# CURRICULUM VITAE

*Todd James Arbogast*

September 10, 2021

## Personal Data


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| Current Address: | The University of Texas at Austin<br>Department of Mathematics<br>2515 Speedway, Stop C1200<br>Austin, Texas 78712-1202 |
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## Education

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|---|---|---|
| Ph.D. (Mathematics) | University of Chicago | 1987 |
| S.M. (Mathematics) | University of Chicago | 1983 |
| B.S. (Mathematics, with high distinction) | University of Minnesota | 1981 |
| B.S. (Physics, with high distinction) | University of Minnesota | 1981 |

## Professional Experience

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| W.A. "Tex" Moncrief, Jr. Distinguished Professorship in Computational Engineering and Sciences — Applied Mathematics | University of Texas at Austin | 2019– |
| W.A. "Tex" Moncrief, Jr. Simulation-Based Engineering and Sciences Professorship I | University of Texas at Austin | 2014–2019 |
| Professor | University of Texas at Austin | 2001– |
| Associate Professor | University of Texas at Austin | 1995–2001 |
| Assistant & Associate Professor | Rice University | 1993–1995 |
| Faculty Fellow | Rice University | 1992–1993 |
| Visiting Assistant Professor | Rice University | 1990–1992 |
| NSF Postdoctoral Research Fellow | University of Houston | 1989–1990 |
| Assistant Professor | Purdue University | 1988–1991 |
| Research Assistant Professor | Purdue University | 1987–1988 |
| Visitor | Institute for Mathematics and its Applications, Univ. of Minnesota | 1986–1987 |
| Lecturer | University of Chicago | 1983–1986 |

## Professional Service

Editorial Board, Numerical Algorithms, 2021–
Editorial Board, Results in Applied Mathematics (RINAM), 2018–
Editorial Board, Advances in Water Resources, 2000–
Editorial Board, Advances in Applied Mathematics and Mechanics, 2014–2018
Editorial Board, Open Modeling and Computation for Flow and Transport Journal, 2012–2014
Associate Editor, SIAM Journal on Numerical Analysis, 1999–2013

**Research Interests**

Algorithm development and numerical analysis of partial differential equations
Homogenization and multi-scale analysis
Mathematical modeling and simulation of subsurface flow phenomena
Eulerian-Lagrangian and WENO methods for transport problems
High performance, parallel, scientific computing

**Professional Societies**

American Mathematical Society
- Fellow, 2012
- ICM 2022 Travel Grants Selection Committee, 2021–2022

Society for Industrial and Applied Mathematics
- Activity Group on Geosciences Early Career Prize Committee, 2020–2021
- Fellow, 2018
- Chair, Activity Group on Geosciences, 2013–2014
- Program Director, Activity Group on Geosciences, 2007–2008
- Faculty co-advisor of the University of Texas Student Chapter, 2006–

Society of Petroleum Engineers
The International Society for Porous Media (InterPore)
- InterPore Rosette award 2014

**Research Centers and Institutes**

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| Department of Statistics and Data Sciences, associated faculty, | 2007– |
| Oden Institute for Computational Engineering & Sciences (Oden, formerly ICES) | |
| Core faculty | 2003– |
| Advisory Board | 2009– |
| Texas Institute for Computational and Applied Mathematics (TICAM) | 1995–2003 |
| Center for Subsurface Modeling, TICAM/Oden | 1995– |
| Associate Director | 2008– |
| Center for Numerical Analysis, TICAM/Oden | 1997– |
| Center for Research on Parallel Computation, Rice Univ., | |
| Technical Steering Committee | 1997–1999 |

**Honors and Awards**

Fellow of the Society for Industrial and Applied Mathematics, 2018
Simons Visiting Professorship, Mathematisches Forschungsinstitut Oberwolfach, 2014
Fellow of the American Mathematical Society, 2012
Moncrief Grand Challenge Faculty Award, 2012 (The University of Texas at Austin)
ICES Distinguished Research Award, 2011 (The University of Texas at Austin)
Frank Gerth III Faculty Fellowship, 2008–2017 (The University of Texas at Austin)
The President's Associates Centennial Teaching Fellowship in Mathematics, 1997–1998 (The University of Texas at Austin)
National Science Foundation Mathematical Sciences Postdoctoral Research Fellowship, 1989–1992 (University of Houston and Rice University)
Robert R. McCormick Fellowship, 1981–1984 (University of Chicago)
Sigma Pi Sigma (physics) and Tau Beta Pi (engineering) honor societies
Century Fund Scholarship, 1976–1977 (University of Minnesota)

**Invited Presentations since 2012**

1. "Direct serendipity and mixed finite elements on convex polygons," 16th U.S. National Congress on Computational Mechanics, virtual from Chicage, Illinois, July 26–29, 2021
2. "A self-adaptive theta method for conservation laws using discontinuity aware quadrature," 3rd Annual Meeting of the SIAM Texas-Louisiana Section, hosted virtually by Texas A&M University, October 16–18, 2020.
3. "Implicit finite volume approximation of nonlinear advection-diffusion equations," The Babuška Forum, Oden Institute, University of Texas at Austin, May 29, 2020.
4. "Finite volume WENO schemes for nonlinear parabolic problems with degenerate diffusion on non-uniform meshes," SIAM Conference on Analysis of Partial Differential Equations, La Quinta, California, December 11–14, 2019.
5. "Approximation of advection-diffusion equations using implicit WENO methods," King Abdullah University of Science and Technology, Thuwal, Saudi Arabia, November, 2019.
6. "Approximation of advection-diffusion equations using implicit WENO methods," Conference on Computational Mathematics and Applications (CCMA), University of Nevada, Las Vegas, October 25–27, 2019.
7. Plenary lecture: "Approximation of Advection-Diffusion Equations using Implicit WENO Methods," Workshop on Scientific Computing meets Machine Learning and Life Sciences, Texas Tech University, Lubbock, Texas, October 7–9, 2019.
8. "Implicit WENO Schemes for Two-Phase Flow in Porous Media," 15th U.S. National Congress on Computational Mechanics (USNCCM) of the USACM, Austin, Texas, July 18–August 1, 2019.
9. "Mixed finite element methods for second order elliptic problems," Numerical PDE's Day, National Sun Yat-Sen University, Kaohsiung, Taiwan (ROC), June 20, 2019.
10. Minisymposium lecture: "Direct Serendipity and Mixed Finite Elements on Quadrilaterals for Flow and Transport in Porous Media," SIAM Conference on Mathematical & Computational Issues in the Geosciences (GS19), Houston, Texas, Mar. 11–14, 2019.
11. Plenary lecture: "Mixed Methods for Two-Phase Darcy-Stokes Mixtures of Partially Melted Materials with Regions of Zero Porosity," The 1st Annual Meeting of the SIAM Texas-Louisiana Section, Lousiana State University, Baton Rouge, LA, Oct. 5–7, 2018.
12. "Mixed methods for two-phase Darcy-Stokes mixtures of partially melted materials with regions of zero porosity," Workshop on Reactive Flows in Deformable, Complex Media, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany, Aug. 27–31, 2018.
13. Minisymposium lecture: Minisymposium lecture: "A linearly stable, implicit WENO scheme applied to two-phase flow in porous media," The tenth Annual Meeting and Jubilee of the Int'l. Society for Porous Media (InterPore), New Orleans, LA, May 14–17, 2018.
14. Applied Math Colloquium: "Mixed finite element methods for second order elliptic problems," University of Arizona, Tucson, Arizona, November 17, 2017.
15. Poster: "H(div) Mixed Finite Elements of Minimal Dimension on Quadrilaterals and Hexahedra," SIAM Conference on Mathematical and Computational Issues in the Geosciences, Erlangen, Germany, September 11–14, 2017.
16. Minisymposium lecture: "Mixed methods for two-phase Darcy-Stokes mixtures of partially melted materials with regions of zero porosity," SIAM Conference on Mathematical and Computational Issues in the Geosciences, Erlangen, Germany, September 11–14, 2017.
17. Plenary lecture: "Mixed methods for two-phase Darcy-Stokes mixtures of partially melted materials with regions of zero porosity," Current trends and challenges in numerical PDEs, Purdue University, July 7–8, 2017.

18. Poster: "H(div) Mixed Finite Elements of Minimal Dimension on Quadrilaterals and Cuboidal Hexahedra," Institute for Mathematics and its Applications, Univ. of Minn., workshop on *Recent Advances and Challenges in Discontinuous Galerkin Methods and Related Approaches,* June 29–July 1, 2017.
19. "Mixed methods for two-phase Darcy-Stokes mixtures of partially melted materials with regions of zero porosity," National Sun Yat-Sen University, Kaohsiung, Taiwan (ROC), June 2017.
20. Poster: "H(div) Mixed Finite Elements of Minimal Dimension on Quadrilaterals and Hexahedra," Advances in Computational Sciences and Engineering: A conference in honor of the 80th birthday of Prof. J. Tinsley Oden, USACM, Austin, TX, March 20–21, 2017
21. "Mixed methods for two-phase Darcy-Stokes mixtures of partially melted materials with regions of zero porosity," Laboratório Nacional de Computação Científica (LNCC), Petropolis, Brazil, March 13, 2017.
22. Poster: "H(div) Mixed Finite Elements of Minimal Dimension on Quadrilaterals and Hexahedra," SIAM Conference on Computational Science and Engineering, Atlanta, Georgia, Feb. 27–Mar. 3, 2017.
23. Minisymposium lecture: "Mixed methods for two-phase Darcy-Stokes mixtures of partially melted materials with regions of zero porosity," SIAM Conference on Computational Science and Engineering, Atlanta, Georgia, Feb. 27–Mar. 3, 2017.
24. "Mixed methods for two-phase Darcy-Stokes mixtures of partially melted materials with regions of zero porosity," Department of Mathematics, University of Minnesota, Oct. 28, 2016.
25. Minisymposium lecture: "Some new approaches to simulating two-phase flow in porous media on hexahedral meshes," The 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications, The American Institute of Mathematical Sciences, Orlando, Florida, July 1–5, 2016.
26. "New mixed finite elements of minimal dimension on quadrilaterals," University of Bergen, Bergen, Norway, June 22, 2016.
27. Minisymposium lecture: "New mixed finite elements on quadrilaterals of minimal dimension," The Mathematics of Finite Elements and Applications (MAFELAP) 2016, Brunel University, London, England, June 14–17, 2016.
28. Plenary lecture: "Mixed methods for two-phase Darcy-Stokes mixtures of partially melted materials with regions of zero porosity," Program on Melt in the Mantle, From the Continuum to the Tectonic: the Magma/Mantle Dynamics of Planet Earth, Isaac Newton Institute for Mathematical Sciences, Cambridge, England, June 6–10, 2016, organized by T. Arbogast, A. Deuss, R. Katz, J. Neufeld, J. Rudge (Chair) and Y. Takei.
29. Minisymposium lecture: "Some new approaches to simulating two-phase flow in porous media on hexahedral meshes," The eighth International Conference on Porous Media and the Annual meeting of the International Society for Porous Media (InterPore), Cincinnati, Ohio, May 9–12, 2016.
30. "Approximation of a degenerate elliptic equation arising from a two-phase mixture modeling the Earth's mantle," Department of Mathematics, University of Wyoming, November 13, 2015.
31. "Approximation of a degenerate elliptic equation arising from a two-phase mixture modeling the Earth's mantle," Conference on Numerical and Multiscale Issues for Partial and Integral Differential Equations, Department of Mathematics and Institute for Computational Engineering and Sciences, University of Texas at Austin, October 14–17, 2015.
32. "High-order Eulerian-Lagrangian WENO schemes for nonlinear advection," The Third In-

ternational Conference on High Performance Computing and Applications (HPCA 2015), Shanghai, China, July 26–30, 2015.

33. "Approximation of a degenerate elliptic equation arising from a two-phase mixture modeling the motion of the Earth's mantle," National Chung Hsing University, Taichung, Taiwan (ROC), July, 2015.
34. "Two families of H(div) mixed finite elements on quadrilaterals of minimal dimension," National Sun Yat-Sen University, Kaohsiung, Taiwan (ROC), July 2015.
35. "H(div) mixed finite elements on quadrilaterals of minimal dimension," SIAM Conference on Mathematical and Computational Issues in the Geosciences, Stanford University, Palo Alto, CA, June 29–July 2, 2015.
36. "Approximation of a degenerate elliptic equation arising from a two-phase mixture modeling the motion of the Earth's mantle," Advanced Numerical Methods in the Mathematical Sciences, Texas A&M University, College Station, TX, May 4–7, 2015.
37. "Approximation of a degenerate elliptic equation arising from a two-phase mixture modeling the motion of the Earth's mantle," MAA Invited Paper Session on the Mathematics of Planet Earth, Joint Mathematics Meetings, San Antonio, TX, Jan. 11, 2015.
38. "Approximation of transport using Eulerian-Lagrangian techniques," King Abdullah University of Science and Technology, Thuwal, Saudi Arabia, January 5, 2015.
39. "Multiscale mixed methods for heterogeneous elliptic problems," Eindhoven University of Technology, Eindhoven, Netherlands, Oct. 8, 2014
40. "Approximation of a linear degenerate elliptic equation arising from a two-phase mixture," University of Bergen, Bergen, Norway, Oct. 3, 2014.
41. "Approximation of transport using Eulerian-Lagrangian techniques," Workshop on Reactive Flows in Deformable, Complex Media, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany, Sept. 21–27, 2014.
42. "Approximation of a linear degenerate elliptic equation arising from a two-phase mixture," Inria, Paris-Rocquencourt, France, Sept. 17, 2014.
43. "Approximation of a Linear Degenerate Elliptic Equation Arising from A Two-Phase Mixture," National Sun Yat-Sen University, Kaohsiung, Taiwan (ROC), August, 2014.
44. "Aspects of discontinuous multiscale flow approximations on transport and a two-level mortar preconditioner," National Sun Yat-Sen University, Kaohsiung, Taiwan (ROC), August, 2014.
45. "Approximation of a linear degenerate elliptic equation arising from a two-phase mixture," International Workshop on Computational Mathematics — Advances in Computational PDEs ICM 2014, Satellite Conference: 2014 NIMS Hot Topics Workshop, Yonsei University, Seoul, Korea, August 9–12, 2014.
46. "Aspects of discontinuous multiscale flow approximations on transort and a two-level mortar preconditioner," Workshop on Computational Multiscale Methods, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany, June 22–28, 2014.
47. "An Eulerian-Lagrangian WENO scheme for two-phase flow in porous media," The sixth International Conference on Porous Media and the Annual meeting of the International Society for Porous Media (InterPore), Milwaukee, Wisconsin, May 27–30, 2014.
48. "Approximation of advection using Eulerian-Lagrangian techniques," Baylor University, Waco, Texas, April 14, 2014.
49. "Approximation of advection using Eulerian-Lagrangian techniques," Southern Methodist University, Dallas, Texas, March 6, 2014.
50. "Mixed mortar methods for flow in heterogeneous porous media," National Sun Yat-Sen University, Kaohsiung, Taiwan (ROC), August 15, 2013.
51. "Approximation of transport processes using Eulerian-Lagrangian techniques," National Sun

Yat-Sen University, Kaohsiung, Taiwan (ROC), August 8, 2013.

52. Plenary: "Approximation of transport processes using Eulerian-Lagrangian techniques," SIAM Conference on Mathematical and Computational Issues in the Geosciences, Padova, Italy, June 17–20, 2013.
53. "Mixed mortar methods for flow in heterogeneous porous media," SIAM Conference on Mathematical and Computational Issues in the Geosciences, Padova, Italy, June 17–20, 2013.
54. "Homogenization-based mortar mixed methods for heterogeneous elliptic problems," ICES Thematic Workshop on Multiscale Modeling, The University of Texas at Austin, April 29–May 1, 2013.
55. "An Eulerian-Lagrangian WENO finite volume scheme for linear transport," South Central Conference on Advanced Numerical Methods and Applications, Little Rock, Arkansas, April 5–7, 2013.
56. "A locally conservative Eulerian-Lagrangian method for a two-phase flow problem," SIAM Conference on Computational Science and Engineering, Boston, MA, February 25–March 1, 2013.
57. "Mortar methods for flow in heterogeneous porous media," SIAM Conference on Computational Science and Engineering, Boston, MA, February 25–March 1, 2013.
58. "Eulerian-Lagrangian finite volume schemes for linear advection problems," University of Texas, Austin, Texas, September 7, 2012.
59. "Eulerian-Lagrangian finite volume schemes for linear advection problems," University of Illinous at Chicago, Chicago, Illinois, August 13, 2012.
60. "Homogenization-based mortar methods for porous media," SIAM Annual Meeting, Minneapolis, Minnesota, July 9–13, 2012.
61. "An Eulerian-Lagrangian WENO Finite Volume Scheme for Advection Problems," The 4th International Conference on Porous Media and the Annual meeting of the International Society for Porous Media (InterPore), Purdue University, West Layayette, Indiana, May 14–16, 2012.
62. Semi-plenary: "Multiscale mixed methods for heterogeneous elliptic problems," The Eighth International Conference on Scientific Computing and Applications, University of Nevada, Las Vegas, April 1–4, 2012.
63. "A Multiscale Mortar Mixed Space Based on Homogenization for Heterogeneous Elliptic Problems," Colloquium: Advances in Computational Science, Engineering, and Mathematics, University of Texas, Austin, Texas, Jan. 19–20, 2012.

**Conference and Seminar Organization**

1. Minisymposium organizer (with S. Sun and I. Yotov), "Advances in Computational Methods for Subsurface Modeling: In Honor of Professor Mary F. Wheeler," 15th National Congress on Computational Mechanics (USNCCM), Austin, Texas, July 28–Aug. 1, 2019.
2. Minisymposium organizer (with S. Sun, H. Chen and I. Yotov), "Development in efficient and compatible algorithms for porous media phenomena," The Mathematics of Finite Elements and Applications 2019 (MAFELAP 2019), Brunel University, London, England, June 18–21, 2019.
3. Minisymposium organizer, "High Order Schemes for Simulation of Flow and Transport in Porous Media," SIAM Conference on Mathematical & Computational Issues in the Geosciences (GS19), Houston, Texas, Mar. 11–14, 2019.
4. Organizing committee, Finite Element Rodeo, University of Texas at Austin, Austin, Texas, Mar. 1–2, 2019.

5. Session organizer, "High order schemes for simulation of flow and transport in porous media," The tenth Annual Meeting and Jubilee of the Int'l. Society for Porous Media (InterPore), New Orleans, LA, May 14–17, 2018.
6. Organizing committee, Texas Applied Mathematics and Engineering Symposium (TAMES), University of Texas at Austin Chapter of SIAM, Austin, Texas, September 21–23, 2017.
7. Minisymposium co-organizer (with M. Hesse), "Modeling and Simulation of Melt in the Mantle," SIAM Conference on Mathematical and Computational Issues in the Geosciences, Erlangen, Germany, September 11–14, 2017.
8. Minisymposium co-organizer (with M. Peszynska and S.-Y. Yi), "Recent Advances in Numerical Flow and Transport in Porous Media: A Mini Symposium in Honor of the Late Jim Douglas, Jr.," SIAM Conference on Mathematical and Computational Issues in the Geosciences, Erlangen, Germany, September 11–14, 2017.
9. Minisymposium co-organizer (with I. Yotov), "Developments in locally conservative conforming methods for elliptic partial differential equations," The Mathematics of Finite Elements and Applications (MAFELAP) 2016, Brunel University, London, England, June 14–17, 2016.
10. Research program co-organizer, "Melt in the Mantle," Isaac Newton Institute for Mathematical Sciences, Cambridge, United Kingdom, February 15–June 17, 2016 with Arwen Deuss (Utrecht University), Richard Katz (Oxford), Jerome Neufeld (Cambridge), John Rudge (Chair, Cambridge) and Yasuko Takei (Tokyo).
11. Session co-organizer (with Shuyu Sun), "Physics-Preserving Numerical Methods for Subsurface Geochemical Transport Processes," The sixth Int'l. Conf. on Porous Media and Annual Meeting of the Int'l. Society for Porous Media (InterPore), Milwaukee, WI, May 27–30, 2014.
12. Organizing Committee, "ICES Thematic Workshop on Multiscale Modeling," The University of Texas at Austin, April 29–May 1, 2013.
13. Program Committee, "Flow and Transport: Modeling, Simulations and Algorithms," An International Workshop in conjunction with the International Conference on Computational Science, June 4–6, 2012, Omaha, Nebraska.
14. Program Committee and Scientific Committee, the 4th International Conference on Porous Media and the Annual meeting of the International Society for Porous Media (InterPore 2012), Purdue Univ., West Lafayette, IN, May 14–16, 2012.
15. Program Committee, "Flow and Transport: Computational Challenges," An International Workshop in conjunction with the International Conference on Computational Science, June 1–3, 2011, Tsukuba, Japan.
16. Scientific Committee, "InterPore 2011 Conference and Annual Meeting," The 3rd International Conference on Porous Media and the Annual meeting of the International Society for Porous Media (InterPore), Bordeaux, France, March 15–17, 2011.
17. Organizer and Speaker, "The Role of Computation in Protecting the Environment: A Workshop on Carbon Sequestration Simulation for High School Mathematics and Science Teachers," Center for Subsurface Modeling of the Institute for Computational Engineering and Sciences, the Bureau of Economic Geology, and the Texas Advanced Computing Center, The University of Texas at Austin, June 15–16, 2010, sponsored by the National Science Foundation and the Department of Energy.
18. Scientific Committee, "InterPore 2010 Conference and Annual Meeting," Texas A&M Univeristy, College Station, Texas, March 14–17, 2010.
19. Organizing Committee Chair, "SIAM Conference on Mathematical and Computational Issues in the Geosciences," Leipziger Kubus Conference Center, Helmholtz Center for Environmental Research (UFZ), Leipzig, Germany, June 15–18, 2009.
20. Organizing Committee, "Computational Subsurface Sciences Workshop," Department of En-

ergy, Offices of Science, Environmental Management, Fossil Energy, and Civilian Radioactive Waste Management, North Bethesda, Maryland, January 9–12, 2007.
21. Organizing Committee, "Summer School in Geophysical Porous Media: Multidisciplinary Science from Nano- to Global-Scale," Purdue Univ., West Lafayette, IN, July 17–28, 2006.
22. SIAM Minisymposium organizer, "Numerical Solution of Partial Differential Equations and Applications to Flow in Porous Media," Joint Mathematics Meetings, San Antonio, TX, Jan. 12, 2006.

**Post-doctoral and Student Supervision**

*Program supervision*

1. Undergraduate advisor for Mathematical Sciences degree option in Scientific Computation, 2000–
2. Computational and Applied Mathematics (CAM) GSSC, 1995–2009 (Chair 1997–2009)
3. Computational Science, Engineering, & Mathematics (CSEM) GSSC, 2009– (Chair 2009– )
4. Chair, Undergraduate Certificate Program in Computational Science and Engineering, 2009–
5. Faculty co-advisor of the Society for Industrial and Applied Mathematics UT-Austin student chapter, 2005–

*Undergraduate supervision*

1. Binglin Zhang, *Analyzing WENO-AO and SWENO-AO methods for solving hyperbolic conservation laws,* Honors Tutorial Course, Spring 2021.
2. Emily Nguyen, *Richard's equation in one dimension with hysteresis,* Fall 2018.
3. Roxana Carcamo, *Numerical methods in queueing theory,* independent study, August 2018.
4. Krzysztof A. Drewniak, *gemm3: Constant-workspace high-performance multiplication of three matrices for matrix chaining,* Turing Scholars Degree, April 2018 (Advisor Robert van de Geijn).
5. James Levitt, *Adding aggressve early deflation to the restructured symmetric QR algorithm,* Dean's Scholars Honors Degree, May 2013 (Advisors Robert van de Geijn and Alan Cline).
6. Kevin Eric Jia, *Improving Data Locality of the Nonsymmetric QR Algorithm,* Undergraduate Honors Thesis, December 2013 (Advisors Robert van de Geijn and Todd Arbogast).
7. Michael S. Lubke, *Studies on Subgrid Upscaling,* Fall 2005.
8. Armando Lara, *Spend a Summer with a Scientist* program, Rice University, 1995.
9. Griselda Mani, *Spend a Summer with a Scientist* program, Rice University, 1994.

*Masters (M.A.) degrees supervised*

1. Xingyao Wang, *Krylov Methods For Solving Linear Systems* (report), Computational Science, Engineering, and Mathematics, M.S. May 2017.
2. Prabhat K. Jha, *Basic Iterative Methods for Solving Linear Systems*, Department of Mathematics, M.A. December 2003.
3. Eunkyoung Yoon, *Homogenization,* Department of Mathematics, M.A. August 2001.

*Ph.D. degrees supervised*

1. Chuning Wang, Department of Mathematics, current student.
2. Danielle King, Department of Mathematics, current student.
3. Chenyu Tian, Computational Science, Engineering, and Mathematics, current student.

4. Xikai Zhao, *Implicit Finite Volume WENO Schemes for Solving Hyperbolic Conservation Laws*, Department of Mathematics, Ph.D. May 6, 2019.
5. Zhen (Jane) Tao, *Numerical Analysis of Multiphase flows in Porous Media on Non-Rectangular Geometry,* Computational Science, Engineering, and Mathematics, Ph.D. Dec. 1, 2017.
6. Thiago de Oliveira Quinelato, *Mixed Hybrid Finite Element Methods in Elasticity and Poroelasticity,* Graduate Program in Computational Modeling, National Laboratory for Scientific Computing (LNCC), Rio de Janeiro, Brazil (co-advisors: Abimael F. D. Loula and Maicon R. Correa), Ph.D. March 2017.
7. Jamie Pool, *A Quadrature Eulerian-Lagrangian WENO Scheme for Reservoir Simulation,* Department of Mathematics, Ph.D. August 11, 2015.
8. Abraham L. Taicher, *Mixed framework for Darcy-Stokes mixtures,* Computational Science, Engineering, and Mathematics, Ph.D. Dec. 1, 2014 (co-advisor Marc A. Hesse).
9. Hailong Xiao, *Multiscale mortar mixed finite element methods for flow problems in highly heterogeneous porous media,* Computational and Applied Mathematics, Ph.D. Dec. 2, 2013.
10. Wenhao Wang, *An algorithm of the volume corrected characteristics mixed method for transport problems,* Computational and Applied Mathematics, Ph.D. December 2, 2009.
11. Mario San Martin Gomez, *A three dimensional finite element method and multigrid solver for a Darcy-Stokes system and applications to vuggy porous media,* Department of Mathematics, Ph.D. April 20, 2007.
12. James M. Rath, *Multiscale basis optimization for Darcy flow,* Computational and Applied Mathematics, Ph.D. April 13, 2007.
13. Dana S. Brunson, *Simulating fluid flow in vuggy porous media,* Department of Mathematics, Ph.D. August 1, 2005.
14. Heather L. Lehr (now Finotti), *Analysis of a Darcy-Stokes system modeling flow through vuggy porous media,* Department of Mathematics, Ph.D. August 2004.
15. Juan-Ming Yuan, *Studies in recurrence and singularity formation in nonlinear dispersive wave equations,* Dept. of Mathematics, Ph.D. Dec. 2001 (primary advisor: Jerry L. Bona).

*Post-doctoral Researcher Supervision*

1. Zhen Tao, February–October 2018.
2. Wenhao Wang, January 2010–May 2010.
3. James M. Rath, April 2007–August 2008.

**Research Grant Support**

1. NSF DMS-2111159, $270,000 (OSP 202003598-001) 1 Sept. 2021 to 31 Aug. 2024, *Direct Finite Elements on Convex Polygons and Polyhedra.*
2. NSF DMS-1912735, $250,000 (OSP 201803826-001) 1 Sept. 2019 to 31 Aug. 2022, *Implicit weighted essentially non oscillatory (iWENO) Schemes for Advection-Diffusion-Reaction Systems.*
3. NSF DMS-1720349, $250,000 (OSP 201603899-001) 15 Aug. 2017 to 31 July 2021, with M. Hesse (coPI), *Simulation of Multiphase Flow and Transport in the Partially Molten Mantle.*
4. Center for Subsurface Modeling Industrial Affiliates Program, Univ. of Texas at Austin, Directed by Mary F. Wheeler. Currently supported by 4 major petroleum and computer companies, $40,000 (each, renewable annually), 1995–2016.
5. NSF DMS-1418752, $365,000 (OSP 201303650-001) 1 July 2014 to 30 June 2017 (extended to 6 June 2018) *Numerical algorithms for nonlinear subsurface flow and transport.*

6. KAUST UT-Austin Academic Excellence Alliance Program, $3,001,332 (OSP 200702891) 1 Sept. 2011 to 31 Aug. 2015, with S. Sun (PI) and I. Hoteit at KAUST and M. F. Wheeler (PI), M. Delshad, and M. Hesse at UT-Austin, *Simulation of Subsurface Geochemical Transport and Carbon Sequestration.*
7. NSF EAR-1025321, $349,832 (OSP 201000240-001) 1 Sept. 2010 to 31 Aug. 2013 (extended to 2014), with M. Hesse (PI), *CMG Research: Robust Numerical Methods for Multi-Phase Darcy-Stokes Flow in Heterogeneous and Anisotropic Partially Molten Materials.*
8. Dept. of Energy DE-SC0001114, $15.1 million, *Center for Frontiers of Subsurface Energy Security* (OSP 200802179-001), 1 Sept. 2009 to 31 Aug. 2014. Director G. A. Pope and S. L. Bryant, Associate Directors M. F. Wheeler and M. Walck (Sandia National Laboratory), and Team Leaders P. Bennett, S. Srinivasan, M. Hesse, M. Delshad, J. Bishop, and T. Arbogast.
9. KAUST UT-Austin Academic Excellence Alliance Program, $431,253, 1 Sept. 2008 to 31 Aug. 2009, with M. F. Wheeler (PI) and M. Delshad *Computational Models for Evaluating Long Term $CO_2$ Storage in Saline Aquifers.*
10. NSF DMS-0835745, $1,332,000 1 Oct. 2008 to 30 Sept. 2012 (extended to 28 Feb. 2014), with M. F. Wheeler (PI) and M. Delshad *CDI-Type II: Collaborative Research: Computational Models for Evaluating Long Term $CO_2$ Storage in Saline Aquifers*, in collaboration with Manish Parashar, Rutgers University, $668,000.
11. NSF DMS-0713815 (OSP 200602754), $258,529 1 Sept. 2007 to 31 Aug. 2010 (extended to 2011), *Fully locally conservative characteristic methods for transport problems.*
12. NSF DMS–0417431 (OSP 200400101), $676,572 1 Sept. 2004 to 31 Aug. 2007 (extended to 2008), with S. L. Bryant, J. Jennings (replaced by C. Zahm), and C. Kerans, *CMG Research: Multi-scale flow and transport modeling of large-vug Cretaceous carbonates.*
13. NSF DMS–0408489 (OSP 200302296), $244,001, 1 Sept. 2004 to 31 Aug. 2007 (extended to 2008), *Development and application of subgrid upscaling.*
14. NSF DMS–0215389, $80,644, 1 Sept. 2002 to 31 Aug. 2003, with M. F. Wheeler, S. L. Bryant, C. N. Dawson, and M. Peszynska, *A parallel computer cluster for multiphysics and multiscale modeling of subsurface and surface flows.*
15. NSF DMS–0074310 (OSP 199902591), $240,000, 1 Sept. 2000 to 31 Dec. 2003, with S. L. Bryant, *Modeling Flow in Porous Media with Vugular Meso-Scale Heterogeneities.*
16. NSF DMS–9873326, $1,700,000, 1 Oct. 1998 to 30 Sept. 2001, with M. F. Wheeler, C. L. Bajaj, S. L. Bryant, C. N. Dawson, *KDI: Multiscale Physics-Based Simulation of Fluid Flow for Energy and Environmental Applications.*
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