative Inverse RHEED Analysis of IBAD MgO, 2026, submitted
76. Seungmin Lee, Chen Liu, Sanghyun Lee; Optimization-based Cell Average Limiters as Metric Projections: Constrained Evolution and Convergence Analysis for Convection-diffusion Equations, 2026, submitted
75. Sanghyun Lee, Brendan Keith, Thomas Wick; Proximal Galerkin for Poroelastic Phase-Field Fracture, 2026, submitted
74. Sanghyun Lee, Hyun-Geun Shin, Son-Young Yi; A Goal-Oriented A Posteriori Error Estimator Based on Equilibrated Stress Reconstruction for Linear Elasticity, 2026, submitted
73. Tameem Almani, Sanghyun Lee, Sanjeeb Poudel, Jihoon Kim; Convergence Analysis of a Multirate Undrained-Splitting Scheme for Hydraulic Fracture Propagation in Fractured Poroelastic Media, 2026, in revision

72. Seonghee Jeong, Sanghyun Lee; A Monolithic Discontinuous Galerkin Framework for Darcy Optimal Control with Radon-Measure Tracking and Pointwise Control Constraints, 2026, submitted
71. Kapil Chawla, Tomoki Koike, Sanghyun Lee, Julie Bessac; SparseModesNet for coupled thermal-hydraulic-mechanical system in heterogeneous porous media, 2026, submitted
70. Sanghyun Lee, Seungmin Lee, Chen Liu; An optimization-based property-preserving limiter for two-phase flow in porous media on non-matching meshes, 2026, submitted
69. Teeratorn Kadeethum, Francesco Ballarin, Youngsoo Choi, Sanghyun Lee; Reference-Space Reuse for Steady and Transient State-Constrained Conjugate Heat Transfer, 2026, submitted
68. Sanghyun Lee; A Proximal C^0 Interior Penalty Method for State-Constrained Darcy Flow Control , 2026, submitted
67. Sanjeeb Poudel, Sanghyun Lee, Teeratorn Kadeethum; Enhancing neural network extrapolation in thermo-fluid systems using steady-state solutions, 2026, submitted
66. Kapil Chawla, Sanghyun Lee, Jonathan Valyou; A Hybrid Coarse-to-Fine Framework for Quantum Computing in Heterogeneous Darcy Flow, 2026, in revision, *SIAM Journal on Scientific Computing*
65. Kapil Chawla, Sanghyun Lee, Yeonjong Shin; A Parallel and Adaptive Mesh-Free method for Heterogeneous Porous Media, 2026, submitted
64. Sanghyun Lee, Zhengqi Liu, Jonathan Valyou, Ludmil Zikatanov; A Conjugate Gradient Formulation of the EnKF Algorithm 2026, in revision, *Computers & Mathematics with Applications*
63. Yi-Yung Yang, Sanghyun Lee, Dmitri Kuzmin; Heat Transfer Modeling in Enhanced Geothermal Energy: A Three-Temperature Approach for Solid, Injected, and Residing Fluids 2026, in revision, *International Journal for Numerical Methods in Fluids*
62. Leon M. Kolditz, Viktor Kosin, Sanghyun Lee, Thomas Wick; Adaptive matrix-free simulations of fluid-filled phase-field fractures with fixed-stress coupling and fracture-width computation, International Journal for Numerical Methods in Engineering 127, no. 15 (2026): e70392
61. Sanjeeb Poudel, Sanghyun Lee, Lin Mu; Pressure-robust enriched Galerkin finite element methods for coupled Navier-Stokes and heat equations 2025, *Computers and Mathematics with Applications*
60. Kapil Chawla, Youngjoon Hong*, Jaeyong Lee, Sanghyun Lee; Discontinuous Galerkin Finite Element Operator Network for solving non-smooth PDEs, 2025, *SIAM Journal on Scientific Computing*, Volume 48, Issue 5, October 2026, C1327 - C1350,
59. Sanghyun Lee, Wing Tat Leung, Maria Vasilyeva, Son-Young Yi*; Generalized Multiscale Enriched Galerkin Method for Flow in Heterogeneous Porous Media, 2025, *Mathematical Models and Methods in Applied Sciences*
58. Jonathan Valyou, Jeremy Brandman, Sanghyun Lee*; Optimal mean-time path planning for unmanned underwater vehicles: a Hamilton-Jacobi approach, 2025, in revision at *Journal of Scientific Computing*
57. Dabin Park, Sanghyun Lee, Sunghwan Moon*; A Machine Learning and Finite Element Framework for Inverse Elliptic PDEs via Dirichlet-to-Neumann Mapping, *Journal of Computational and Applied Mathematics*, Volume 486, November 2026, 117679

56. Hyun-Geun Shin, Yi-Yung Yang, Sanghyun Lee*; A Posteriori Error Estimation for Parabolic Equations with Enriched Galerkin Finite Element Methods, 2025, in revision at Applied Numerical Mathematics
55. Hemanta Kunwar, Sanghyun Lee, Son-Young Yi*; Non-intrusive global-local method for poroelasticity problems with localized pressure effects, *International Journal for Numerical and Analytical Methods in Geomechanics*, Volume 50, Issue2 10 February 2026 Pages 1033-1044
54. Jihoon Kim*, Sanghyun Lee, Mary Wheeler; Stability analysis of the fixed stress schemes in poroelastodynamics, *International Journal for Numerical and Analytical Methods in Geomechanics*, Volume 50, Issue4, March 2026, Pages 1939-1951
53. Seungmin Lee, Sanghyun Lee*; Convergence and Numerical Simulations of the Continuous Data Assimilation for Biot's Poroelasticity System, *Computers and Mathematics with Applications*, Volume 202, 15 January 2026, Pages 20-37
52. Ryuou Hu, Sanjeeb Poudel, Feng Bao, Sanghyun Lee*; Ensemble Score Filter for Data Assimilation of Two-Phase Flow Models in Porous Media, Volume 544, 1 January 2026, 114416, *Journal of Computational Physics*
51. Dmitri Kuzmin, Sanghyun Lee*, Yi-Yung Yang; Bound-preserving and entropy stable enriched Galerkin methods for nonlinear hyperbolic equations, Volume 541, 5 November 2025, 114323, *Journal of Computational Physics*
50. Sanghyun Lee*, Mary F. Wheeler, Thomas Wick; A phase-field diffraction model for thermo-hydro-mechanical propagating fractures, Volume 239, April 2025, 126487, *International Journal of Heat and Mass Transfer*
49. Sanghyun Lee, Henry von Wahl*, Thomas Wick; A thermo-flow-mechanics-fracture model employing a high-accuracy phase-field interface approach, 126: e7646 2025, *International Journal for Numerical Methods in Engineering*
48. SeongHee Jeong*, Sanghyun Lee; Optimal Control for Darcy's flow in a heterogeneous porous media, Volume 207, January 2025, Pages 303-322, *Applied Numerical Mathematics*
47. Sanjeeb Poudel*, Xiaoqiang Wang, Sanghyun Lee; A novel technique for minimizing energy functional using neural networks, Volume 133, Part D, July 2024, 108313, *Engineering Applications of Artificial Intelligence*
46. Sanghyun Lee, Yeonjong Shin* ; On the training and generalization of deep operator networks, Vol. 46, Iss. 4 2024, *SIAM Journal on Scientific Computing*
45. Francesco Ballarin*, Sanghyun Lee, Son-Young Yi ; Projection-based reduced order modeling of an iterative coupling scheme for thermo-poroelasticity, Volume 21, February 2024, 100430, *Results in Applied Mathematics*
44. Yifan Dai, Bing Hou*, Sanghyun Lee, Thomas Wick ; A thermal-hydraulic-mechanical-chemical coupling model for acid fracture propagation based on a phase-field method, 57(7), 4583-4605, 2024, *Rock Mechanics and Rock Engineering*
43. Son-Young Yi, Sanghyun Lee*; Physics-preserving enriched Galerkin method for a fully-coupled thermo-poroelasticity model, 156, 949–978 2024, *Numerische Mathematik*
42. Sanghyun Lee, Son-Young Yi*; Locking-Free and Locally Conservative Enriched Galerkin Method for Poroelasticity, volume 94, Article number: 26, 2023, *Journal of Scientific Computing*
41. Son-Young Yi, Xiaozhe Hu, Sanghyun Lee*, Jame Adler, Ludmil Zikatanov; An Enriched Galerkin Method for the Stokes Equations, Volume 120, 15 August 2022, Pages 115-131, *Computers & Mathematics with Applications*

40. T. Kadeethum, D. O'Malley, F. Ballarin, I. Ang, J. N. Fuhg, N. Bouklas, V. L. S. Silva, P. Salinas, C. E. Heaney, C. C. Pain, S. Lee, Hari S. Viswanathan, H. Yoon, Enhancing high-fidelity nonlinear solver with reduced order model 12 (1), 1-15, 2022, *Scientific Reports*
39. B. Hou, Y. Dai, M. Fan, K. Zhang, Thomas Wick, Sanghyun Lee, Numerical simulation of pores connection by acid fracturing based on phase field method, 43(6), pp. 849-859, 2022, *Acta Petrolei Sinica*
38. Sanghyun Lee*, Hamid M. Nick, Teeratorn Kadeethum; Choice of interior penalty coefficient for interior penalty discontinuous Galerkin method for Biot's system by employing neural network and machine learning, Volume 21, Number 5, Pages 764–792, 2024, *International Journal of Numerical Analysis and Modeling*
37. Sanghyun Lee*, Teeratorn Kadeethum. Physics-Informed Neural Networks for solving coupled flow and transport system, vol2964, 2021, *AAAI*
36. Son-Young Yi*, Sanghyun Lee, Ludmil Zikatanov Locking-free enriched Galerkin method for linear elasticity, 60:1, 52-75, 2021, *SIAM Journal on Numerical Analysis*
35. Teeratorn Kadeethum*, Sanghyun Lee, Francesco Ballarin, Jinhyun Choo, Hamid M. Nick A Locally Conservative Finite Element Framework for Coupled Hydro-Mechanical-Chemical Processes in Heterogeneous Porous Media, 152, 104774, 2021, *Computers & Geosciences*
34. Teeratorn Kadeethum*, Hamid M. Nick, Sanghyun Lee, Francesco Ballarin; Enriched Galerkin discretization for modeling poroelasticity and permeability alteration in heterogeneous porous media, Volume 427, 2021, *Journal of Computational Physics*
33. Hyunchul Yoon, Sanghyun Lee, S.M. Mallikarjunaiah, Quasi-static anti-plane shear crack propagation in nonlinear strain-limiting elastic solids using phase-field approach, pp.1-20, 2021, *International Journal of Fracture*
32. Sanghyun Lee, S.M. Mallikarjunaiah, Hyunchul Yoon* Finite element simulation of quasi-static tensile fracture in nonlinear strain-limiting solids with the phase-field approach, 399, 113715, 2021, *Journal of Computational and Applied Mathematics*
31. Mary F. Wheeler*, Sanghyun Lee Hydraulic Fracture Propagation Simulations in Porous Media with Natural Fractures by IPACS, 2020; Unconventional Resources Technology Conference, 20-22 July 2020. Unconventional Resources Technology Conference (URTeC)
30. Andrea Rupp, Sanghyun Lee* Continuous Galerkin and enriched Galerkin methods with arbitrary order discontinuous trial functions for the elliptic and parabolic problems with jump conditions, 84 (1), 1-25, 2020, *Journal of Scientific Computing*
29. Teeratorn Kadeethum*, Sanghyun Lee, Hamid M. Nick Finite Element Solvers for Biot's Poroelasticity Equations in Porous Media, 1-30, 2020, *Mathematical Geosciences*
28. Mary F. Wheeler, Thomas Wick*, Sanghyun Lee IPACS: Integrated Phase-Field Advanced Crack Propagation Simulator. An adaptive, parallel, physics-based-discretization phase-field framework for fracture propagation in porous media, 367, 113124, 2020, *Computer Methods in Applied Mechanics and Engineering*
27. Teeratorn Kadeethum*, Hamid M. Nick, Sanghyun Lee, Francesco Ballarin; Flow in Porous Media with Low Dimensional Fractures by Employing Enriched Galerkin Method, 142, 103620, 2020, *Advances in Water Resources*
26. Sanghyun Lee*, Mary F. Wheeler; Modeling interactions of natural and two phase fluid filled fracture propagation in porous media, Volume 25, pages 731–755, 2021, *Computational Geosciences*

25. Teeratorn Kadeethum*, Hamid M. Nick, and Sanghyun Lee; Comparison of Two- and Three-field Formulation Discretizations for Flow and Solid Deformation in Heterogeneous Porous Media, International Association for Mathematical Geosciences, 2019
24. T. Kadeethum*, H.M. Nick, Sanghyun Lee, C.N. Richardson, S. Salimzadeh, F. Ballarin; A Novel Enriched Galerkin Method for Modelling Coupled Flow and Mechanical Deformation in Heterogeneous Porous Media, American Rock Mechanics Association, 2019
23. Rencheng Dong*, Mary F. Wheeler, Sanghyun Lee; Numerical Simulation of Matrix Acidizing in Fractured Carbonate Reservoirs Using Adaptive Enriched Galerkin Method, 2019, SPE 193830-MS, SPE Reservoir Simulation Conference 2019
22. Mary F. Wheeler*, Sanjay Srinivasan, Sanghyun Lee, M. Singh; Unconventional Reservoir Management Modeling Coupling Diffusive Zone/Phase Field Fracture Modeling and Fracture Probability Maps, 2019, SPE 193862-MS, SPE Reservoir Simulation Conference 2019
21. Woocheol. Choi, Sanghyun Lee*; Optimal error estimate of elliptic problems with Dirac sources for discontinuous and enriched Galerkin methods, Volume 150, April 2020, Pages 76-104, *Applied Numerical Mathematics*
20. Sogo Shiozawa*, Sanghyun Lee, Mary F. Wheeler; The effect of stress boundary conditions on fluid-driven fracture propagation in porous media using a phase field modeling approach, Volume 43, Issue6 25 April 2019 Pages 1316-1340, *International Journal for Numerical and Analytical Methods in Geomechanics*
19. Jinhyun Choo*, Sanghyun Lee; Enriched Galerkin Finite Element Method for Locally Mass Conservative Simulation of Coupled Hydromechanical Problems, 2018, Proceedings of China-Europe Conference on Geotechnical Engineering
18. Sanghyun Lee*, Andro. Mikelic, Mary F. Wheeler, Thomas Wick; Phase-field modeling of two-phase fluid-filled fractures in a poroelastic medium, 2018, 16-4, pp. 1542-1580, *SIAM Multiscale Modeling and Simulation*
17. Jinhyun Choo*, Sanghyun Lee; Enriched Galerkin finite elements for coupled poromechanics with local mass conservation, November 2018, Volume 341, Pages 311-332, *Computer Methods in Applied Mechanics and Engineering*
16. Sanghyun Lee*, Mary F. Wheeler; Enriched Galerkin approximations for two phase flow in porous media with capillary pressure, Volume 367, 15 August 2018, Pages 65-86, *Journal of Computational Physics*
15. Sanghyun Lee, Baehyun Min*, , Mary F. Wheeler; Optimal design of hydraulic fracturing in porous media using the phase field fracture model coupled with genetic algorithm, Volume 22, pages 833–849, 2018, *Computational Geosciences*
14. Tameem Almani, Sanghyun Lee*, Mary F. Wheeler, Thomas Wick; Multirate Coupling for Flow and Geomechanics Applied to Hydraulic Fracturing Using an Adaptive Phase-Field Technique, SPE-182610-MS, SPE Reservoir Simulation Conference 2017
13. Guglielmo Scovazzi*, Mary F. Wheeler, Andro Mikelić, Sanghyun Lee, Analytical and variational numerical methods for unstable miscible displacement flows in porous media, Volume 335, 15 April 2017, Pages 444-496, *Journal of Computational Physics*
12. Sanghyun Lee*, Mary F. Wheeler; An adaptive enriched Galerkin method for miscible displacement and viscous fingering problems with entropy residual stabilization, Volume 331, 15 February 2017, Pages 19-37, *Journal of Computational Physics*

11. Sanghyun Lee*, Mary F. Wheeler, Thomas Wick; Iterative coupling of flow, geomechanics and adaptive phase-field fracture including a level-set crack width approach, Volume 314, April 2017, Pages 40-60, *Journal of Computational and Applied Mathematics*
10. Sanghyun Lee, Jacqueline E. Reber* , Mary F. Wheeler, Nick W. Hayman; Investigation of wing crack formation with a combined phase-field and experimental approach, 43, 2016, *Geophysical Research Letters*
9. Sanghyun Lee*, Abner J. Salgado; Stability analysis of pressure correction schemes for the Navier-Stokes equations with traction boundary conditions, Volume 309, 2016, Pages 307-324, *Computer Methods in Applied Mechanics and Engineering*
8. Sanghyun Lee, Mary F. Wheeler*, Thomas Wick, Sanjay Srinivasan; Initialization of phase-field fracture propagation in porous media using probability maps of fracture networks, Volume 80, March 2017, Pages 16-23, *Mechanics Research Communications*
7. Sanghyun Lee*, Young-Ju Lee, Mary F. Wheeler,; A Locally Conservative Enriched Galerkin Approximation and Efficient Solver For Elliptic and Parabolic Problems, 38(3), A1404-A1429, 2016, *SIAM Journal on Scientific Computing*
6. Sanghyun Lee, Andro Mikelić, Mary F. Wheeler*, Thomas Wick; Phase-field modeling of a proppant-filled fracture in a poroelastic medium, Volume 312, Pages 509 - 541, 2016, *Computer Methods in Applied Mechanics and Engineering*
5. Sanghyun Lee*, Mary F. Wheeler, Thomas Wick; Pressure and fluid-driven fracture propagation in porous media using an adaptive finite element phase field model, Volume 305, 15 June 2016, Pages 111-132, *Computer Methods in Applied Mechanics and Engineering*
4. Andrea Bonito*, Jean-Luc Guermond, Sanghyun Lee; Numerical simulations of bouncing jets, 80: 53-75, 2016, *International Journal for Numerical Methods in Fluids*
3. Thomas Wick*, Sanghyun Lee, Mary F. Wheeler; 3D Phase-field for pressurized fracture propagation in heterogeneous media, VI International Conference on Computational Methods for Coupled Problems in Science and Engineering 2015 Proceedings
2. Andrea Bonito*, Jean-Luc Guermond, Sanghyun Lee; Modified Pressure-Correction Projection Methods: Open Boundary and Variable Time Stepping, 103, 623–631, 2015, Numerical Mathematics and Advanced Applications - ENUMATH 2013, Lecture Notes in Computational Science and Engineering
1. Sanghyun Lee, E.Q. Li, J.O. Marston, Andrea Bonito, S.T. Thoroddsen*; Leaping shampoo glides on a lubricating layer, 87, 061001(R) 2013, *Phys. Rev. E*
0. Sanghyun Lee; Numerical Simulations of the Bouncing Jets, PhD Thesis, Texas A&M University, 2014

Invited Seminar and Colloquium Talks

45 Department of Mathematics, Kyungpook National University, South Korea, July 28th 2026

44 Seminar, Seoul National University (Machine Learning and Scientific Computing (MLSC) Lab), South Korea, July 13th 2026

43 Seminar, Ewha Womans University (Energy Systems Laboratory), South Korea, July 8th 2026

42 Numerical Analysis and Scientific Computing Seminar, Rice University, Houston, Texas, Jan 21st 2026

41 ARAMCO Hydraulic Fracturing Seminar, Online, Dec 11th 2025

40 ARMA Hydraulic Fracturing Seminar, Online, Oct 30th 2025

39 Applied Math Seminar, Department of Mathematics, Purdue University, Oct 20th 2025

38 Lecture Series, Department of Mathematics, Kyungpook National University, South Korea, Sep 25th-26th 2024

37 Applied Math Seminar, Institute of Applied Mathematics Leibniz University Hannover, Germany, May 16th 2024

36 Seminar, Institut fur Baumechanik und Numerische Mechanik (IBNM) Leibniz University Hannover, Germany, May 15th 2024

35 Applied Math Seminar, Department of Mathematics, Technical University Dortmund, Germany, May 14th 2024

34 Machine Learning Seminar, Department of Mathematics, Florida State University, USA, Apr 12th, 2024

33 Applied Math Seminar, Department of Mathematics, University of Georgia, Oct 24th, 2023

32 Numerical Analysis Seminar, Department of Mathematics, Texas A&M University, Oct 18th, 2023

31 Applied Mathematics and Computation Seminars, Department of Mathematics, Oregon State University, Sep 29, 2023

30 Colloquium, Department of Scientific Computing, FSU, Sep 27, 2023

29 Colloquium, Department of Mechanical Engineering, College of Engineering, FAMU-FSU, Nov, 2022

28 Applied Math Seminar Talk, Texas A&M University at Corpus Christi, online, Feb, 2022

27 BK Applied Math Seminar Talk, Sungkyunkwan University, online, Jan, 2022

26 Applied Math Seminar Talk, Michigan Tech University, online, Oct, 2021

25 Applied Math Seminar Talk, Kyungpook University, Daegu, South Korea, June, 2021

24 Energy Systems Laboratory, Ewha Womans University, Seoul, South Korea, June, 2021

23 Seminar Talk, Korean Institute of Geoscience and Mineral Resources, Daejeon, South Korea, June, 2021

22 Applied Math Seminar Talk, Sungkyunkwan University, Suwon, South Korea, June, 2021

21 Applied Math Seminar Talk, Seoul National University, Seoul, South Korea, June, 2021

20 Department of Earth Science and Engineering Seminar Talk, Division of Physical Science and Engineering, King Abdullah University of Science and Technology, Saudi Arabia, Jan 27, 2020

19 Department of Mathematics, Numerical Applied Math Seminar Talk, Auburn University, Alabama, USA, Sep 20, 2019

18 J.T. Oden Faculty Fellow Visiting Researcher, the Center for Subsurface Modeling (Mary F. Wheeler), the University of Texas at Austin, 15-28 July 2019

17 Geotech/Structure Seminar Series, the University of Central Florida, Orlando, Florida, 27-28 Feb 2019

16 Seminar Series, Department of Scientific Computing, FSU, Nov 15, 2017

15 Seminar Series, Department of Mechanical Engineering, FSU-FAMU, Oct 3, 2017

14 Colloquium Series, Department of Mathematics, Baylor University, Feb 2, 2017

13 Colloquium Series, Department of Mathematical Sciences, Montclair State University, Jan 29, 2017

12 Colloquium Series, Department of Mathematics, Florida State University, Jan 13, 2017

11 Colloquium Series, Department of Mathematical Sciences, The University of Texas at El Paso, Sep 30, 2016

10 Graduate Seminar Colloquium, Department of Petroleum and Geosystems Engineering, The University of Texas at Austin, Sep 12, 2016

9 Math Seminar, Department of Mathematics, Changwon National University, Changwon, South Korea, July 1, 2016

8 Math Seminar, Department of Mathematics, POSTECH (Pohang University of Science and Technology), Pohang, South Korea, June 30, 2016

7 Math Seminar, Department of Mathematics, Seoul National University, Seoul, South Korea, June 28, 2016

6 Math Seminar, UNIST (Ulsan National Institute of Science and Technology), Ulsan, South Korea, June 27, 2016

5 Seminar, Department of Computational Science & Engineering, Yonsei University, Seoul, South Korea, June 22, 2016

4 Applied Math Seminar, Department of Mathematics, Sogang University, Seoul, South Korea, June 21, 2016

3 Discrete Math Seminar, Texas State University, San Marcos, USA, Nov 13, 2015

2 Differential Equations and Applied Math Seminar, Texas State University, San Marcos, Texas, USA, Apr 24, 2015

1 Computational and Applied Math Seminar, The University of Tennessee, Knoxville, USA, Apr 8, 2015

Conferences and Symposia Organized

2026 **Workshop Co-Organizer**, *Southeast Applied and Computational Math Student Workshop*, 3-4 April 2026, Emory University, USA

2025 **Conference Organizer**, *8th Biot Conference on Poromechanics*, 7-10 Oct 2025, Salt Lake City, Utah, USA
Main organizing committee.

2025 **Mini-Symposium Organizer**, *17th Annual International Conference on Porous Media*, 19-22 May 2025, Albuquerque, New Mexico, USA
Organized (MS07) Mathematical and numerical methods for multiscale, multiphysics, nonlinear coupled processes

2025 **Workshop Co-Organizer**, *Southeast Applied and Computational Math Student Workshop*, 4-5 April 2025, Auburn University, USA

2024 **Mini-Symposium Organizer**, *SIAM Conference on Mathematics of Data Science*, 21-25 Oct 2024, Atlanta, USA
Recent Advances in Scientific Machine Learning for Data-Driven Discovery of Dynamical Systems

2024 **Workshop Organizer**, *Florida-Georgia Applied Computational Math Student Workshop 2023*, 1-2 April 2023, Florida State University, USA

2024 **Mini-Symposium Organizer**, *SIAM Conference Texas-Louisiana Section 7th Annual Meeting*, 11-13 Oct 2024, Baylor University, USA
Recent Advancements in Numerical Methods for Subsurface Simulations

2023 **SIAM Conference on Mathematical & Computational Issues in the Geosciences**, *Organized a minisymposium*, 19-22nd Jun 2023, Bergen, Norway

2023 **Workshop Organizer**, *Florida-Georgia Applied Computational Math Student Workshop 2023*, 1-2 April 2023, Florida State University, USA

2024 **Mini-Symposium Organizer**, *AMS Spring Southeastern Sectional Meeting*, 23-24 Mar 2024, Florida State University, USA
Special Session on Advanced Numerical Methods for Partial Differential Equations and Their Applications

2022 **Session Chair**, *Florida Fluids Symposium*, May 7 2022

2021 **Organizing Committee**, *The Thirty-Fifth AAAI Conference on Artificial Intelligence (AAAI-21)- Combining Artificial Intelligence and Machine Learning with Physics Sciences*, Mar 23-25 2021
Video Conference

2020 **Mini-Symposium Organizer**, *The 44th SIAM Southeastern Atlantic Section Conference*, Mar 2020, Auburn University, USA, *delayed due to Covid-19 pandemic*
Mini-Symposium 13 (MS13): Recent Development of Coupled Problems with Advanced Physics-Based Numerical Methods

2019 **Mini-Symposium Organizer**, *The 20th Annual Conference of the International Association for Mathematical Geosciences*, Aug 2019, Pennsylvania, USA.
"Coupling geomechanics and flow systems in subsurface applications"

2019 **Mini-Symposium Organizer**, *Finite Elements in Fluids*, Apr 2019, Chicago, IL, USA.
"Additive Manufacturing and Digital Rock Physics for Granular and Fractured Materials"

2019 **Mini-Symposium Organizer**, *SIAM Conference on Mathematical and Computational Issues in the Geosciences*, Mar 2019, Houston, TX, USA
"Recent advances in computational modeling of coupled flow and geomechanics in the subsurface environment"

2019 **Mini-Symposium Organizer**, *SIAM Conference on Mathematical and Computational Issues in the Geosciences*, Mar 2019, Houston, TX, USA
"Scalable methods for coupling water-resources modeling and parameter estimation"

Presentations at Conferences and Workshops

2026 **The Spring 2026 Finite Element Circus**, 24-25 Apr 2026, Tufts University

2026 **ICERM Workshop: Simulation-Based Optimization with Applications**, 13-17 Apr, 2026, Brown University

2026 **FSU-NC State University PDE workshop**, 13-14 Feb 2026, Florida State University, Florida

2025 **SIAM Conference on Mathematical & Computational Issues in the Geosciences**, Oct 14-17 2025, Baton Rouge, Louisiana, USA

2025 **8th Biot Conference on Poromechanics**, Oct 7-10 2025, Salt Lake City, Utah, USA

2025 **Texas-Louisiana Section of SIAM 8th Annual Meeting**, Sep 26-28 2025, Austin, Texas

2025 **Modeling and Simulation of Transport Phenomena**, July 27-31 2025, Moselle Valley, Germany

2025 **17th Annual International Conference on Porous Media**, May 19-22 2025, Albuquerque, New Mexico, USA.

2025 **DOE EarthShot PI Meeting**, May 15-16 2025, The University of Texas at El Paso, El Paso, Texas

2025 **NSF Computational Math Meeting**, May 8-9 2025, The University of Utah, Utah

2024 **SIAM Conference on Mathematics of Data Science**, Oct 21-25 2024, Atlanta, Georgia

2024 **The 11th deal.II Workshop**, Aug 11-16 2024, Colorado State University, Fort Collins, Colorado

2024 **WCCM 2024**, July 21-26 2024, Vancouver, British Columbia, Canada

2024 **NSF PI meeting**, July 15-16 2024, Seattle, Washington

2024 **SIAM Annual Meeting**, July 8-12 2024, Spokane, Washington

2024 **The Eleventh Graduate Student Conference**, Apr 20-21 2024, Clemson University

2024 **Southeast Applied and Computational Math Student Workshop**, Apr 5-7 2024, Georgia Institute of Technology, Atlanta, GA

2024 **AMS Spring Southeastern Sectional Meeting**, March 23-24, 2024, Florida State University, Tallahassee, FL

2024 **Affiliates Meeting, The Center for Subsurface Modeling,**, March 21, 2024, The University of Texas at Austin, Austin, TX

2024 **ICERM Numerical Analysis of Multiphysics Problems**, February 12-16, 2024, Brown University

2023 **The 41st Southeastern-Atlantic Regional Conference on Differential Equations**, November 18-19, 2023, Florida A&M University

2023 **Fall 2023 Finite Element Circus**, 20-21st Oct 2023, The University of Notre Dame, Indiana

2023 **SIAM Conference on Mathematical & Computational Issues in the Geosciences**, *Organized a minisymposium and Presented a talk*, 19-22nd Jun 2023, Bergen, Norway

2023 **Florida-Georgia Applied and Computational Math Student Workshop**, *Invited as Plenary Speaker*, Apr 1st-2nd, Florida State University, USA

2023 **Spring Southeastern Sectional Meeting**, *Invited at the minisymposium*, Mar 18th-19th, Georgia Tech University, USA

2022 **SIAM Conference on Mathematics of Data Science**, *Invited at the Minisymposium : MS98 Machine Learning in Numerical PDEs and Their Applications*, Sep 26th-30th, San Diego, USA

2022 **Florida Fluids Symposium**, *Invited speaker in a session*, Computational Method, May 7

2022 **ICCMAE 2022: The Second International Conference on Computational Methods and Applications in Engineering**, *Invited speaker in a minisymposium*, May 7 - May 8 2022, Video online talk

2021 **13th International Conference on Large-Scale scientific computations**, *Invited speaker in a minisymposium (Robust Iterative Solution Methods for Coupled Problems in Poromechanics)* , June 7- June 11 2021, Video online conference

2021 **Interpore 2021**, *Invited speaker in a minisymposium (Mathematical and computational challenges related to porous media - Special session in memory of Andro Mikelic (invitation only))* , May 31- June 4 2021, Video online conference

2021 **The Thirty-Fifth AAAI Conference on Artificial Intelligence (AAAI-21)-Combining Artificial Intelligence and Machine Learning with Physics Sciences**, *Organizing committee and presenting a talk*, Mar 23-25 2021, Video Conference

2020 **The 44th SIAM Southeastern Atlantic Section Conference**, *Organized a minisymposium and presenting a talk : Mini-Symposium 13 (MS13): Recent Development of Coupled Problems with Advanced Physics Based Numerical Methods*, Mar 2020, Auburn University, USA, *delayed due to Covid-19 pandemic*

2020 **WCCM & ECCOMAS Congress 2020**, *Nonlinear strain limiting fracture propagation*, July 19-24 2020, Paris, France *Video online conference*

2020 **Computational Methods in Water Resources XXIII (CMWR)**, *Physics Informed Neural Network for coupled flow and transport*, June 21-25 2020, Stanford University, CA, USA, *Video online conference*

2020 **The Center for Subsurface Modeling Annual Industrial Affiliates Meeting**, *Invited Speaker*, Mar 3-4 2020, Institute for Computational Engineering and Sciences, The University of Texas at Austin Austin, TX, USA

2019 **The 20th Annual Conference of the International Association for Mathematical Geosciences (IAMG)**, *Organized a minisymposium : Coupling geomechanics and flow systems in subsurface applications*, Aug 2019, Pennsylvania, USA

2019 **The US National Congress on Computational Mechanics (USNCCM)**, *Presented a talk in Advances in Computational Methods for Subsurface Modeling: In Honor of Professor Mary F. Wheeler*, Aug 2019, Austin, Texas, USA

2019 **Finite Elements in Fluids**, *Organized a minisymposium : Additive Manufacturing and Digital Rock Physics for Granular and Fractured Materials*, Apr 2019, Chicago, IL, USA

2019 **SIAM Conference on Mathematical & Computational Issues in the Geosciences**, *Organized a minisymposium I : Recent advances in computational modeling of coupled flow and geomechanics in the subsurface environment*, Mar 2019, Houston, TX, USA

2019 **SIAM Conference on Mathematical & Computational Issues in the Geosciences**, *Organized a minisymposium II : Scalable methods for coupling water resources modeling and parameter estimation*, Mar 2019, Houston, TX, USA

2018 **AGU Fall Meeting 2018**, *T31F: Numerical and Laboratory Analogue Models of Dykes, Sills, and Hydraulic Fractures* , Dec 2018, Washington D.C, USA

2018 **Hydraulic Fracturing: Modeling, Simulation, and Experiment (18w5085)**, *Invited speaker (Phase field modeling for fracture propagation in porous medium)*, Jun 3-8 2018, BIRS (Banff International Research Station)

2018 **The Center for Subsurface Modeling Annual Industrial Affiliates Meeting 2018**, Apr 11-12 2018, Institute for Computational Engineering and Sciences, The University of Texas at Austin Austin, TX, USA

2018 **Finite Element Rodeo 2018**, *presented a talk; "Enriched Galerkin Approximation for Coupled Systems"*, Feb 23-24 2018, LSU, Baton Rouge, Louisiana, USA.

2017 **Finite Element Circus 2017**, *presented a talk; "Enriched Galerkin Approximation for Flow and Transport"*, Oct 20-21 2017, UMBC, Baltimore, Maryland, USA.

2017 **SIAM Conference on Mathematical and Computational Issues in the Geosciences**, *Mini-Symposium: Coupled Geomechanics and Flow Systems in Porous Media*, September 11-14, 2017, Erlangen, Germany
"Phase-Field Modeling for Fracture Propagation in Porous Media and its applications"

2017 **14th U.S. National Congress on Computational Mechanics**, *507 - Phase-field Modeling and Simulation in Fluids, Solids and Biomechanics*, July 17-20, 2017, Palais des Congres de Montreal, QC, Canada
"Hydraulic Fracturing in Porous Media using Phase Field Approach"

2017 **Analog Modeling of Tectonic Processes**, *presented a poster*, May 17 - 19 2017, Bureau of Economic Geology, The University of Texas at Austin, USA

2017 **Institute for Pure and Applied Mathematics (IPAM): Computational Issues in Oil Field Applications**, *Invited speaker in Workshop I: Multiphysics, Multiscale, and Coupled Problems in Subsurface Physics*, Apr 3 - 7 2017, UCLA, California, USA

2017 **Advances in Computational Sciences and Engineering: A conference in honor of the 80th birthday of Prof. J. Tinsley Oden**, *Presented a poster*, Mar 20-21, 2017, University of Texas at Austin, USA

2017 **SIAM Conference on Computational Science and Engineering** , *Invited to the MiniSymposium : 'Computational Poromechanics'* , Feb 27- Mar 3, 2017, Atlanta, Georgia, USA

2017 **SPE Reservoir Simulation Conference 2017**, *talk: SPE-182610-MS Multirate Coupling for Flow and Geomechanics Applied to Hydraulic Fracturing Using an Adaptive Phase-Field Technique*, Feb 20-22, 2017, Montgomery, Texas, USA

2016 **The Mathematics of Finite Elements and Applications (MAFELAP) 2016**, *Invited to the mini symposia 'Numerical Methods for Flow and Fractures in Subsurface Modeling'*, June 14-17 2016, Brunel University, London

2016 **Finite Element Rodeo 2016**, *presented a talk; "Enriched Galerkin Approximation for Hydraulic Fracture Propagation"*, Mar 4-5 2016, Texas A&M University, USA

2016 **EFRC-CFSES DOE Review Meeting**, *presented a talk; "Pressure and fluid-driven fracture propagation in porous media using an adaptive finite element phase field model"*, Mar 3 2016, Gaithersburg Marriott Washingtonian Center, Gaithersburg, MD USA

2016 **UT- Third Carbon Capture and Sequestration DOE CFSES Annual Meeting**, *presented a talk; "Pressure and fluid-driven fracture propagation in porous media using an adaptive finite element phase field model"*, Feb 17-18 2016, University of Texas at Austin, USA

2015 **25th CSM Annual Industrial Affiliates Meeting 2015**, *presented a talk; "Phase field modeling for fluid filled fractures in porous media"*, Nov 3-4 2015, AT&T Conference Center, University of Texas at Austin, USA

2015 **2015 Department of Energy (DOE) Carbon Storage RD Project Review Meeting**, *Poster: Fracture Propagation in Porous Media using Phase Field Model*, August 18-20, 2015, Sheraton Station Square Hotel, Pittsburgh, USA

2015 **USACM's 13th U.S. National Congress on Computational Mechanics (USNCCM13)**, *presented a talk; "3D Phase field modeling for fluid filled fracture propagation" in the mini symposia: Phase Field Methods for Moving Interfaces in Physics and Biology;* , July 26-30, 2015, San Diego, California, USA

2015 **SIAM Conference on Mathematical and Computational Issues in the Geosciences**, *presented a talk; "Phase field modeling for fracture propagation", in the minisymposium 'Fluid-rock interactions in fractured media'*, June 29 - July 2, 2015, Stanford University, California USA

2015 **Hydraulic Fracturing: From Modeling and Simulation to Reconstruction and Characterization**, *Poster: "3D Fracture Propagation using Phase Field"*, May 11 - 14, 2015, IMA, Minnesota, USA

2015 **Advanced Numerical Methods in the Mathematical Sciences**, *Poster: "3D Fracture Propagation using Phase Field"*, May 4-8, 2015, Texas A&M University, College Station, Texas, USA

2015 **DOE Center for Frontiers of Subsurface Energy Security (CFSES) Annual Meeting**, *Poster: "Fracture with Gel and Phase Field Model"*, Apr 9-10 2015, University of Texas at Austin

2015 **Finite Element Rodeo 2015**, *presented a talk; "Fluid Filled Fracture Propagation"*, Feb 27-28 2015, Southern Methodist University, Dallas, Texas, USA

2014 **24th CSM Annual Industrial Affiliates Meeting 2014**, *presented a talk: "Phase Field Modeling for Fracture Propagation"*, Nov 17-18 2014, AT&T Conference Center, University of Texas at Austin

2014 **SIAM Annual Meeting 2014**, *presented a talk; "Numerical Investigations of Bouncing Jets", in the Mini Symposium 'Nonlinear Fluids'*, July 7-11 2014, The Palmer House,Chicago, Illinois USA

2014 **Finite Element Rodeo 2014**, *presented a talk: "Bouncing Jets"*, Feb.28-Mar.1 2014, University of Texas at Austin,USA

2013 **ENUMATH(European Numerical Mathematics and Advanced Applications) 2013**, *"Numerical Simulation of the Kaye effects"*, Minisymposia in Numerical methods for fluid flows with free boundaries and interfaces, Aug.26-30 2013; EPFL, Lausanne, Switzerland

2013 **4th deal.II Workshop**, *presented a talk: "Two Phase Flow with Free Boundary: Numerical Simulation of the Kaye effects"*, Aug.19-22 2013, Texas A&M University, USA

2013 **Finite Element Circus and Rodeo 2013**, *presented a talk: "Numerical Simulation of the Kaye effects"*, Mar.8-9 2013, Louisiana State University,USA

2012 **4th IAMCS Annual Spring Symposium**, *presented a talk; "Towards Numerical Simulation of Kaye Effect"*, May.5-6 2012, KAUST,Saudi Arabia

2012 **Finite Element Rodeo 2012**, *presented a talk: "Towards Numerical Simulation of Kaye Effect"*, Mar.2-3 2012, Rice University,Houston,USA

Member of Doctoral Committee

6 Ryan Bausback; Ph.D (2025), Department of Mathematics. Florida State University.

5 AbuShoshah, Mohammed Ahmed; Ph.D (2025), Department of Mathematics. Florida State University.

4 Estebe, Cody Lee; Ph.D (2024), Department of Mathematics, Florida State University.

3 Ream, Julia Alison; Ph.D (2023), Department of Mathematics, Florida State University.

2 Wilson, Azaryah Asher; Ph.D (2024), Department of Mathematics, Florida State University.

1 Samuel Conner; Ph.D (2023), Department of Mathematics, Florida State University.

Member of Committee for Honors in the Major Thesis

3 Abby Scott; 2024, Department of Biomedical Engineering, Florida State University

2 Carolyn Emerson; 2024, Department of Meteorology, Florida State University

1 Ethan Todd; 2023, Department of Physics, Florida State University

Teaching Experience

Spring 2026 **MAP 5395 Finite Element Method**
Department of Mathematics, Florida State University

Spring 2025 **MAS 3105 Linear Algebra**
Department of Mathematics, Florida State University

Spring 2024 **MAD 5404 Foundation of Computational Mathematics II**
Department of Mathematics, Florida State University

Fall 2023 **MAD 5403 Foundation of Computational Mathematics I**
Department of Mathematics, Florida State University

Fall 2023 **Applied Computational Mathematics Seminar**
Department of Mathematics, Florida State University

Spring 2023 **MAC 2313: 0008 Calculus with analytical geometry III**
Department of Mathematics, Florida State University

Spring 2023 **MAD 5404 Foundation of Computational Mathematics II**
Department of Mathematics, Florida State University

Fall 2022 **Applied Computational Mathematics Seminar**
Department of Mathematics, Florida State University

Fall 2022 **MAD 5403 Foundation of Computational Mathematics I**
Department of Mathematics, Florida State University

Spring 2022 **MAP 5395 Finite Element Method**
Department of Mathematics, Florida State University

Fall 2021 **MAC 2313: 0005 and 0010 Calculus with analytical geometry III**
Department of Mathematics, Florida State University

Spring 2021 **MAP 5395 Finite Element Method**
Department of Mathematics, Florida State University

Spring 2021 **MAD 3703 Numerical Analysis**
Department of Mathematics, Florida State University

Fall 2020 **MAC 2313:006 Calculus with analytical geometry III**
Department of Mathematics, Florida State University

Spring 2020 **MAP 5395 Finite Element Method**
Department of Mathematics, Florida State University

Fall 2019 **MAD 3703 Numerical Analysis**
Department of Mathematics, Florida State University

Fall 2019 **MAC 2313:006 Calculus with analytical geometry III**
Department of Mathematics, Florida State University

Summer 2019 **MAP 2702 Ordinary Differential Equations**
Department of Mathematics, Florida State University

Spring 2019 **MAD 3703 Numerical Analysis**
Department of Mathematics, Florida State University

Fall 2018 **MAC 2313:006 Calculus with analytical geometry III**
Department of Mathematics, Florida State University

Spring 2018 **MAC 2313:002 Calculus with analytical geometry III**
Department of Mathematics, Florida State University

Fall 2017 **MAC 2313:005 Calculus with analytical geometry III**
Department of Mathematics, Florida State University

Spring 2014 **MATH 610:600 Numerical Methods for PDE**
Responsibilities: Homework, finite element numerical simulations lab sessions

Fall 2013 **MATH 412 Applied Partial Differential Equations**
Responsibilities: Grading and help sessions

Spring 2013 **MATH 131:504 Mathematical Concepts - Calculus**, *Instructor*
Responsibilities: Full management, lectures, homework, quizzes, and exams.

Fall 2012 **MATH 131:501 Mathematical Concepts - Calculus**, *Instructor*
Responsibilities: Full management, lectures, homework, quizzes, and exams.

Fall 2011 **MATH 609:600 Numerical Analysis**
Responsibilities: Homework, numerical methods programming lab sessions

Spring 2011 **MATH 610:600 Numerical Methods for PDE**
Responsibilities: Homework, finite element numerical simulations lab sessions

Fall 2010 **MATH 151:801-803 Engineering Mathematics I**
Responsibilities: Exercise classes, homework, quizzes and MATLAB sessions

Summer 2010 **MATH 308:503-504 Differential Equations**
Responsibilities: Grading and help sessions

Spring 2010 **MATH 152:522-524 Engineering Mathematics II**
Responsibilities: Exercise classes, homework, quizzes and MATLAB sessions

Fall 2009 **MATH 151:519-521 Engineering Mathematics I**
Responsibilities: Exercise classes, homework, quizzes and MATLAB sessions

Summer 2009 **MATH 151:301-302 Engineering Mathematics I**
Responsibilities: Exercise classes, homework, quizzes and MATLAB sessions

Spring 2009 **MATH 409 Advanced Calculus**
Responsibilities: Grading and help sessions

Fall 2008 **MATH 304 Linear Algebra**
Responsibilities: Grading and help sessions

Professional Service

External Proposal Review and Panels

Panelist / Reviewer, *National Science Foundation*, Computational Mathematics; Directorate for Engineering; Graduate Research Fellowship Program; CAREER Program

Reviewer for Proposals, *U.S. Department of Energy*, Advanced Scientific Computing Research (ASCR); Basic Energy Sciences (BES)

Reviewer for Proposals, *American Chemical Society*, Petroleum Research Fund

Editorial and Journal Service

2024 **Editorial Board, Special Issue**, *Results in Applied Mathematics*, "Coupled Processes: Modeling, Analysis, and Numerics"

Since 2020 **Topic Editor**, *Fluids*

Since 2014 **Reviewer for peer-reviewed journals**, *Advances in Water Resources; Applied Numerical Mathematics; Applied Mathematics and Computation; Computational Geosciences; Computers & Fluids; Computers & Mathematics with Applications; Computer Methods in Applied Mechanics and Engineering; Engineering Fracture Mechanics; International Journal on Geomathematics; Numerical Methods for Partial Differential Equations; SIAM Journal on Scientific Computing; SIAM Journal on Numerical Analysis; Numerische Mathematik*

Departmental Service

Department of Mathematics, Florida State University

2025–2026 **Faculty Evaluation Committee**

2019–2023; 2025–2026 **Graduate Student Admission Committee**

2021–2022; 2023–2024 **Tenure-Track Faculty Search Committee**

2018–2019; 2022–2023 **Postdoctoral Search Committee**