CURRICULUM VITA

Todd James Arbogast

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Personal Data

Birth:	December 9, 1957, Minneapolis, Minnesota.
Current Address:	The University of Texas at Austin Mathematics Department 1 University Station C1200 Austin, Texas 78712-0257
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Education

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

Professor	The University of Texas at Austin	2001–
Associate Professor	The University of Texas at Austin	1995–01
Assistant & Associate Professor	Rice University	1993–95
Faculty Fellow	Rice University	1992–93
Visiting Assistant Professor	Rice University	1990–92
NSF Postdoctoral Research Fellow	University of Houston	1989–90
Assistant Professor	Purdue University	1988–91
Research Assistant Professor	Purdue University	1987–88
Visitor	Institute for Mathematics and its Applications, University of Minnesota	1986–87
Lecturer	University of Chicago	1983–86

Professional Service

Associate Editor, SIAM Journal on Numerical Analysis, 1999–

Editorial Board, Advances in Water Resources, 2000–

Editorial Board, Chapman & Hall/CRC Numerical Analysis and Scientific Computing Series, 2006–

Research Interests

Algorithm development and numerical analysis of partial differential equations

Homogenization and multi-scale analysis

Mathematical modeling and simulation of subsurface flow phenomena

High performance, parallel, scientific computing

Professional Societies

American Mathematical Society

Society for Industrial and Applied Mathematics

Program Director, Activity Group on Geosciences, 2007–2008

Faculty co-adviser of the University of Texas Student Chapter, 2006–

Society of Petroleum Engineers

Research Centers and Institutes

Associated faculty, Division of Statistics and Scientific Computing (SSC), The University of Texas at Austin, Austin, Texas	2007–
Institute for Computational Engineering and Sciences (ICES), The University of Texas at Austin, Austin, Texas,	2003–
Texas Institute for Computational and Applied Mathematics (TICAM) The University of Texas at Austin, Austin, Texas	1995–2003
Center for Subsurface Modeling, TICAM/ICES	1995–
Associate Director	2008–
Center for Numerical Analysis, TICAM/ICES	1997–
Center for Research on Parallel Computation, Rice University, Technical Steering Committee	1997–1999

Honors and Awards

Frank Gerth III Faculty Fellowship, 2008–2010 (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)

Lectures, Conferences, and Service to Other Universities

Invited Presentations

1. "Homogenization-based Mixed Multiscale Finite Elements for Heterogeneous Elliptic Problems," National Sun Yat-Sen University, Kaohsiung, Taiwan (ROC), August 4, 2009.
2. "Homogenization-Based Multiscale Finite Elements for Heterogeneous Porous Media," SIAM Conference on Mathematical and Computational Issues in the Geosciences, Leipzig, Germany, June 15–18, 2009.
3. "Homogenization-Based Multiscale Finite Elements for Heterogeneous Porous Media," The Mathematics of Finite Elements and Applications (MAFELAP) 2009, Brunel University, West London, England, June 9–12, 2009.
4. "Fully Conservative Streamline Methods for One and Two-Phase Flows," The Mathematics of Finite Elements and Applications (MAFELAP) 2009, Brunel University, West London, England, June 9–12, 2009.
5. "Variational multiscale methods and mixed multiscale finite elements," Workshop on Meshless Methods, Generalized Finite Element Methods, and Related Approaches, University of Maryland, March 26–28, 2009.
6. "The Mixed Variational Multiscale Method and Aspects of Convergence for Heterogeneous Porous Media," Mini-Workshop on Numerical Upscaling for Flow Problems: Theory and Applications, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany, March 1–7, 2009.
7. "Aspects of Convergence for Mixed Multiscale Finite Elements and a New Approach to their Definition," Conference on Scaling Up and Modeling for Transport and Flow in Porous Media, Dubrovnik, Croatia, October 13–16, 2008.
8. "Multiscale Finite Element Methods for Heterogeneous Porous Media," Computational Infrastructure for Geodynamics (CIG) Workshop on Mathematical and Computational Issues

in the Solid Earth Geosciences, Santa Fe, New Mexico, September 15–17, 2008.

9. "Multiscale Finite Element Methods for Heterogeneous Porous Media," Summer School on Multiscale Modeling and Analysis, Workshop, University of Texas, Austin, Texas, August 4–8, 2008.
10. "Volume Corrected Characteristic Methods," SIAM Annual Meeting, San Diego, California, July 2008.
11. "Modeling flow and transport in vuggy porous media," Workshop on The Added Value of Geosciences for Reservoir Characterization and Performance Simulation, The Society of Petroleum Engineers (SPE) and The Mexican Association of Exploration Geophysicists (AMGE), Villahermosa, Tabasco, Mexico, March 10–11, 2008.
12. "Modeling flow and transport in vuggy porous media," Interdisciplinary Distinguished lecture series on Multi-Scale Processes in Earth Systems, Texas A&M University, November 14, 2007.
13. "Modeling flow and transport in vuggy porous media," National Sun Yat-Sen University, Kaohsiung, Taiwan (ROC), July 25, 2007.
14. "Multiscale computational techniques for second order elliptic problems," National Sun Yat-Sen University, Kaohsiung, Taiwan (ROC), July 17, 2007.
15. "A multiscale mortar mixed finite element method for elliptic problems," Conference on Computational Methods in Energy and Environmental Research (CMEER), Peking University, Beijing, China, July 9–12, 2007.
16. "Fully conservative characteristic methods for transport problems," Conference on Computational Methods in Energy and Environmental Research (CMEER), Peking University, Beijing, China, July 9–12, 2007.
17. "Modeling flow and transport in vuggy porous media," International Workshop on Computational Methods in Geosciences, July 5–7, 2007, Xi'an Jiaotong University, Xi'an, Shaanxi, China.
18. "Multiscale iterative computational methods for heterogeneous second order elliptic problems," Lead presentation, Workshop on Modeling, Analysis and Simulation of Multiscale Nonlinear Systems, Oregon State University, Corvallis, Oregon, June 25–29, 2007.
19. "A Fully Mass and Volume Conserving Implementation of a Characteristic Method for Transport Problems," SIAM Conference on Mathematical and Computational Issues in the Geosciences, Santa Fe, New Mexico, March 19–22, 2007.
20. "Modeling Flow and Transport in Vuggy Media," SIAM Conference on Mathematical and Computational Issues in the Geosciences, Santa Fe, New Mexico, March 19–22, 2007.
21. "Simulation of Flow and Transport in Large Vug Cretaceous Carbonates," Schlumberger Joint Signal Processing—Applied Mathematics—Inversion, Optimization and Uncertainty Eureka Workshop, League City, Texas, October 10, 2006.
22. "Variational multiscale methods for computational modeling of heterogeneous porous media," Colloquium, Department of Mathematics, Colorado State University, Fort Collins, Colorado, September 25, 2006.
23. "Lectures on Partial Differential Equations and their Numerical Approximation," Summer School in Geophysical Porous Media: Multidisciplinary Science from Nano- to Global-Scale, Purdue University, West Lafayette, Indiana, July 19 and 24, 2006.
24. "A fully mass and volume conserving implementation of a characteristic method for transport problems," The Mathematics of Finite Elements and Applications (MAFELAP) 2006, Brunel University, West London, England, June 13–16, 2006.
25. "A fully mass and volume conserving implementation of a characteristic method for transport problems," NSF-CBMS Regional Research Conference on Mathematical and Numerical Treatment of Fluid Flow and Transport in Porous Media, University of Nevada, Las Vegas,

Nevada, May 22–26, 2006.

26. "Mixed Variational Multiscale Modeling of Stochastic Porous Media," Joint Mathematics Meetings, San Antonio, Texas, January 12–15, 2006.
27. "Improved accuracy for alternating-direction methods for parabolic equations based on regular and mixed finite elements," 50 Years of Alternating Direction Methods: Celebrating the contributions of Jim Douglas, Don Peaceman, and Henry Rachford, Rice University, Houston, Texas, November 4–5, 2005.
28. "Numerical Multiscale Approaches to Mixed Finite Element Approximation of Second Order Elliptic Problems," Department of Mathematics, University of Houston, Houston, Texas, November 3, 2005.
29. "Mixed variational multiscale methods and mixed multiscale finite elements," Eighth U.S. National Congress on Computational Mechanics, Austin, Texas, June 24–28, 2005.
30. "Mixed variational multiscale methods and mixed multiscale finite elements," Eighth SIAM Conference on Mathematical and Computational Issues in the Geosciences, Avignon, France, June 7–10, 2005.
31. "Mixed multiscale variational methods and subgrid upscaling," Department of Mathematics, University of Nevada, Las Vegas, Nevada, May 9, 2005.
32. "Mixed multiscale variational methods and subgrid upscaling," Workshop on Multiscale Finite Element Methods, Institute for Computational Engineering and Sciences, University of Texas at Austin, Austin, Texas, May 5–6, 2005.
33. "Mixed variational multiscale methods and mixed multiscale finite elements," Department of Mathematics, Texas A&M University, College Station, Texas, April 13, 2005.
34. "Mixed variational multiscale methods and multiscale finite elements," Workshop on Mixed and Nonstandard Finite Element Methods, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany, January 31 to February 4, 2005.
35. "Modeling flow in vuggy media," Hydrogeology Brown Bag Seminar, Department of Geological Sciences, University of Texas at Austin, Austin, Texas, October, 2004.
36. "Coupled Darcy-Stokes flow modeling for vuggy pore space," Reservoir Characterization Research Laboratory for Carbonate Studies 2004 Annual Review Meeting, Bureau of Economic Geology, University of Texas, Austin, Texas, October 4, 2004.
37. "Modeling flow in large vug Cretaceous carbonates using homogenization and numerical analysis," Department of Mathematics, Colorado State University, Fort Collins, Colorado, July 23, 2004.
38. Variational multiscale methods and multiscale finite elements for heterogeneous porous media," Second DOE Workshop on Multiscale Mathematics, Omni Interlocken Resort, Broomfield, Colorado, July 20–22, 2004.
39. "Variational multi-scale methods for computational modeling of heterogeneous porous media," Applied Mathematics Seminar, University of North Carolina, Chapel Hill, North Carolina, January 16, 2004.
40. "Modeling flow in large vug Cretaceous carbonates," Earth and Atmospheric Sciences Department, Purdue University, West Lafayette, Indiana, January 14, 2004.
41. "Variational multi-scale methods for computational modeling of heterogeneous porous media," Mathematics Colloquium, Purdue University, West Lafayette, Indiana, January 13, 2004.
42. "Macroscale modeling of flow in vuggy porous media," NSF Meeting on Applications of Modern Tools of Mathematics and Physics to Subsurface Hydrology, Purdue University, West Lafayette, Indiana, August 11–13, 2003.
43. "Analysis of a two-scale, locally conservative subgrid upscaling approximation for elliptic

problems," University of Chicago, Chicago, Illinois, May 21, 2003.

44. "Modeling flow in vuggy porous media," Purdue University, West Lafayette, Indiana, May 19, 2003.
45. "Analysis of a two-scale, locally conservative subgrid upscaling approximation for elliptic problems," Seventh SIAM Conference on Mathematical and Computational Issues in the Geosciences, Austin, Texas, March, 2003.
46. "A two-scale, locally conservative subgrid approximation for elliptic problems," Workshop on Numerical Methods for Multiscale Problems, Max-Planck-Institute for Mathematics in the Sciences, Leipzig, Germany, Nov. 13, 2002.
47. "Modeling flow in vugular porous media," Institute for Applied Mathematics and Numerical Analysis, Vienna University of Technology, Vienna, Austria, Nov. 11, 2002.
48. "Modeling flow in vugular porous media," University of Colorado at Denver, Denver, Colorado, October 14, 2002.
49. "A two-scale, locally conservative subgrid approximation for elliptic problems," ICM 2002 Satellite Conference on Scientific Computing, Xi'an Jiaotong University, Xi'an, China (PRC), Aug. 15–18, 2002.
50. "A two-scale, locally conservative subgrid approximation for elliptic problems," National Sun Yat-Sen University, Kaohsiung, Taiwan (ROC), Aug. 5, 2002.
51. "Two-scale, locally conservative subgrid upscaling for elliptic problems," Institute for Mathematics and its Applications, Univ. of Minn., program on *Quantifying Uncertainty and Multiscale Phenomena in Subsurface Processes*, organized by L. J. Durlofsky et al., Jan., 2002.
52. "Two-scale, locally conservative subgrid upscaling for elliptic problems," Southeast Conference on Applied Mathematics, North Carolina State Univ., Raleigh, Nov. 9–11, 2001.
53. "A two-scale locally conservative framework for approximating an elliptic equation," The Pennsylvania State University, State College, Pennsylvania, September 28, 2001.
54. "Locally conservative mixed finite element subgrid upscaling for elliptic equations," Sixth SIAM Conference on Mathematical and Computational Issues in the Geosciences, Denver, Colorado, June, 2001.
55. "Two-scale numerical subgrid upscaling for two-phase flow in porous media ," New Directions and Developments in Computational Mathematics, The 2001 John H. Barrett Lectures, Department of Mathematics, University of Tennessee, Knoxville, May 10–12, 2001
56. Plenary lecture, "A two-scale framework for approximating the solution of an elliptic equation," 13th Int'l. Conf. on Domain Decomposition Methods, Lyon, France, Oct. 9–12, 2000.
57. "A two-scale framework for approximating an elliptic equation," Int'l. Con. on Homogenization and Materials Science, Univ. of Akron, Akron, Ohio, Sept. 15–17, 2000.
58. "A subgrid-scale numerical technique for efficient upscaling of multiphase flow," International Conference on Finite Elements in Flow Problems (FEF2000), The University of Texas at Austin, April 30 to May 4, 2000.
59. Survey lecture, "Some aspects of numerical simulation of two-phase flow through permeable media," at the Mathematisches Forschungsinstitut Oberwolfach meeting on *Porous Media*, organized by C. J. van Duijn and P. Knabner, Oberwolfach, Germany, January, 2000.
60. "Nonlinear Subgrid Upscaling of Two-Phase Flow in Porous Media," Institute for Mathematics and its Applications, Univ. of Minn., program on *Confinement and remediation of environmental hazards*, organized by R. E. Ewing, A. Cunningham, & J. Chadam, Jan., 2000.
61. "Nonlinear Subgrid Upscaling of Two-Phase Flow in Porous Media," University of Pittsburgh, Pittsburgh, Pennsylvania, January, 2000.
62. "Nonlinear Subgrid Upscaling of Two-Phase Flow in Porous Media," Georgia Tech, Atlanta, Georgia, November, 1999.

63. "Nonlinear Subgrid Upscaling of Two-Phase Flow in Porous Media," 36th Annual Technical Meeting of the Society of Engineering Science, Austin, Texas, October 1999.
64. "Nonlinear Subgrid Upscaling of Two-Phase Flow in Porous Media," $948th$ AMS Meeting, Austin, Texas, October 1999.
65. "Mixed Finite Element Methods on Non-Matching Multiblock Grids," $948th$ AMS Meeting, Austin, Texas, October 1999.
66. "Nonlinear Subgrid Upscaling of Two-Phase Flow in Porous Media," International Workshop on Computational Physics: Fluid Flow and Transport in Porous Media, Beijing, China, August 2–6, 1999.
67. "Subgrid upscaling of two-phase flow in porous media," 1999 SIAM Annual Meeting, Atlanta, Georgia, May, 1999.
68. "Numerical simulation of subsurface flow through permeable media," Southern Methodist University, April, 1999.
69. "Subgrid upscaling of two-phase flow in porous media," Fifth SIAM Conference on Mathematical and Computational Issues in the Geosciences, San Antonio, Texas, March, 1999.
70. "Error estimation and upscaling for mixed method approximation of the pressure equation," Fifth SIAM Conference on Mathematical and Computational Issues in the Geosciences, San Antonio, Texas, March, 1999.
71. "Numerical simulation of subsurface flow and reactive transport" (with Mary F. Wheeler), Exploring the interface between the sciences and mathematical sciences, Committee on strengthening the linkages between the sciences and mathematical sciences, National Research Council, Washington, D.C., March 25–26, 1998.
72. "Mixed finite elements on multiblock grids for subsurface flow," Third IMACS Int'l. Symposium on Iterative Methods in Scientific Computation, Jackson Hole, Wyoming, July 1997.
73. "Mixed Finite Element Methods on Non-Matching Multiblock Grids," Spring Southeastern Sectional Meeting of the American Mathematical Society, Memphis, Tennessee, March, 1997.
74. "Dual-porosity modeling and simulation for single and two-phase flow," Hydrogeology Brown Bag Seminar, Department of Geological Sciences, University of Texas at Austin, Austin, Texas, January, 1997.
75. "A non-mortar mixed finite element method for elliptic problems on non-matching multiblock grids," Interdisciplinary Symposium on Advances in Computational Mechanics, The University of Texas at Austin, Austin, Texas, January, 1997.
76. "Finite difference or volume methods for subsurface simulation arising from mixed finite elements," Pacific Northwest National Laboratory, Richland, Washington, September, 1996.
77. "Mixed finite element methods on multi-block domains," at the Mathematisches Forschungsinstitut Oberwolfach meeting on *Porous Media*, organized by J. Douglas, Jr., U. Hornung, and P. Knabner, Oberwolfach, Germany, February–March, 1996.
78. "The application of mixed finite element methods to subsurface simulation," First GAMM Seminar on Modelling and Computation in Environmental Sciences, University of Stuttgart, Stuttgart, Germany, October, 1995.
79. "Mathematical simulation of flow in porous media," Texas Institute for Computational and Applied Mathematics (TICAM), University of Texas, Austin, Texas, March, 1995.
80. "A nonlinear mixed finite element method for a degenerate parabolic equation arising in flow in porous media," Third SIAM Conference on Mathematical and Computational Issues in the Geosciences, San Antonio, Texas, February, 1995.
81. Sociedade Brasileira de Matemática Aplicada e computacional (SBMAC), "Mixed finite element methods as finite difference methods on general geometry," XVII Crongresso Nacional de Matemática Aplicada e Computacional CNMAC 94, Vitória, ES, Brasil, Aug.–Sept., 1994.

82. Joint American Mathematical Society and Mathematical Association of America invited address "Mathematical simulation of flow in porous media," Mathfest, Minneapolis, Minn., Aug., 1994.
83. "Mixed methods for flow and transport problems on general geometry", Workshop on *Finite Element Modeling of Environmental Problems*, Univ. of Texas at Austin, Mar. 4–5, 1994.
84. "Characteristic and mixed methods for approximating advection-diffusion equations," Georgia Tech, Atlanta, Georgia, November, 1993.
85. "Equations with dual-porosity microstructure for modeling flow in fractured porous media," Differential Equations Conference, Ohio University, Athens, Ohio, August, 1993.
86. "A characteristics-mixed method for contaminant transport and miscible displacement," SIAM Conference on Mathematical and Computational Issues in the Geosciences, Houston, Texas, April, 1993.
87. "Computational justification of a dual-porosity model for two-phase flow in fractured media," Second SIAM Conference on Mathematical and Computational Issues in the Geosciences, Houston, Texas, April, 1993.
88. "A characteristics-mixed method for advection dominated transport problems," at the Institute for Mathematics and its Applications, University of Minnesota, summer program on *Environmental studies: mathematical, computational, and statistical analysis*, organized by M. F. Wheeler, J. Chang, M. Ghil, D. McTigue, J. Seinfeld, and P. Switzer, July 6-31, 1992.
89. "Computational validation of the homogenization of dual-porosity systems," at the Mathematisches Forschungsinstitut Oberwolfach meeting on *Porous Media*, organized by J. Douglas, Jr., C. J. van Duijn, and U. Hornung, Oberwolfach, Germany, June 21-27, 1992.
90. "Gravitational forces in dual-porosity models," IMSL, Houston, Texas, September, 1991.
91. "Gravitational forces in dual-porosity models," Exxon Production Research Co., Houston, Texas, September, 1991.
92. Paper *Gravitational forces in dual-porosity models of single phase flow*, Thirteenth IMACS world congress on computation and applied mathematics, Trinity College, Dublin, Ireland, July, 1991.
93. "Homogenization theory applied to dual-porosity models of reservoir flow," University of Texas, Austin, Texas, April, 1991.
94. "Simulation of two-phase flow in naturally fractured porous media," Department of Mathematics, University of Houston, Houston, Texas, February, 1990.
95. "The dual porosity model as derived by homogenization," University of Wyoming, Laramie, Wyoming, November, 1989.
96. "Existence of solutions to boundary value problems of two-phase porous media flow," University of Colorado, Denver, Colorado, November, 1989.
97. "On modeling fractured reservoir flow by homogenization" at the workshop *Mathematical Modeling for Preferential Flow in Groundwater Flow and Contaminant Transport*, Utah State University, Logan, Utah, March, 1989.

Other Presentations

1. Presentation, "Convergence of mixed multiscale finite elements," at the *Finite Element Rodeo*, University of Texas, Austin, Texas, Feb. 27–28, 2009.
2. Presentation, "A fully mass and volume conserving implementation of a characteristic method for transport problems," at the *Finite Element Rodeo*, Southern Methodist University, Dallas, Texas, March 4–5, 2005.
3. Presentation, "A rectangular mixed element with a continuous flux for second order elliptic problems," at the *Finite Element Rodeo*, University of Houston, Houston, Texas, Feb. 28–

March 1, 2003.

4. Presentation, "Framework for numerical subgrid upscaling," at the *Finite Element Rodeo*, Texas A&M University, College Station, Texas, March 1–2, 2002.
5. "Two-scale, locally conservative subgrid upscaling for elliptic problems," TICAM, The University of Texas at Austin, November 6, 2001.
6. Paper *Numerical subgrid upscaling for waterflood simulations* presented at the *16th Society of Petroleum Engineers Reservoir Simulation Symposium* held in Houston, Texas, Feb., 2001.
7. Presentation of paper *An operator-based approach to upscaling the pressure equation* at the Twelfth International Conference on Computational Methods in Water Resources, Crete, Greece, June, 1998.
8. Presentation, "Upscaling through numerical subgrid-scale approximations," at the *Finite Element Rodeo*, Texas A&M University, College Station, Texas, March, 1998.
9. Presentation, "A non-mortar mixed finite element method for elliptic problems on non-matching multiblock grids," at the *Finite Element Rodeo*, The University of Texas at Austin, Austin, Texas, February–March, 1997.
10. Presentation, "Introduction to Homogenization," PDE Seminar, The University of Texas at Austin, October, 1996.
11. Presentation, "Discretization on multi-block domains," Department of Energy Advanced Computational Technology Initiative (DOE–ACTI), *Research in new generation framework for reservoir simulation,* Annual review meeting, June, 1996.
12. Presentation, "Superconvergent cell-centered finite difference mixed methods for flow through geometrically heterogeneous porous media," Society of Engineering Science $31st$ Annual Technical Meeting, Texas A&M University, College Station, Texas, October, 1994.
13. Presentation of paper *Logically rectangular mixed methods for groundwater flow and transport on general geometry* and session chair at the Tenth International Conference on Computational Methods in Water Resources, Heidelberg, Germany, July, 1994.
14. Video presentation (with C. Dawson, D. Moore, J. Warren, and M. Wheeler) on "A demonstration of the Rice transport code," *Supercomputing '92*, Minneapolis, Minn., Nov., 1992.
15. Presentations, Papers *Simulation of flow in root-soil systems* and *A simplified dual-porosity model for two-phase flow*, and session chair at the Ninth International Conference on Computational Methods in Water Resources, Denver, Colorado, June, 1992.
16. Presentation, "A characteristic-mixed method for advection-dominated transport," at the *Texas Finite Element Circus*, the Texas Institute for Computational Mechanics (TICOM), University of Texas, Austin, Texas, April, 1992.
17. "Simulation of flow in root-soil systems," Thirteenth IMACS world congress on computation and applied mathematics, Trinity College, Dublin, Ireland, July, 1991.
18. "Variable coefficient mixed finite element methods as nonconforming methods," *Finite Element Circus*, University of Houston, Houston, Texas, March, 1991.
19. "An error analysis for a model nonlinear elliptic-parabolic equation," *Texas Finite Element Circus*, Rice University, Houston, Texas, October, 1990.
20. "Simulation of Two-phase flow in naturally fractured porous media," workshop on *Mathematics and Environmental Waste Problems*, Oak Ridge National Laboratory, Oak Ridge, Tennessee, July, 1990.
21. "Convergence analysis of Richard's equation", *Finite Element Circus*, Cornell University, Ithaca, New York, April, 1990.
22. Presentation on immiscible flow through fractured reservoirs at the *Finite Element Circus*, Purdue University, West Lafayette, Indiana, March, 1989.
23. Paper *Dual-porosity models for flow in naturally fractured reservoirs* presented at the, 1988

American Geophysical Union Fall Meeting, San Francisco, California, December, 1988.

24. Presentation on simulating flow in fractured reservoirs at the 1988 *Society for Industrial and Applied Mathematics Annual Meeting*, Minneapolis, Minnesota, July, 1988.
25. Presentation on simulating flow in fractured reservoirs at the *Finite Element Circus*, Cornell University, Ithaca, New York, November, 1987.
26. Paper *Simulation of flow in naturally fractured reservoirs* presented at the *Ninth Society of Petroleum Engineers Symposium on Reservoir Simulation*, San Antonio, Texas, Feb., 1987.
27. Paper *The double porosity model for single phase flow in naturally fractured reservoirs* presented at the *Symposium on Numerical Simulation in Oil Recovery*, Institute for Mathematics and its Applications, University of Minnesota, December, 1986.

Center for Subsurface Modeling Industrial Affiliates Meetings

Center for Subsurface Modeling, University of Texas at Austin

1. "Homogenization-based multiscale finite elements for heterogeneous porous media," October, 2008.
2. "A multiscale mortar method for efficient solution of the heterogeneous pressure equation," October, 2007.
3. "Modeling flow and transport in vuggy media," October, 2006.
4. "A fully mass and volume conserving implementation of a characteristic method for transport problems," October, 2005.
5. "Darcy-Stokes and Darcy flow modeling of vuggy porous media," October, 2004.
6. "Progress in Modeling flow in vuggy porous media," October, 2003.
7. "Modeling flow in vugular porous media," October, 2002.
8. "Locally conservative subgrid upscaling for waterflood simulations," October, 2001.
9. "Nonlinear numerical subgrid upscaling of two-phase flow in porous media," October, 1999.
10. "Upscaling through Subgrid-Scale Approximation," October, 1998.
11. "An approach to upscaling," November, 1997.
12. "Discretization on multiblock domains: Finite difference or volume methods arising from mixed finite elements," November, 1996.
13. "Overview of discretization, post-processing, and adaptivity," October, 1995.

Subsurface Modeling Group, Rice University

14. "RPARSim1: the Rice Parallel Aquifer and Reservoir Simulator, single phase" and "Tensor permeabilities and structured meshes," August, 1994.
15. "RPGW: A parallel ground water reactive flow and transport code" and "Advances in the modeling of fractured reservoirs," June, 1993.
16. "Transport and Advection Schemes," August, 1992.
17. "Fractures," December, 1991.
18. "Dual-porosity simulation," *Parallel Computation Project for Modeling Flow in Porous Media Prospective Industrial Affiliates Meeting*, June, 1991.

Conference and Seminar Organization

1. Scientific Committee, "InterPore 2010 Conference and Annual Meeting," Texas A&M Univeristy, College Station, Texas, March 14–17, 2010.
2. 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.

3. Organizing Committee, "Computational Subsurface Sciences Workshop," Department of Energy, Offices of Science, Environmental Management, Fossil Energy, and Civilian Radioactive Waste Management, North Bethesda, Maryland, January 9–12, 2007.
4. Organizing Committee, "Summer School in Geophysical Porous Media: Multidisciplinary Science from Nano- to Global-Scale," Purdue University, West Lafayette, Indiana, July 17–28, 2006.
5. SIAM Minisymposium organizer, "Numerical Solution of Partial Differential Equations and Applications to Flow in Porous Media," Joint Mathematics Meetings, San Antonio, Texas, January 12, 2006.
6. Workshop co-organizer (with B. Engquist), "Multiscale Finite Element Methods," Institute for Computational Engineering and Sciences, The University of Texas at Austin, May 5–6, 2005.
7. Conference co-organizer (with I. Gamba), "Current and Future Trends in Numerical PDE's: Where is the field, and where is it going?" Texas Institute for Computational and Applied Mathematics, The University of Texas at Austin, February 8–9, 2002.
8. Session organizer, "Transport: Simulation of Mathematically Challenging Aspects of Flow in Porous Media," The Finite Elements in Flow Problems 2000 conference, The University of Texas at Austin, April–May, 2000.
9. Session co-organizer, "Computational Methods in Porous Media, I & II," Society of Engineering Science 31*st* Annual Technical Meeting, Texas A&M University, College Station, Texas, October, 1994.
10. Minisymposium co-organizer, "Parallel Computation in Applications," SIAM Conference on Mathematical and Computational Issues in the Geosciences, Houston, Texas, April, 1993.
11. Minisymposium co-organizer, "Parallel Domain Decomposition and Multigrid Techniques," SIAM Conference on Mathematical and Computational Issues in the Geosciences, Houston, Texas, April, 1993.
12. Tutorial co-organizer, "Parallel Computing with applications to linear algebra," SIAM Conference on Mathematical and Computational Issues in the Geosciences, Houston, Texas, April, 1993.
13. Session co-organizer and chair, "Computational aspects of modeling heterogeneous porous media," Thirteenth IMACS world congress on computation and applied mathematics, Trinity College, Dublin, Ireland, July, 1991.

Selected University and Departmental Committees

Mathematics Tenure Review, 1996–98, 2000, 2007, 2009–2010
Mathematics Assistant Professor Recruiting, 1998–2000, 2003 (Chair), 2005 (Chair)
Mathematics Instructor and Lecturer Recruiting, 2004
Mathematics Graduate Studies ASGSC, 2002–2003
Undergraduate adviser for Mathematical Sciences degree option in Scientific Computation, 2000–
Computational and Applied Mathematics (CAM) GSSC, 1995–2009 (Chair 1997–2009)
Computational Science, Engineering, & Mathematics (CSEM) GSSC, 2009– (Chair 2009–)
Chair, Certificate Program in Computational Science and Engineering, 2009–
Advisory Board, Institute for Computational Engineering and Sciences (ICES), 2009–
Advisory Board for the Undergraduate Studies Committee, Department of Mathematics, 2009–
University Intellectual Property Committee, 1999–2002

Courses Taught

University of Texas

M308L Integral Calculus, 1997S

M408D Calculus, 2000F

M318M Introduction to Scientific Computing, 1999S (as M310), 1999F

M427L Advanced Calculus for Applications, II, 1996F

M427K Advanced Calculus for Applications, I, 1995F, 1996S, 2008F

M340L Matrices and Matrix Calculations, 1996F, 1996S, 1997F, 1998F, 1999F, 2001S, 2006F

M348 Scientific Computation in Numerical Analysis, 2000S, 2001S, 2001F, 2002F, 2003F, 2004F, 2005F, 2006F, 2007F

M362K Probability, 1997F, 1998S, 1998F, 2004Sum

M368K Numerical Methods for Applications, 2003S, 2005S, 2006S, 2007S, 2009S

M383C/CAM385C Methods of Applied Mathematics I, 2000F, 2007F

M383D/CAM385D Methods of Applied Mathematics II, 1998S (as M393D/CAM393D), 2000S, 2004S, 2005S, 2006S, 2007S, 2008S, 2009S

M 383G/CAM 386K/CS 386K. Numerical Treatment of Differential Equations, 2002F

M393D/CAM393D

- Homogenization, 1997S
- Numerical Solution and Analysis of Differential Equations, 1999S, 2001F

Individual Instruction

- M175WR Writing course, 1996F, 1999F (3), 2001F, 2002S, 2002F (6), 2003S (2), 2003F, 2004S, 2004Sum, 2006S, 2006F
- M375, Conference course in applied mathematics, 2005F
- M275, Conference course in applied mathematics, 2003S
- M393C Conference course in applied mathematics, 2000S, 2009S
- M393D Conference course in numerical analysis, 1998S
- M375C Undergraduate research, 1999S

Rice University

Foundations of Applied Mathematics II, for juniors, 1994S, 1995S

Numerical Methods for Partial Differential Equations II, graduate course, 1995S

Partial Differential Equations, for juniors, 1991F, 1992F

Partial Differential Equations I, graduate course, 1992S

Purdue University

Differential Equations for Engineering and the Sciences, for juniors, 1988F, 1988S, 1989S

Finite Element Method for Partial Differential Equations, graduate course, 1988F

Introductory Analysis II, for sophomores (in humanities and social sciences), 1987F (twice)

Linear Analysis, graduate course, 1989S

University of Chicago

Calculus with Analytic Geometry I–III, for freshmen, 1983–86

Post-doctoral and Graduate Student Supervision and Committee Participation

Post-doctoral Researcher Supervision

1. James Rath, April 2007–August 2008.

Ph.D. degrees supervised

Current

1. Hailong Xiao, Computational and Applied Mathematics (began 9/08)
2. Wenhao Wang, Computational and Applied Mathematics (began 3/06)

Completed

1. 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 (began 8/04).
2. James Rath, *Multiscale Basis Optimization For Darcy Flow,* Computational and Applied Mathematics Ph.D. April 13, 2007 (began 9/01).
3. Dana S. Brunson, *Simulating fluid flow in vuggy porous media,* Department of Mathematics Ph.D. August 1, 2005 (began 9/00).
4. Heather L. Lehr, *Analysis of a Darcy-Stokes system modeling flow through vuggy porous media,* Department of Mathematics, Ph.D. August 2004 (began 1/02).
5. Juan-Ming Yuan, *Studies in recurrence and singularity formation in nonlinear dispersive wave equations,* Department of Mathematics, Ph.D. December 2001 (Primary adviser: Jerry L. Bona).

Masters (M.A.) degrees supervised

1. Prabhat K. Jha, *Basic Iterative Methods for Solving Linear Systems*, Department of Mathematics, M.A. December 2003.
2. Eunkyoung Yoon, *Homogenization,* Department of Mathematics, M.A. August 2001.

Membership on Ph.D. committees

Current

1. Nathanael Ringer, *Valuation and Investment in Incomplete Markets Department of Mathematics*, Department of Mathematics, (8/06, Adviser: Thaleia Zariphopoulou)
2. Xianhui Kong, Department of Petroleum and Geosystems Engineering (9/09, Advisers Mojdeh Delshad and Mary Wheeler)
3. Shan Yang, Computational and Applied Mathematics (4/09, Advisers: Omar Ghattas and Robert Moser)
4. Weifeng (Frederick) Qiu, Computational and Applied Mathematics (11/08, Adviser: Leszek Demkowicz)
5. Matyas A. Sustik, Department of Computer Science (4/08, Adviser: Dhillon)
6. Haydar Oguz Erdin, Department of Mathematics (4/07)
7. Ricardo Verotti O. Teixeira, Department of Mathematics (2/07, Adviser: Ted Odell)
8. Nicholas Leger, Department of Mathematics, (8/06, Adviser: Alexis Vasseur)
9. Kefei Wang, Department of Petroleum and Geosystems Engineering (6/01, Advisers: Kamy Sepehrnoori and John Killough).

Completed

1. Sunil George Thomas, *On Some Problems in the Simulation of Flow and Transport through Porous Media*, Computational and Applied Mathematics, Ph.D. July, 2009, (Adviser: Mary F. Wheeler)
2. Chetan Jhurani, *Multiscale Modeling Using Goal-Oriented Adaptivity and Numerical Homogenization*, Computational and Applied Mathematics, Ph.D. June, 2009 (Adviser: Leszek Demkowicz).
3. Anthony S. Ditanna, *The Optimal Control of A Levy Process*, Department of Mathematics, Ph.D. May, 2009 (Adviser: Gordon Zitkovic).

4. Farhad Tarahhom, *Development of an Implicit Full-Tensor Dual Porosity Compositional Reservoir Simulator*, Department of Petroleum and Geosystems Engineering, Ph.D. December, 2008 (Adviser: Kamy Sepehrnoori).
5. Jin-Wook Jung, *Analysis of Atomic and Molecular Negative Ions in a Constant Electric Field using a Resolvent Method*, Department of Physics, Ph.D. November 25, 2008 (Advisers: Linda Reichl and William C. Schieve).
6. Ti Zhou, *Essays on Pricing and Portfolio Choice in Incomplete Markets*, Department of Mathematics, Ph.D. November 24, 2008 (Adviser: Thaleia Zariphopoulou)
7. Bin Zhang, *IC Design for Reliability*, Electrical and Computer Engineering, Ph.D. October 22, 2008 (Adviser: Michael Orshansky).
8. Marco A. Iglesias, *An iterative representer-based scheme for data inversion in reservoir modeling*, Computational and Applied Mathematics, Ph.D. July 23, 2008 (Adviser: Clint Dawson).
9. Raman Jha, *Investigation of Local Mixing and Its Influence on Core Scale Mixing (Dispersion)*, Department of Petroleum and Geosystems Engineering, Ph.D. June 2008 (Adviser: Steve Bryant).
10. Narayan Gopinathan Nair, *Measurement and Modeling of Multiscale Flow and Transport through Large-Vug Cretaceous Carbonates,* Department of Petroleum and Geosystems Engineering, Ph.D. June 2008 (Advisers: Steve Bryant and Jim Jennings).
11. Sri Harsha Tharkabhushanam, *Conservative Deterministic Spectral Method for Rarefied Gas Flows*, Computational and Applied Mathematics, Ph.D. June 3, 2008 (Adviser: Irene Gamba).
12. Suvrit Sra, *Matrix Nearness Problems in Data Mining,* Department of Computer Science, Ph.D. May 2, 2007 (Adviser: Inderjit Dhillon).
13. Omar Alan Vicencio, *Nitrogen Injection Into Naturally Fractured Reservoirs,* Department of Petroleum and Geosystems Engineering, Ph.D. April 26, 2007 (8/04, Adviser: Kamy Sepehrnoori).
14. Paolo Bientinesi, *Mechanical derivation and systematic analysis of correct linear algebra algorithms*, Department of Computer Science, Ph.D. July, 2006 (Adviser: Robert van de Geijn).
15. Jim Nolen, Department of Mathematics, Ph.D. May, 2006 (Advisers: Xin and Souganidis).
16. Liying Zhang, *Multiscale flow and transport in highly heterogeneous carbonates,* Department of Petroleum and Geosystems Engineering, Ph.D. August 2, 2005 (Adviser: Steve Bryant).
17. P. J. Phillips, Computational and Applied Mathematics, Ph.D. August 2005 (Adviser: Mary Wheeler)
18. Reza Naimi-Tajdar, *Development and implementation of a naturally fractured reservoir model into a fully implicit, equation-of-state compositional, parallel simulator,* Department of Petroleum and Geosystems Engineering, Ph.D. July 14, 2005 (Advisers: Mark A. Miller and Kamy Sepehrnoori).
19. Drew Lamar, Department of Mathematics, Ph.D. May 2, 2005 (Adviser: Jack Xin).
20. Mihaela (Michele) D. Pal, *Theory of principle component filter banks with applications to multicomponent imagery,* Department of Mathematics, Ph.D. May 2003 (Adviser: E. Ward Cheney and Christopher M. Brislawn).
21. Nemesio Miguel-Hernandez, *Scaling parameters for characterizing gravity drainage in naturally fractured reservoirs,* Department of Petroleum and Geosystems Engineering, Ph.D. July 2002 (Advisers: Mark A. Miller and Kamy Sepehrnoori).
22. James R. Overfelt, *Numerical Modeling of Stokesian Emulsions*, Computational and Applied Mathematics, Ph.D. January 2002 (Advisers: Greg J. Rodin and Robert van de Geijn)
23. F. Joseph Eaton, *A multigrid preconditioner for two phase flow in porous media,* Computational and Applied Mathematics, Ph.D. December 2001 (Adviser: Mary F. Wheeler).
24. Bowei Li, *Implementation of full permeability tensor representation in a dual porosity reser-*

voir simulator, Department of Petroleum and Geosystems Engineering, Ph.D. August 2001 (Advisers: Mark A. Miller and Kamy Sepehrnoori).

25. Kumar S. Vemaganti, *Goal-oriented adaptive modeling of heterogeneous elastic solids,* Department of Aerospace Engineering and Engineering Mechanics, Ph.D. November 2000 (Adviser: J. Tinsley Oden).
26. Gregory S. Richardson, *Conditional limit theorems for a class of spectrally positive, asymptotically self-similar Lévy processes*, Department of Mathematics, Ph.D. December 2000 (Adviser: Jerry L. Bona and P. T. Konstantopoulos).
27. Qin Lu, *A parallel multi-block/multi-physics approach for multi-phase flow in porous media,* Department of Petroleum and Geosystems Engineering, Ph.D. May 2000 (Adviser: Mary F. Wheeler).
28. Beatrice Riviere, *Discontinuous Galerkin methods for solving the miscible displacement problem in porous media,* Computational and Applied Mathematics, Ph.D. May 2000 (Adviser: Mary F. Wheeler).
29. Hee Chul Pak, *Two distributed capacitance models*, Department of Mathematics, Ph.D. December 1999 (Adviser: Ralph Showalter).
30. Abdulaziz A. Aldejain, *Implementation of a dual porosity model in a chemical flooding simulator,* Department of Petroleum and Geosystems Engineering, Ph.D. July 1999 (Advisers: Mark A. Miller and Kamy Sepehrnoori).
31. Fredrik Saaf, *A study of reactive transport phenomena in porous media*, Department of Computational and Applied Mathematics, Rice University, Ph.D. August 1996 (Adviser: Mary F. Wheeler).
32. Ivan Yotov, *Mixed finite element methods for flow in porous media*, Department of Computational and Applied Mathematics, Rice University, Ph.D. April 1996 (Adviser: Mary F. Wheeler).
33. Lawrence C. Cowsar, *Some domain decomposition and multigrid preconditioners for hybrid mixed finite elements*, Department of Computational and Applied Mathematics, Rice University, Ph.D. April 1994 (Adviser: Mary F. Wheeler).

Membership on Masters (M.A.) committees

1. Joshua L. Fisher, *An analysis of the finite element method using B-spline basis functions,* Department of Mathematics, M.A. Report, May 2006 (Adviser: Oscar Gonzalez).
2. Shubing Wang, *Numerical approximation of $C^{1,1}$-curves and their thickness,* Department of Mathematics, M.A. Report, December 2003 (Adviser: Oscar Gonzalez).

Research Support

Grants

1. U.S. Department of Energy, $15.1 million, Center for Frontiers of Subsurface Energy Security, 1 Sept. 2009 to 31 Aug. 2014. Director Gary A. Pope, Associate Directors Mary F. Wheeler and Arthur Ratzel (Sandia National Laboratory), and Team Leaders Philip Bennett, Steven L. Bryant, Sanjay Srinivasan, and Todd Arbogast.
2. KAUST UT-Austin Academic Excellence Alliance Program, $431,253, 1 Sept. 2008 to 31 Aug. 2009, with Mary F. Wheeler (PI) and Mojdeh Delshad *Computational Models for Evaluating Long Term CO_2 Storage in Saline Aquifers.*
3. U.S. National Science Foundation DMS-0835745, $1,332,000 1 Oct. 2008 to 30 Sept. 2012, with Mary F. Wheeler (PI) and Mojdeh 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.

4. U.S. National Science Foundation DMS-0713815 (OSP 200602754), $258,529 1 Sept. 2007 to 31 Aug. 2010, *Fully locally conservative characteristic methods for transport problems.*
5. U.S. National Science Foundation DMS–0417431 (OSP 200400101), $676,572 1 Sept. 2004 to 31 Aug. 2007 (extended to 2008), with Steven L. Bryant, James Jennings, and Charles Kerans, *CMG Research: Multi-scale flow and transport modeling of large-vug Cretaceous carbonates.*
6. U.S. National Science Foundation DMS–0408489 (OSP 200302296), $244,001, 1 Sept. 2004 to 31 Aug. 2007 (extended to 2008), *Development and application of subgrid upscaling.*
7. U.S. National Science Foundation DMS–0215389, $80,644, 1 Sept. 2002 to 31 Aug. 2003, with Mary F. Wheeler, Steven L. Bryant, Clinton N. Dawson, and Malgorzata Peszynska, *A parallel computer cluster for multiphysics and multiscale modeling of subsurface and surface flows.*
8. U.S. National Science Foundation DMS–0074310 (OSP 199902591), $240,000, 1 Sept. 2000 to 31 Dec. 2003, with Steven L. Bryant, *Modeling Flow in Porous Media with Vugular Meso-Scale Heterogeneities.*
9. U.S. National Science Foundation DMS–9873326, $1,700,000, 1 Oct. 1998 to 30 Sept. 2001, with Mary F. Wheeler, Chandrajit L. Bajaj, Steven L. Bryant, Clinton N. Dawson, *KDI: Multiscale Physics-Based Simulation of Fluid Flow for Energy and Environmental Applications.*
10. U.S. National Science Foundation DMS–9707015, $75,000, 1 Aug. 1997 to 31 July 2000, *A posteriori error estimation and up-scaling for mixed finite element methods* (OSP Number: P004899700).
11. Center for Subsurface Modeling Industrial Affiliates Program, currently 6 major petroleum and computer companies, $40,000 (each, renewable annually), The University of Texas at Austin.
12. U.S. Department of Energy, Advanced Computing Technology Initiative (ACTI), $1,157,000, 1995–97, with Clint Dawson, Larry Lake, Daene McKinney, Gary Pope, Kamy Sepehrnoori, and Mary Wheeler, and with Argonne National Laboratory (William Gropp, Tom Morgan, and Barry Smith), *Research in New Generation Framework for Petroleum Reservoir Simulation.*
13. U.S. National Science Foundation DMS–8905505, $75,000, 1989–92, NSF Mathematical Sciences Postdoctoral Research Fellowship, *Simulation of Flow in Naturally Fractured Porous Media.*
14. U.S. National Science Foundation DMS–8903211, 1989–92, with Jim Douglas, Jr., *Mathematical Sciences: Numerical Analysis and Simulation of Reservoir Flows and Waves in Porous Media.*

Other Supported Projects

1. U.S. Department of Energy, $826,193, 1995–1997 (P.I.: M. F. Wheeler), Partnership in Computational Science, *Grand Challenge Problems in Environmental Modeling and Remediation: Groundwater Contaminant Transport.*
2. U.S. Department of Energy, DE FG05-92ER25142, 1992–1996 (P.I.: M. F. Wheeler), *Parallel Algorithms for Modeling Flow in Permeable Media.*
3. U.S. Department of Energy through Oak Ridge National Laboratory, Martin Marietta 19X-SK963C, 1992–1995 (P.I.: M. F. Wheeler), *Partnership in Computational Science: Groundwater Modeling.*

Miscellaneous Professional Activities

Software Development

1. *Parssim1: The Parallel Subsurface Simulator, Single Phase.*
2. *ParTrans: The Parallel Transport Simulator.*

Refereeing and Reviewing

- Advances in Water Resources, 1992, 1998, 2001–09
- Applicable Analysis, 2009
- American Mathematical Monthly, 2002
- Applied Numerical Mathematics, 2005
- Colorado State University (tenure), 2009
- Communications in Mathematical Sciences, 2003
- Communications in Numerical Methods in Engineering, 2002
- Computational Geosciences, 1996–97, 1999, 2001–02, 2006, 2008–09
- Computer Methods in Applied Mechanics and Engineering, 1998–99, 2006, 2008–09
- Computers and Mathematics with Applications, 2006
- DOE, 1994, 1996–98, 2000, 2003–04
- Electronic Journal of Differential Equations, 2005
- In Situ, 1991–92
- IMA J. on Numerical Analysis, 2003
- International J. for Numerical Methods in Engineering, 2002, 2008
- J. of Applied Mathematics and Physics, 2009
- J. of Canadian Petroleum Technology, 2009
- J. of Computational and Applied Math., 1995–97, 2002
- J. of Computational Physics, 1998–99, 2007
- J. of Differential Equations, 1999
- J. of Mathematical Analysis and Applications, 2006
- J. of Nonlinear Analysis, 2005
- Mathematical Modeling and Numerical Analysis (M^2AN), 2002, 2009
- Mathematical Models and Methods in Applied Sciences (M3AS), 2008
- Mathematics of Computation, 1990, 1994, 2001, 2003
- Multiscale Modeling and Simulation, 2003, 2005, 2007–09
- NSF, 1993–94, 1997–09
- National Sciences and Engineering Research Council of Canada, 1999, 2001
- Numerische Mathematik, 2009
- Numerical Methods for Partial Differential Equations, 1994–98, 2000, 2007
- Prentice Hall, 1995, 1998
- Proceedings of the American Mathematical Society, 1998
- Proceedings of the SIAM Conference on Mathematical and Computational Issues in Geophysical Fluid and Solid Mechanics, 1990
- Reviews of Geophysics, 2009
- SIAM J. on Applied Math., 1994–95, 1998, 2003
- SIAM J. on Math. Analysis, 1990, 1992–93
- SIAM J. on Numerical Analysis, 1993, 1995–01, 2004–06
- SIAM J. on Sci. Comp., 1996, 2002–03
- Society of Petroleum Engineers, 2000–01, 2003–04, 2006–07, 2009
- Swedish Research Council for Engineering Sciences, 1996
- Swiss National Science Foundation, 2008

- Transport in Porous Media, 1996, 1998–01
- University of Tulsa (tenure), 1997
- Water Resources Research, 1991, 2004, 2005

Miscellaneous

1. Visitor, Department of Mathematics, Colorado State University, June 22 to July 22, 2008.
2. Attended the *Second Atomistic-to-Continuum (AtC) Coupling Methods Workshop,* hosted by the Institute for Computational Engineering and Sciences, University of Texas, Austin, Texas, April 2–3, 2007.
3. Attended the *Finite Element Rodeo*, University of Houston, Houston, Texas, March 2–3, 2007.
4. Attended the 2007 *Conference of The Academy of Medicine, Engineering and Science of Texas*, Austin, Texas, January 4–5, 2007.
5. Attended the conference *A Scientific Celebration of the 60*th *Birthday of Professor Richard E. Ewing,* Texas A&M University, November 17-18, 2006.
6. Attended the *Atomistic-to-Continuum (AtC) Coupling Methods Workshop,* sponsored by Sandia National Laboratory, Albuquerque, New Mexico March 20–21, 2006.
7. Attended the *Finite Element Rodeo*, Texas A&M University, College Station, Texas, March 3–4, 2006.
8. Attended the *Finite Element Rodeo*, The University of Texas at Austin, Austin, Texas, March, 2004.
9. Attended the joint meeting of the *Finite Element Circus* and *Finite Element Rodeo*, The University of Texas at Austin Austin, Texas, February, 2000.
10. Attended the *Fourth SIAM Conference on Mathematical and Computational Issues in the Geosciences*, Albuquerque, NM, June, 1997. Co-author presented paper, "Mixed finie element methods for flow in multi-block domains with non-matching grids."
11. Attended and co-chaired session at the 1997 Center for Research on Parallel Computation Annual Meeting, Houston, Texas, May, 1997.
12. Attended the XI International Conference on Computational Methods in Water Resources, Cancun, Mexico, July, 1996.
13. *Spend a Summer with a Scientist* student, Armando Lara, Rice University, 1995.
14. Exhibitor for the Center for Research on Parallel Computation and the Center for Subsurface Modeling at the *Society of Petroleum Engineers Petroleum Computer Conference*, Houston, Texas, June, 1995.
15. Attended the *Thirteenth Society of Petroleum Engineers Symposium on Reservoir Simulation*, San Antonio, Texas, February, 1995.
16. *Spend a Summer with a Scientist* student, Griselda Mani, Rice University, 1994.
17. Co-group leader of Numerical and Analytical Methods, SIAM Activity Group on Geosciences, 1992–1994.
18. Attended and chaired session at the *Workshop on parallel multigrid and domain decomposition*, Rice University, Houston, Texas, March, 1991.
19. Attended and chaired session at the *Fifth SIAM conference on parallel processing for scientific computing*, Houston, Texas, March, 1991.
20. Attended the *Tenth Society of Petroleum Engineers Symposium on Reservoir Simulation*, Houston, Texas, February, 1989.
21. Attended the NSF-CBMS conference *Mathematical Modeling in the Energy and Environmental Sciences*, West Virginia University, Morgantown, West Virginia, June, 1986.

Publications

Articles in Journals and Other Refereed Works

[1] Todd Arbogast and Wenhao Wang. Convergence of a fully conservative volume corrected characteristic method for transport problems. *Submitted*, 2009.

[2] T. Arbogast, Ch.-S. Huang, and T. F. Russell. A locally conservative streamline method for a model two-phase flow problem in a one-dimensional porous medium. *Submitted*, 2009.

[3] T. Arbogast and Ch.-S. Huang. A fully conservative Eulerian-Lagrangian method for a convection-diffusion problem in a solenoidal field. *Submitted*, 2009.

[4] Jichun Li, Todd Arbogast, and Yunqing Huang. Mixed methods using standard conforming finite elements. *Comput. Methods Appl. Mech. Engrg.*, 198(5):680–692, 2009.

[5] T. Arbogast and M. S. M. Gomez. A discretization and multigrid solver for a Darcy-Stokes system of three-dimensional vuggy porous media. *Comput. Geosci.*, 13(3):331–348, 2009. DOI 10.1007/s10596-008-9121-y.

[6] T. Arbogast and D. S. Brunson. A computational method for approximating a Darcy-Stokes system governing a vuggy porous medium. *Comput. Geosci.*, 11(3):207–218, 2007.

[7] R. Naimi-Tajdar, C. Han, K. Sepehrnoori, T. J. Arbogast, and M. A. Miller. A fully implicit, compositional, parallel simulator for IOR processes in fractured reservoirs. *SPE Journal*, 12(3), September 2007.

[8] T. Arbogast, G. Pencheva, M. F. Wheeler, and I. Yotov. A multiscale mortar mixed finite element method. *Multiscale Model. Simul.*, 6(1):319–346, 2007.

[9] T. Arbogast, Ch.-S. Huang, and S.-M. Yang. Improved accuracy for alternating-direction methods for parabolic equations based on regular and mixed finite elements. *Mathematical Models & Methods in Applied Sciences*, 17(8):1279–1305, 2007.

[10] T. Arbogast and Ch.-S. Huang. A fully mass and volume conserving implementation of a characteristic method for transport problems. *SIAM J. Sci. Comput.*, 28(6):2001–2022, 2006.

[11] T. Arbogast and K. J. Boyd. Subgrid upscaling and mixed multiscale finite elements. *SIAM J. Numer. Anal.*, 44(3):1150–1171, 2006.

[12] T. Arbogast and H. L. Lehr. Homogenization of a Darcy-Stokes system modeling vuggy porous media. *Comput. Geosci.*, 10(3):291–302, 2006.

[13] T. Arbogast and M. F. Wheeler. A family of rectangular mixed elements with a continuous flux for second order elliptic problems. *SIAM J. Numer. Anal.*, 42:1914–1931, 2005.

[14] T. Arbogast. Analysis of a two-scale, locally conservative subgrid upscaling for elliptic problems. *SIAM J. Numer. Anal.*, 42:576–598, 2004.

[15] T. Arbogast. An overview of subgrid upscaling for elliptic problems in mixed form. In Z. Chen, R. Glowinski, and Kaitai Li, editors, *Current Trends in Scientific Computing*, volume 329 of *Contemporary Mathematics*, pages 21–32. American Mathematical Society, 2003.

[16] T. Arbogast and S. L. Bryant. A two-scale numerical subgrid technique for waterflood simulations. *SPE J.*, 7:446–457, Dec. 2002.

[17] T. Arbogast. Implementation of a locally conservative numerical subgrid upscaling scheme for two-phase Darcy flow. *Comput. Geosci.*, 6:453–481, 2002.

[18] T. Arbogast. Numerical subgrid upscaling of two-phase flow in porous media. In Z. Chen, R. E. Ewing, and Z.-C. Shi, editors, *Numerical treatment of multiphase flows in porous media*, volume 552 of *Lecture Notes in Physics*, pages 35–49. Springer, Berlin, 2000.

[19] T. Arbogast, L. C. Cowsar, M. F. Wheeler, and I. Yotov. Mixed finite element methods on non-matching multiblock grids. *SIAM J. Numer. Anal.*, 37:1295–1315, 2000.

[20] T. Arbogast, C. N. Dawson, P. T. Keenan, M. F. Wheeler, and I. Yotov. Enhanced cell-centered finite differences for elliptic equations on general geometry. *SIAM J. Sci. Comput.*, 19:404–425, 1998.

[21] T. Arbogast and I. Yotov. A non-mortar mixed finite element method for elliptic problems on

non-matching multiblock grids. *Comput. Methods Appl. Mech. Engrg.*, 149:225–265, 1997.

[22] T. Arbogast, M. F. Wheeler, and I. Yotov. Mixed finite elements for elliptic problems with tensor coefficients as cell-centered finite differences. *SIAM J. Numer. Anal.*, 34:828–852, 1997.

[23] T. Arbogast. Computational aspects of dual-porosity models. In U. Hornung, editor, *Homogenization and Porous Media*, Interdisciplinary Applied Math. Series, pages 203–223. Springer, New York, 1997.

[24] T. Arbogast, S. Bryant, C. Dawson, F. Saaf, Chong Wang, and M. Wheeler. Computational methods for multiphase flow and reactive transport problems arising in subsurface contaminant remediation. *J. Comput. Appl. Math.*, 74:19–32, 1996.

[25] T. Arbogast, M. F. Wheeler, and Nai-Ying Zhang. A nonlinear mixed finite element method for a degenerate parabolic equation arising in flow in porous media. *SIAM J. Numer. Anal.*, 33:1669–1687, 1996.

[26] T. Arbogast, C. N. Dawson, and M. F. Wheeler. A parallel algorithm for two phase multicomponent contaminant transport. *Applications of Math.*, 40:163–174, 1995.

[27] T. Arbogast and Zhangxin Chen. On the implementation of mixed methods as nonconforming methods for second order elliptic problems. *Math. Comp.*, 64:943–972, 1995.

[28] T. Arbogast and M. F. Wheeler. A characteristics-mixed finite element method for advection dominated transport problems. *SIAM J. Numer. Anal.*, 32:404–424, 1995.

[29] T. Arbogast. Gravitational forces in dual-porosity systems. II. Computational validation of the homogenized model. *Transport in Porous Media*, 13:205–220, 1993.

[30] T. Arbogast. Gravitational forces in dual-porosity systems. I. Model derivation by homogenization. *Transport in Porous Media*, 13:179–203, 1993.

[31] T. Arbogast, M. Obeyesekere, and M. F. Wheeler. Numerical methods for the simulation of flow in root-soil systems. *SIAM J. Numer. Anal.*, 30:1677–1702, 1993.

[32] J. Douglas, Jr., T. Arbogast, P. J. Paes Leme, J. L. Hensley, and N. P. Nunes. Immiscible displacement in vertically fractured reservoirs. *Transport in Porous Media*, 12:73–106, 1993.

[33] T. Arbogast. The existence of weak solutions to single-porosity and simple dual-porosity models of two-phase incompressible flow. *Journal of Nonlinear Analysis: Theory, Methods, and Applications*, 19:1009–1031, 1992.

[34] J. Douglas, Jr., J. L. Hensley, and T. Arbogast. A dual-porosity model for waterflooding in naturally fractured reservoirs. *Comput. Methods Appl. Mech. Engrg.*, 87:157–174, 1991.

[35] J. Douglas, Jr. and T. Arbogast. Dual-porosity models for flow in naturally fractured reservoirs. In J. H. Cushman, editor, *Dynamics of Fluids in Hierarchical Porous Media*, pages 177–221. Academic Press, London, 1990.

[36] T. Arbogast, J. Douglas, Jr., and U. Hornung. Derivation of the double porosity model of single phase flow via homogenization theory. *SIAM J. Math. Anal.*, 21:823–836, 1990.

[37] T. Arbogast and F. A. Milner. A finite difference method for a two-sex model of population dynamics. *SIAM J. Numer. Anal.*, 26:1474–1486, 1989.

[38] T. Arbogast. On the simulation of incompressible, miscible displacement in a naturally fractured petroleum reservoir. *R.A.I.R.O. Modél. Math. Anal. Numér*, 23:5–51, 1989.

[39] T. Arbogast. Analysis of the simulation of single phase flow through a naturally fractured reservoir. *SIAM J. Numer. Anal.*, 26:12–29, 1989.

Articles in Unrefereed Works

[1] Todd Arbogast. The mixed variational multiscale method and aspects of convergence for heterogeneous porous media. In *Oberwolfach Reports,* Numerical Upscaling for Flow Problems: Theory and Applications, organized by Achi Brandt, Yalchin Efendiev, and Oleg Iliev.

The Mathematisches Forschungsinstitut Oberwolfach (MFO), European Mathematical Society, 2009.

[2] R. Naimi-Tajdar, C. Han, K. Sepehrnoori, T. J. Arbogast, and M. A. Miller. A fully implicit, compositional, parallel simulator for IOR processes in fractured reservoirs. In *Proceedings of the 2006 SPE/DOE Symposium on Improved Oil Recovery held in Tulsa, Oklahoma*, April 22–26, 2006. SPE 100079.

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