

## RÉSUMÉ

RICHARD E. EWING

November 24, 1946—December 5, 2007

CITIZENSHIP: U.S.A.

EDUCATION: Ph.D., The University of Texas at Austin, 1974  
M.A., The University of Texas at Austin, 1972  
B.A., The University of Texas at Austin, 1969

PROFESSIONAL LICENSES: Professional Engineer, State of Texas, No. 95392

**TABLE OF CONTENTS** Postdoctoral Fellowships, Professional Experience, Honorary Doctorates/Professorships, Awards and Honors, Professional Societies, State or Federal Boards, Councils, or Commissions, Boards of Trustees/Directors, National/International Committees and Advisory Positions, Publications, Invited Named Lectures, Invited Talks, Invited Colloquia and Special Seminars, Panel Presentations and Discussions, Editorial Work, Ph.D. Students, M.S. Students, Research Grants and Contracts

### Postdoctoral Fellowships:

1. Postdoc, Mathematics Research Center, University of Wisconsin-Madison, 1978–1979.
2. NSF Energy-Related Postdoctoral Fellowship at the University of Chicago, 1976–1977.
3. Oakland University Research Fellowship, 1975–1976.

### Professional Experience

1. Distinguished Professor of Mathematics and Applied Mathematics, Texas A&M University, 1998–2007.
2. Mobil Technology Chair in Computational Science (inaugural holder), Texas A&M University 1999–2007.
3. Executive Director, Institute for Scientific Computation, Texas A&M University, 1992–2007
4. Texas Engineering Experiment Station Distinguished Research Chair, Texas A&M University, 1992–2007.
5. Vice President for Research, Texas A&M University, 2000–2007.
6. Richard H. Harrison III and External Development Chair for the Dean of Science (inaugural holder), Texas A&M University, 1999–2000.
7. Dean, College of Science, Texas A&M University, 1992–2000.
8. Director, Integrative Center for Homeland Security, Texas A&M University, 2002–2003.
9. Director, Academy for Advanced Telecommunications and Learning Technologies, Texas A&M University, 1996–2001.
10. Director, Institute for Telecommunications and Information Technologies, TEES, 1997–2001.
11. Professor of Mathematics and Engineering, Texas A&M University, 1992–2007.
12. Director, Science and Technology Division, Texas Engineering Experiment Station, 1992–2000.
13. John and Jane Wold Centennial Chair in Energy, University of Wyoming, 1990–1992.
14. Director of Wyoming Center for Energy Research, University of Wyoming, 1990–1992.
15. Director of NSF Cooperative Research Center for Mathematical Modeling, University of Wyoming, 1986–1989.
16. Director of Institute for Scientific Computation, University of Wyoming, 1986–1992.
17. Director of Enhanced Oil Recovery Institute, University of Wyoming, 1984–1992.

18. J.E. Warren Distinguished Professor of Energy and Environment, University of Wyoming, 1984–1992.
19. Professor of Mathematics, Petroleum Engineering, and Chemical Engineering, University of Wyoming, 1983–1992.
20. Associate, Mobil Research and Development Corporation, 1982–1983.
21. Senior Research Mathematician, Mobil Research and Development Corporation, 1980–1982.
22. Associate Professor, The Ohio State University, 1980–1981.
23. Research Associate, Institute of Polar Studies, The Ohio State University, 1977–1981.
24. Assistant Professor, The Ohio State University, 1977–1980.
25. Assistant Professor, Oakland University, 1974–1977.

#### ADJUNCT POSITIONS:

1. Adjunct Professor of Health Information, The University of Texas School of Allied Health Sciences, 1998–2007.
2. Adjunct Professor of Civil Engineering and Mathematics, Montana State University, 1992–2007.
3. Adjunct Professor of Mathematics, Southern Methodist University, 1980–1984.
4. Adjunct Professor of Mathematics, Rice University, 1980–1984.

#### VISITING POSITIONS:

1. Visiting Professor, Department of Civil Engineering and Operations Research, Princeton University, March–April, 1990.
2. Visiting Westinghouse Professor, Department of Mathematical Sciences, University of South Carolina, January–May 1990.
3. Visiting Professor, Computational Mathematics Group, Department of Mathematics, University of Colorado at Denver, August–December 1989.
4. Distinguished Research Professor, Texas A&M University, February 1989.
5. IBM Scientist, Bergen Scientific Center, March 1987, May 1988.
6. J.E. Warren Distinguished Visiting Professor of Energy and Environment, University of Wyoming, 1982–1983.
7. Visiting Assistant Professor, Mathematics Research Center, University of Wisconsin-Madison, 1978–1979.
8. NSF Postdoctoral Fellow, University of Chicago, 1976–1977.

#### CONSULTING:

1. Ecodynamics, 1991–1995.
2. Westinghouse Savannah River Corporation, 1991–2000.
3. Institute for Process Analysis, NSF Engineering Research Center, Montana State University, 1991–2007.
4. Sandia National Laboratory, 1990–2000.
5. Los Alamos National Laboratory, 1989–2000.
6. Amoco Production Company, 1989–1992.
7. IBM Bergen Scientific Research Centre, 1987–1992.
8. Louisiana Board of Regents, 1987–1991.
9. Pacific Power and Light Company, 1985–1992.
10. Colorado Research Development Corporation, 1985–1992.
11. Reservoir Simulation Research Corporation, 1985–2000.
12. Exxon U.S.A., 1984–1991.
13. Chevron Oil Field Research Company, 1984–1995.
14. In-Situ Incorporated, 1984–1999.

15. Mobil Research and Development Corporation, 1982–1999.
16. Exxon-Mobil Research Corporation, 2000–2007.
17. Saudi-Aramco, 1999–2007.

#### **Honorary Doctorates/Professorships:**

1. Honorary Doctoral Degree, University of Bergen, Norway, 1996.
2. Honorary Guest Professorship, Shandong University, People's Republic of China, 1987.
3. Honorary Guest Professorship, Wuhan University, People's Republic of China, 1997.

#### **Awards and Honors:**

1. Honorary Societies: Phi Beta Kappa, Phi Kappa Phi, Phi Eta Sigma, Sigma Xi, Kappa Mu Epsilon, Kappa Kappa Psi, Phi Beta Delta, Order of the Engineer.
2. J.E. Warren Distinguished Professor of Energy and Environment, University of Wyoming, 1984.
3. Burlington Northern Foundation Faculty Achievement Award, University of Wyoming, 1986.
4. Halliburton Special Award for Excellence in Multidisciplinary Research and Teaching, University of Wyoming, 1986.
5. University of Wyoming President's Speakers Series, 1988.
6. George Duke Humphrey Distinguished Faculty Medal, University of Wyoming, 1990.
7. John and Jane Wold Centennial Chair in Energy, University of Wyoming, 1990.
8. Texas Engineering Experiment Station Distinguished Research Chair, Texas A&M University, 1992.
9. Boeing Distinguished Lecturer, Wichita State University, 1992.
10. Miles Distinguished Lecturer, Notre Dame University, 1992–1994.
11. Election to New York Academy of Sciences, 1993.
12. Who's Who in America, 1995–2006.
13. Who's Who in the World, 1995–2006.
14. Who's Who in Science and Engineering, 1996.
15. Fellow of American Association for the Advancement of Science, Engineering Section, 1996.
16. Who's Who in the Twenty-first Century, 2001.
17. National Aeronautics and Space Administration (NASA) Public Service Medal, 2003.
18. Outstanding Innovative Research Award - CAST-TX, 2004.
19. Who's Who in American Education, 2005.
20. Who's Who in Computational Science and Engineering, 2005.
21. Humboldt Research Award for Senior U.S. Scientists, 2005.
22. Academia Europaea, Foreign Member, 2005–2007.
23. Magnus Distinguished Lecturer, Colorado State University, 2006.
24. Richard Ewing Award for Excellence in Science, Technology, and Economic Development, established by Texas A&M University, 2006.
25. Economic Development Leadership Award, Research Valley Partnership, 2007.
26. Michael P. Malone International Leadership Award, National Association of State Universities and Land-Grant Colleges (NASULGC), 2007.

#### **Professional Societies:**

1. American Association for the Advancement of Science, Fellow.
2. American Chemical Society.
3. American Geophysical Union.

4. American Mathematical Society.
5. European Society of Computational Methods in Sciences and Engineering.
6. International Association for Computational Mechanics.
7. International Association for Mathematics and Computers in Simulation.
8. International Federation of Nonlinear Analysts.
9. Institute of Electrical and Electronics Engineers Inc.
10. Mathematics Association of America.
11. Society of Engineering Science.
12. Society for Industrial and Applied Mathematics.
13. Society of Petroleum Engineers of AIME.
14. United States Association for Computational Mechanics.

**State or Federal Boards, Councils, or Commissions:**

1. NASA Advisory Council (NAC), 2001–2003.
2. Texas Council on Environmental Technology (TCET), 2001–2005.
3. Texas Product Development and Small Business Incubator Board, 2004–2007.

**Boards of Trustees/Directors:**

1. Member, Board of Trustees, Society for Industrial and Applied Mathematics, 1987–1993.
2. Member, Board of Trustees, SIAM Institute for the Advancement of Scientific Computing, 1987–1993.
3. Member, Board of Directors, Geoscience Institute for Oil and Gas Recovery Research (14 State Consortium), University of Texas at Austin, 1988–1992.
4. President, Environmental Modeling and Analysis Corporation, 1991–2000.
5. Member, General Council, International Association for Computational Mechanics, 1991–2007.
6. Member, Board of Directors, National Space Biomedical Research Institute, 2000–2007.
7. Member, Board of Directors, Software Commercialization and Innovation Center, 2000–2005.
8. Member, Board of Directors, Houston Technology Center, 2000–2007.
9. Member, Board of Trustees, Texas A&M University Research Foundation, 2000–2007.
10. Member, Board of Directors, Associated Western Universities, 2000–2007.
11. Member, Board of Directors, Southeastern Universities Research Association, 2000–2007.
12. Member, Board of Directors, Texas Healthcare and Biosciences Institute, 2000–2007.
13. Member, Council, Oak Ridge Associated Universities, 2001–2006.
14. Member, Board of Directors, Texas Society for Biomedical Research, 2001–2007.
15. Member, Council, Harte Research Institute, 2001–2004.
16. President and Chairman of the Board of Directors, Texas GigaPOP, 2002–2004.
17. Member, Board of Directors, Oak Ridge Associated Universities, 2003–2007.
18. President and Chairman of the Board of Directors, Lonestar Research and Education Network, 2004.
19. Member, Board of Directors, Texas Institute for Genomic Medicine, 2005–2007.
20. Member, Board of Directors, Houston Advanced Research Center, 2005–2007.
21. Member, Board of Directors, Bi-National Sustainability Laboratory, 2006–2007.

**National/International Committees and Advisory Positions:**

1. Organizer, Special Session on Finite Element Analysis, Tenth IMACS World Congress on Systems Simulation and Scientific Computation, 1982, Montreal, Canada.
2. Member, Organizing Committee, International Conference on Mathematical, Statistical, and Computational Methods in Petroleum Exploration and Extraction, University of Houston, 1984.

3. Technical Advisor, Special Year in Mathematics of Energy, 1982–1983, University of Wyoming.
4. Member, Advisory Council, Texas-Oklahoma Section of Society for Industrial and Applied Mathematics, 1981–1982.
5. Member, Research Advisory Council, Center for Computational Studies in Petroleum, Colorado State University.
6. Member, Advisory Committee, Academic/Industrial Workshop on Mathematical Problems in Granular Flow, Duke University, 1984.
7. Member, Advisory Committee, International Conference on Accuracy Estimates and Adaptive Refinements in Finite Element Computations, Lisbon, Portugal, 1984.
8. SIAM Representative to AMS-MAA-SIAM Joint Committee on Employment Opportunities, 1984–1986.
9. Organizer, Special Session on Seismic Exploration, Fifth American Society of Civil Engineers, Engineering Mechanics Division Specialty Conference.
10. Member, Organizing Committee, NSF Workshop on Computing Resources for the Mathematical Sciences, Boulder, Colorado, 1984.
11. Member, Program Committee, 1984 Rocky Mountain Regional Meeting of the Society of Petroleum Engineers, Casper, Wyoming, May 21–22, 1984.
12. Member, Program Committee, Eighth SPE Symposium on Reservoir Simulation, Dallas, Texas, February 10–13, 1984.
13. Organizer, Special Session on Adaptive Local Grid Refinement, SIAM Meeting, Houston, Texas, January 21–24, 1985.
14. Member, Review Committee, Center for Excellence in Mathematical Sciences, Army Research Office, December 1984.
15. Member, Outside Review Committee, Department of Mathematics, University of Colorado at Denver, March 1985.
16. Member, Program Committee, Ninth SPE Symposium on Reservoir Simulation, San Antonio, Texas, February 2–4, 1987.
17. Member, Program Committee, First Wyoming Enhanced Oil Recovery Symposium, Casper, Wyoming, May 1985.
18. Member, Wyoming EPSCoR Experimental Program Committee.
19. Organizer, Symposium on Computational Advances in Oil Reservoir Simulation and Energy Related Applications, First World Congress on Computational Mechanics, Austin, Texas, September 22–26, 1986.
20. Member, Program Committee, Second Wyoming Enhanced Oil Recovery Symposium, Casper, Wyoming, May 1986.
21. Joint Policy Board on Mathematics Public Information Resource Committee, 1986–2007.
22. Co-organizer, Special Session on Optimization and Inverse Problems in Reservoir Aquifer Modeling, ORSA/TIMS Conference, Miami Beach, Florida, October 27–29, 1986.
23. Co-organizer, Special Session on Reservoir Simulation, First International Conference on Industrial and Applied Mathematics, Paris, France, June 29–July 3, 1987.
24. Member, Program Committee, SPE/DOE Sixth Symposium on Enhanced Oil Recovery, Tulsa, Oklahoma, April 1988.
25. Member, Army Basic Research Committee, National Research Council, 1987–1989.
26. Member, Panel to Assess Competitive Research, Louisiana Board of Regents, 1987.
27. Advisor, Research Institute of Petroleum Exploration and Development, Beijing, People's Republic of China, 1987–2007.
28. Member, Steering Committee, Center for Fluid Dynamics Modeling in the Geosciences, University of South Carolina, 1987–1989.
29. Co-leader, Group on Oil Recovery Simulation and Seismic Processing, Center for Applied Parallel Processing, University of Colorado, Boulder, 1988–1992.
30. Member, Organizing Committee, International Conference on Reliability of Finite Element Methods: Formulations, Quality Assessment, Solution Procedures, University of Texas at Austin, October 1989.
31. Member, International Consulting Board and Organizer, Special Session on Fluid Flow in Porous Media, Second World Congress on Computational Mechanics, Stuttgart, West Germany, August 27–31, 1990.

32. Industrial Advisor, IBM Bergen Scientific Centre, 1988–1992.
33. Member, Program Committee, SIAM Conference on Domain Decomposition, Houston, Texas, March 20–22, 1989.
34. Member, Program Committee, SIAM Conference on Mathematics of Geophysical Sciences, Houston, Texas, September 18–21, 1989.
35. Organizer, Minisymposium on Adaptive Techniques for Fluid Flow in Porous Media, SIAM Conference on Mathematics of Geophysical Sciences, Houston, Texas, September 18–21, 1989.
36. Organizer, Special Session on Flow in Porous Media, Second World Congress on Computational Mechanics, Stuttgart, West Germany, August 27–31, 1990.
37. Member, Advisory Board, The Center for Scientific Computing, Jyvaskyla, Finland, 1990–2007.
38. Member, Advisory Board, Improved Oil Recovery Center, Bergen, Norway, 1990–2007.
39. Member, Organizing Committee, AMS-SIAM Conference on Inverse Problems in Partial Differential Equations, Humboldt State University, California, July 29–August 4, 1989.
40. Member, Advisory Panel for Advanced Scientific Computing Divisions of the National Science Foundation, 1989–1991.
41. Member, Scientific Council, International Computer Committee, Moscow, USSR, 1989–2007.
42. Member, Program Committee, Eleventh SPE Symposium on Reservoir Simulation, Anaheim, California, February 1991.
43. Member, South Carolina High Performance Data Network, 1990–2007.
44. Member, Steering Committee, Industrial Mathematics Institute, University of South Carolina, 1990–2007.
45. Chair, Steering Committee, Groundwater Transport Consortium, Partnership in Computational Sciences, 1991–1996.
46. Member, Steering Committee, Center for Computational Sciences, Oak Ridge National Laboratory, 1991–1994.
47. Member, National Research Council Panel on the Role of the Mathematical Sciences in the Federal High Performance Computing and Communications Program, Washington, DC, July 30–31, 1991.
48. Member, Organizing Committee, IX International Conference on Computational Methods in Water Resources, Denver, Colorado, June 9–12, 1992.
49. Member, International Scientific Advisory Committee, 4th International Conference on Development and Application of Computer Techniques to Environmental Studies, ENVIROSOFT 92, Southampton, United Kingdom, September 1–3, 1992.
50. Vice-Chair, SIAM Activity Group in Geosciences, 1992–2007.
51. Member, Program Council, Institute for Biosciences and Technology, Houston, Texas, 1992–2007.
52. Member, Review Panel, Army High Performance Computing Research Center, University of Minnesota, Minneapolis, Minnesota, September 13–15, 1992.
53. Member, Committee on Science Policy, American Mathematical Society, 1992–2007.
54. Member, Scientific Advisory Board, Interdisciplinary Center for Computational Sciences, University of Heidelberg, Heidelberg, Germany, 1992–2007.
55. Member, International Advisory Committee, International Conference on Mathematical Modeling and Scientific Computation, Sozopol, Bulgaria, 1993.
56. Member, Review Panel, Minnesota Supercomputer Institute, University of Minnesota, Minneapolis, Minnesota, June 23–24, 1993.
57. Member, International Programme Committee, Sixth International Workshop on Parallel Processing by Cellular Automata and Arrays, PARCELLA 94, Potsdam, Germany, September 21–23, 1994.
58. Member, International Program Committee/International Advisory Committee, 3rd International Conference on Numerical Methods and Applications, Sofia Bulgaria, August 21–26, 1994.
59. Member, Scientific Committee, 2nd French-Latin American Colloquium on Numerical Methods of the Petroleum Industry, Cuenca, Ecuador, December 19–21, 1994.
60. Member, Dow Chemical Academic Advisory Council, 1994–1997.
61. Member, Organizing Committee, International Meeting on Mathematical Modeling of Flow and Transport in Porous Media, St. Etienne, France, May 22–26, 1995.

62. Member, Advisory Committee for the IBT Keck Center for Genome Informatics, Houston, Texas, 1994–2003.
63. Member, Programme Committee, International Conference on Advanced Mathematics, Computations, and Applications, Academtown, Novosibirsk, Russia, June 20–24, 1995.
64. Member, International Program Committee, Second IMACS Symposium on Iterative Linear Algebra, Blagoevgrad, Bulgaria, June 18–21, 1995.
65. Member, International Advisory Committee, 3rd U.S. National Congress on Computational Mechanics, Dallas, Texas June 12–14, 1995.
66. Member, Program Committee, International Conference on Algebraic Multilevel Iteration Methods with Applications, University of Nijmegen, The Netherlands, June 19–21, 1996.
67. Member, Scientific and Program Committee, Conference on Inverse Problems of Wave Propagation and Scattering, Aix les Bains, France, September 23–27, 1996.
68. Member, International Advisory Committee, 4th U.S. National Congress on Computational Mechanics, San Francisco, California, August 6–8, 1997.
69. Member, Scientific Advisory Review Panel, Institute for Mathematical Sciences, University of Alberta, Canada, 1996–1998.
70. Texas A&M University System voting delegate to the Commission on Information Technology for the National Association of State Universities and Land-Grant Colleges, 1996.
71. Member, International Advisory Board, Institute for the Mathematics of Life Sciences, Texas Tech University, 1997–2000.
72. Member, Steering Committee, Texas Telecommunications Engineering Consortium, State of Texas, 1997–2000.
73. Executive Liaison of Texas GigaPOP, Internet 2, 1998–2004.
74. Member, Scientific Board, Industrial Mathematics Institute (IMI), University of South Carolina, 1999–2007.
75. Member, International Scientific Programme Committee, International Conference on Environmental Mathematical Modeling and Numerical Analysis (EMMNA '99), Rostov-on-Don, Russia, May 24–31, 1999.
76. Blue Ribbon Panelist, NSF Division of Elementary, Secondary and Informal Education solicitation for Centers for Learning and Teaching, May 21–22, 2001.
77. Steering Committee, Center for Animal Biotechnology and Genomics, Texas Agricultural Experiment Station, May, 2001–2007
78. Member, Organizing Committee, Int. Conf. on Ind. Math., Bombay, India, December 7–9, 2002.
79. Member, Innovation Environment and Infrastructure Working Group, National Innovation Initiative Council on Competitiveness, 2004
80. Team Member, State Strategy on Advanced Technology Development, 2004–2005.
81. Member, FutureGen Texas Advisory Board, 2005–2007.
82. Member, Big 12 Center for Economic Development, Operations Committee.

#### PUBLICATIONS:

1. The approximation of certain parabolic equations backward in time via Sobolev equations, *SIAM J. Math. Anal.* **6** (1975), 283–294.
2. Numerical solution of Sobolev partial differential equations, *SIAM J. Numer. Anal.* **12** (1975), 345–363.
3. The locations and strengths of point sources (with J.R. Cannon), *Improperly Posed Boundary Value Problems, Research Notes in Mathematics* **1**, Pitman Publishing, London, 1975, 39–53.
4. Determination of a source term in a linear parabolic partial differential equation (with J.R. Cannon), *J. Appl. Math. Phys. (ZAMP)* **27** (1976), 393–401.
5. A direct numerical procedure for the Cauchy problem for the heat equation (with J.R. Cannon), *J. Math. Anal. Appl.* **56** (1976), 7–17.
6. A coupled nonlinear hyperbolic-parabolic system (with J.R. Cannon), *J. Math. Anal. Appl.* **58** (1977),

- 665–686.
7. Galerkin procedures for systems of parabolic partial differential equations related to the transmission of nerve impulses (with J.R. Cannon), *Nonlinear Diffusion, Research Notes in Mathematics* **14**, Pitman Publishing, London, 1977, 24–52.
  8. A coupled nonlinear hyperbolic-Sobolev system, *Ann. Math. Pura. Appl. (IV)* **114** (1977), 331–349.
  9. On the stability of the temperature distribution in a composite heat conductor (with J.R. Cannon), *Boll. Un. Mat. Ital. (5)* **14-B** (1977), 190–202.
  10. Time-stepping Galerkin methods for nonlinear Sobolev partial differential equations, *SIAM J. Numer. Anal.* **15** (1978), 1125–1150.
  11. A Galerkin procedure for systems of differential equations (with J.R. Cannon), *Calcolo* **17** (1980), 1–23.
  12. The Cauchy problem for a linear parabolic partial differential equation, *J. Math. Anal. Appl.* **71** (1979), 167–186.
  13. Incomplete iteration for time-stepping a Galerkin method for a quasilinear parabolic problem (with J. Douglas, Jr. and T. Dupont), *SIAM J. Numer. Anal.* **16** (1979), 503–522.
  14. Quasilinear parabolic systems with non-linear boundary conditions (with J.R. Cannon), *Inverse and Improperly Posed Problems in Differential Equations* (G. Anger, ed.), *Math. Research* **1**, Akademie-Verlag, Berlin, 1979, 35–44.
  15. Numerical approximation of a Cauchy problem for a parabolic partial differential equation (with R.S. Falk), *Math. Res. Ctr. Rept. No. 1898*, University of Wisconsin-Madison, 1979; and *Math. Comp.* **33** (1979), 1125–1144.
  16. Galerkin methods for miscible displacement problems in porous media (with M.F. Wheeler), *Math. Res. Ctr. Rept. No. 1932*, University of Wisconsin-Madison, 1979; and *SIAM J. Numer. Anal.* **17** (1980), 351–365.
  17. On efficient time-stepping methods for nonlinear second order hyperbolic partial differential equations, *Math. Res. Ctr. Rept. No. 1996*, University of Wisconsin-Madison, 1979; and *Computers and Math. with Appl.* **6** (1980), 1–13.
  18. Efficient multistep procedures for nonlinear parabolic problems with nonlinear Neumann boundary conditions, *Math. Res. Ctr. Rept. No. 1982*, University of Wisconsin-Madison, 1979, and *Trans. 25th Conf. Army Math.*, ARO Rept. 80–1; and *Calcolo* **XIX** (1982), 231–252.
  19. On some ill-posed problems arising in glaciology (with R.S. Falk), *Ill-Posed and Inverse Problems*, University of Delaware, Newark, Delaware.
  20. Shallow-depth temperature models for Dome C, Antarctica, *Antarctic J. of the U.S.* **15(5)** (1980), 75–76.
  21. Efficient time-stepping methods for miscible displacement problems in porous media (with T.F. Russell), *SIAM J. Numer. Anal.* **19** (1982), 1–66.
  22. Multistep Galerkin methods along characteristics for convection-diffusion problems (with T.F. Russell), *Advances in Computer Methods for Partial Differential Equations* **IV** (R. Vichnevetsky and R.S. Stepleman, eds.), IMACS, 1981, 28–36.
  23. Alternating-direction Galerkin methods for parabolic, hyperbolic, and Sobolev partial differential equations, *Lectures in the Numerical Solution of Partial Differential Equations*, University of Maryland, College Park, *Lecture Notes* **20** (1981), 123–150.
  24. Galerkin methods for miscible displacement problems with point sources and sinks—unit mobility ratio case (with M.F. Wheeler), *Lectures in the Numerical Solution of Partial Differential Equations*, University of Maryland, College Park, *Lecture Notes* **20** (1981), 151–174; and *Mathematical Methods in Energy Research* (K.I. Gross, ed.), SIAM, Philadelphia, 1984, 40–58.
  25. Techniques for conductivity measurements in Antarctica (with R.S. Falk, J.F. Bolzan and I.M. Whillans), *Annals of Glaciology* **3** (1982), 96–102.
  26. The approximation of the pressure by a mixed method in the simulation of miscible displacement (with J. Douglas, Jr. and M.F. Wheeler), *R.A.I.R.O. Analyse Numerique* **17** (1983), 17–33.
  27. A time-discretization procedure for a mixed finite element approximation of miscible displacement in porous media (with J. Douglas, Jr. and M.F. Wheeler), *R.A.I.R.O. Analyse Numerique* **17** (1983), 249–265.
  28. Mixed finite element methods for miscible displacement problems in porous media (with B.L. Darlow and M.F. Wheeler), *Proceedings Sixth SPE Symp. on Reservoir Simulation*, New Orleans, 1982, 137–146; and

- Soc. Pet. Eng. J.* **4** (1984), 391–398.
29. Mixed methods for elliptic partial differential equations (with M.F. Wheeler, R.W. Jones and R. Fontecilla), *Proceedings Tenth IMACS World Congress on Systems Simulation and Scientific Computation*, Montreal, August 8–13, 1982, 40–42.
  30. Computational aspects of mixed finite element methods (with M.F. Wheeler), *Numerical Methods for Scientific Computing* (R.S. Stepleman, ed.), North Holland Publishing Co., 1983, 163–172.
  31. Determination of coefficients in reservoir simulation, *Numerical Treatment of Inverse Problems for Differential and Integral Equations* (P. Deuflhard and E. Hairer, eds.), Birkhauser, Berlin, 1982, 206–226.
  32. Simulation of miscible displacement using mixed methods and a modified method of characteristics (with T.F. Russell and M.F. Wheeler), *SPE No. 12241, Proceedings Seventh SPE Symp. on Reservoir Simulation*, San Francisco, November 15–18, 1983, 71–82; *SPE Reprint Series 20, Numerical Simulation II*, Society of Petroleum Engineers, Dallas.
  33. Incorporation of mixed finite element methods in compositional simulation for reduction of numerical dispersion (with R.F. Heinemann), *SPE No. 12267, Proceedings Seventh SPE Symp. on Reservoir Simulation*, San Francisco, November 15–18, 1983, 341–347.
  34. Problems arising in the modeling of processes for hydrocarbon recovery, Vol. I, *Mathematics of Reservoir Simulation* (R.E. Ewing, ed.), *Research Frontiers in Applied Mathematics*, SIAM, Philadelphia, 1984, 3–34.
  35. On the role of applied mathematics in the petroleum industry, *SIAM News* **16(6)** (1983), 15.
  36. Self-adaptive local-grid refinement in enhanced oil recovery (with J.C. Diaz, R.W. Jones, A.E. McDonald, L.M. Uhler and D.U. von Rosenberg), *Proceedings Fifth Intl. Symp. on Finite Elements and Flow Problems*, Austin, Texas, January 23–26, 1984, 479–484.
  37. Computing accurate velocities for fluid flow in porous media (with J.V. Koebbe, R. Gonzalez, and M.F. Wheeler), *Proceedings Fifth Intl. Symp. on Finite Elements and Flow Problems*, Austin, Texas, January 23–26, 1984, 131–136.
  38. Convergence analysis of an approximation of miscible displacement in porous media by mixed finite elements and a modified method of characteristics (with T.F. Russell and M.F. Wheeler), *Computer Meth. Appl. Mech. Eng.* (R.E. Ewing, ed.) **47** (1984), 73–92.
  39. Mixed finite element approximation of phase velocities in compositional reservoir simulation (with R.F. Heinemann), *Computer Meth. Appl. Mech. Eng.* (R.E. Ewing, ed.) **47** (1984), 161–176.
  40. Adaptive mesh refinements in reservoir simulation applications, *Proceedings Intl. Conference on Accuracy Est. and Adaptive Refinements in Finite Element Computations*, Lisbon, Portugal, June 19–22, 1984, 31–40.
  41. Viscous fingering in hydrocarbon recovery processes (with J.H. George), *Mathematical Methods in Energy Research* (K.I. Gross, ed.), SIAM, Philadelphia, 1984, 194–213.
  42. The fast adaptive composite grid method for solving differential boundary-value problems (with S. McCormick and J. Thomas), *Proceedings Fifth ASCE Specialty Conference “Engineering Mechanics in Civil Engineering”*, Laramie, Wyoming, August 1–3, 1984, 1453–1456.
  43. Mixed finite element methods for groundwater flow and contaminant transport (with J.V. Koebbe), *Proceedings Fifth IMACS Intl. Symp. on Computer Meth. for Partial Differential Equations*, Bethlehem, Pennsylvania, June 19–21, 1984, 106–113.
  44. Self-adaptive local grid refinement for time-dependent two-dimensional simulation (with J.C. Diaz, R.W. Jones, A.E. McDonald, L.M. Uhler, and D.U. von Rosenberg), *Finite Elements in Fluids VI*, John Wiley and Sons, Ltd., 1985, 279–290.
  45. Mixed finite element methods for accurate fluid velocities (with J.V. Koebbe, R. Gonzalez, and M.F. Wheeler), *Finite Elements in Fluids 6* (R.H. Gallagher, C.F. Carey, J.T. Oden, and O.C. Zienkiewicz, eds.), John Wiley and Sons, Ltd., 1985, 233–249.
  46. Identification and control for distributed parameters in porous media flow (with J.H. George), *Distributed Parameter Systems, Lecture Notes in Control and Information Sciences 75* (M. Thoma, ed.), Springer-Verlag, May 1985, 145–161.
  47. Finite element methods for nonlinear flows in porous media, *Computer Meth. Appl. Mech. Eng.* **51** (1985), 421–439.
  48. Adaptive mesh refinements in large-scale fluid flow simulation, *Accuracy Estimates and Adaptivity for*

- Finite Elements* (I. Babuška, O.C. Zienkiewicz, and E. Oliveira, eds.), Chapter 16, John Wiley and Sons, New York, 1986, 299–314.
49. Mixed finite-element methods for computing groundwater velocities (with M.B. Allen and J.V. Koebbe), *NUMETA 85, Numerical Methods in Engineering: Theory and Application II* (J. Middleton and G.N. Pande, eds.), A.A. Balkema Publishers, Rotterdam, Netherlands, 1985, 609–614; *Numerical Methods for Partial Differential Equations* **3** (1985), 195–207.
  50. Potential of HEP-like MIMD architecture in self adaptive local grid refinement for accurate simulation of physical processes (with J.C. Diaz), *Proceedings Workshop on Parallel Processing Using the HEP*, Norman, Oklahoma, March 20–21, 1985, 209–226.
  51. Efficient adaptive procedures for fluid-flow applications, *Computer Meth. Appl. Mech. Eng.* **55** (1986) 89–103.
  52. Introduction to the Enhanced Oil Recovery Institute (with R.E. Terry), *Proceedings First Wyoming Enhanced Oil Recovery Symposium*, Casper, Wyoming, May 21–22, 1985, 1–6.
  53. Mathematics proves to be valuable tool in modeling critical underground water resources (with M.B. Allen), *SIAM News* **18**(4) (July 1985), 3,14.
  54. Local grid refinement for oil recovery simulation (with J.C. Diaz, R.W. Jones, A.E. McDonald, D.U. von Rosenberg, and L.M. Uhler), *Proceedings of SEG/SIAM/SPE Conference on Mathematical and Computational Methods in Seismic Exploration and Reservoir Modeling* (W.E. Fitzgibbon, ed.), Houston, Texas, January 21–24, 1985, SIAM Publications, 1986, 238–240.
  55. Adaptive local grid refinement, *Proceedings SEG/SIAM/SPE Conference on Mathematical and Computational Methods in Seismic Exploration and Reservoir Modeling* (W.E. Fitzgibbon, ed.), Houston, Texas, January 21–24, 1985, SIAM Publications, 1986, 235–247.
  56. CO<sub>2</sub> flood projects take center stage (with G.W. Rosenwald), *Western Oil World Magazine*, 1985, 57–60.
  57. Finite element techniques for reservoir simulation (with J.V. Koebbe), *Innovative Numerical Methods in Engineering* (R.P. Shaw, J. Periaux, A. Chaudouet, J. Wu CiMerino, and C.A. Brebbia, eds.), Springer-Verlag, Berlin, 1986, 173–186.
  58. Variational methods for fluid flow in porous media, *Variational Methods in Geosciences* (Y. Sasaki, ed.), Elsevier, Amsterdam, 1986, 251–263.
  59. Application of conjugate-gradient-like methods to a hyperbolic problem in porous-media flow (with U. Obeysekare, M.B. Allen, and J.H. George), *International Journal for Numerical Methods in Fluids* **7** (1987), 551–566.
  60. Nonlinear instability for a modified form of Burgers' equation (with B. Straughan, P.G. Jacobs, and M.J. Djomehri), *Numerical Methods for Partial Differential Equations* **3** (1987), 51–64.
  61. A preconditioning technique for the efficient solution of problems with local grid refinement (with J. Bramble, J. Pasciak, and A. Schatz), *Computer Meth. Appl. Mech. Eng.* **67** (1988), 149–159.
  62. Status of the Enhanced Oil Recovery Institute (with H.G. Harris), *Proceedings Second Wyoming Enhanced Oil Recovery Symposium*, Casper, Wyoming, May 15–16, 1986, 1–7.
  63. Accurate velocity weighting techniques (with J.V. Koebbe and R. Lagnado), *Proceedings Second Wyoming Enhanced Oil Recovery Symposium*, Casper, Wyoming, May 15–16, 1986, 140–157.
  64. Mathematical modeling and large-scale computing in energy and environmental research, in *New Directions in Applied and Computational Mathematics* (R.E. Ewing, K.I. Gross, and C.F. Martin, eds.), Springer-Verlag, Berlin, 1986, 45–60.
  65. Characteristic Petrov-Galerkin subdomain methods for two-phase immiscible flow (with Magne Espedal), *Computer Meth. Appl. Mech. Eng.* **64** (1987), 113–135.
  66. Numerical solution of systems of partial differential equations *Transactions of Fourth Army Conference on Applied Mathematics and Computing, ARO Report 87-1*, 1987, 583–595.
  67. Parameter estimation for distributed systems arising in fluid flow problems via time series methods (with T. Lin), *Inverse Problems International Series of Numerical Mathematics* **77**, Birkhauser Verlag, Basel, West Germany, 1986, 117–126.
  68. Inverse and ill-posed problems in reservoir simulation (with T. Lin and R.S. Falk), *Inverse and Ill-Posed Problem, Notes and Reports on Mathematics in Science and Engineering*, Academic Press, 1987, 483–497.

69. Adaptive grid refinement methods for time-dependent flow problems, *Communications in Applied Numerical Methods* **3** (1987), 351–358.
70. Velocity weighting techniques for fluid displacement problems (with R.F. Heinemann, J.V. Koebbe, and U.S. Prasad), *Computer Meth. in Appl. Mech. Eng.* **64** (1987), 137–151.
71. Adaptive grid-refinement techniques for treating singularities, heterogeneities and dispersion, *IMA Volume 11 Numerical Simulation in Oil Recovery* (M.F. Wheeler, ed.), Springer-Verlag, Berlin, 1988, 133–148.
72. Characteristic Petrov-Galerkin subdomain methods for convection-diffusion problems (with H. Dahle and M. Espedal), *IMA Volume 11 Numerical Simulation in Oil Recovery* (M.F. Wheeler, ed.), Springer-Verlag, Berlin, 1988, 77–88.
73. Simulation techniques for multiphase and multicomponent flows (with M.S. Espedal, J.A. Puckett, and R.S. Schmidt), *Communications in Applied Numerical Methods* **4** (1988), 335–342.
74. Status of the Enhanced Oil Recovery Institute (with L.D. Flournoy and L.I.Kline), *Proceedings of Third Wyoming Enhanced Oil Recovery Symposium*, Casper, Wyoming, May 13–14, 1987, 1–13.
75. Progress in reservoir simulation techniques, *Proceedings of Third Wyoming Enhanced Oil Recovery Symposium*, Casper, Wyoming, May 13–14, 1987, 121–139.
76. Finite element method for the incompressible nuclear waste-disposal contamination in porous media (with Y. Yuan and G. Li), *Numerical Analysis 1987* (D.F. Griffiths and G.A. Watson, eds.), *Pitman Research Notes in Mathematics, Series 170*, Longman Scientific and Technical, Essex, U.K., 1988, 53–66.
77. A modified method of characteristics for transport of nuclear-waste contamination in porous media, *Computational Mechanics '88 Theory and Applications II* (S.N. Atluri and G. Yagana, eds.), Springer-Verlag, Berlin, 1988, 50ii, 1–4.
78. Finite element techniques for convective-diffusive transport in porous media, *Developments in Water Science* **36**, *Computational Methods in Water Resources* (M.A. Celia, L.A. Ferrand, C.A. Brebbia, W.G. Gray, and G.F. Pinder, eds.), Elsevier, Boston, 1988, 27–34; *Advances in Water Resources* (1988), 123–126.
79. Alternating direction multistep methods for parabolic problems—iterative stabilization (with J.H. Bramble and G. Li), *SIAM J. Numer. Anal.* **26** (1989), 904–919.
80. Status of the Enhanced Oil Recovery Institute (with D.L. Whitman, L.D. Flournoy, and L.I. Kline), *Proceedings of Fourth Wyoming Enhanced Oil Recovery Symposium*, Casper, Wyoming, May 1988, 1–18.
81. Finite element techniques for multiphase flows in porous media, *Proceedings of FEMSA 88*, Pretoria, South Africa, January 25–29, 1988, 2A.1, 1–13.
82. Adaptive local grid refinement (with R.D. Lazarov), *SPE No. 17806, Proceedings of 1988 Rocky Mountain Regional Meeting of SPE*, Casper, Wyoming, May 1988, 643–652; *Proceedings Fourth Wyoming Enhanced Oil Recovery Symposium*, Casper, Wyoming, May 1988, 87–102.
83. The effect of carboxylic acid anions on the stability of framework mineral grains in petroleum reservoirs (with D.B. MacGowan and R.C. Surdam), *SPE No. 17802, Proceedings of 1988 Rocky Mountain Regional Meeting of SPE*, Casper, Wyoming, May 1988, 621–630; *Proceedings Fourth Wyoming Enhanced Oil Recovery Symposium*, Casper, Wyoming, May 1988, 71–86.
84. Domain decomposition techniques for efficient adaptive local grid refinement, *Domain Decomposition Methods* (T.F. Chan, R. Glowinski, J. Periaux, and O.B. Widlund, eds.), SIAM, Philadelphia, Pennsylvania, 1989, 192–206.
85. Continuous thermodynamic correlations for thermal simulations using a cubic equation of state (with C.P. Angelos), *Proceedings of 25th National Heat Transfer Conference, AIChE Symposium Series 263(84)*, Houston, Texas, July 1988, 186–190.
86. Timestepping along characteristics for a mixed finite-element approximation for compressible flow of contamination from nuclear waste in porous media (with Y. Yuan and G. Li). *SIAM J. Numer. Anal.* **26** (1989), 1513–1524.
87. Modern trends in reservoir modeling, *Proceedings of the VISTA Conference on Fundamental Oil and Gas Research*, Stavanger, Norway, June 1–3, 1988, 51–58.
88. Large scale computing in reservoir simulation, *The International Journal of Supercomputer Applications* **24** (1988), 45–53; *Vector and Parallel Computing Issues in Applied Research and Development*

- (J. Dongarra, I. Duff, P. Gaffney, and S. McKee, eds.), Ellis Harwood Limited Chichester, 1989, 123–138.
89. Local refinement techniques in the finite element and finite difference methods (with R.D. Lazarov), *ISC Report #1988-14; Numerical Methods and Applications*, Publishing House of the Bulgarian Academy of Sciences, Sofia, Bulgaria, 1989, 148–159.
  90. A direct numerical method for an inverse problem for the heat equation via hyperbolic perturbation (with T. Lin), *Proceedings 27th IEEE Conf. on Decision and Control* **1**, Austin, Texas, December 7–9, 1988, 240–244.
  91. A direct method for parameter estimation in a hyperbolic partial differential equation (with T. Lin), *Proceedings 27th IEEE Conf. on Decision and Control* **2**, Austin, Texas, December 7–9, 1988, 1662–1667.
  92. Parameter identification problems in single-phase and two-phase flow (with T. Lin), *Proceedings 4th Int. Conf. on Control of Distributed Parameter Systems, International Series for Numerical Mathematics* **91**, Birkhauser Verlag, Basel, 1989, 85–108.
  93. A note on source term identification for parabolic equations (with T. Lin), *Proceedings Fourth International Conference on Control of Distributed Parameter Systems, International Series for Numerical Mathematics* **91**, Birkhauser Verlag, Basel, 1989, 263–281.
  94. A knowledge-based system for the determination of activity indicators for self-adaptive grid methods (with C.G. Macedo, Jr. and J.C. Diaz), *Mathematics and Computers in Simulation* **31** (1989), 431–439.
  95. An anisotropic course-grid dispersion model of heterogeneity and viscous fingering in five-spot miscible displacement that matches experiments and fine-grid simulations (with T.F. Russell and L.C. Young), *SPE 18441, Proceedings Tenth SPE Symposium on Reservoir Simulation*, Houston, Texas, February 6–8, 1989, 447–466.
  96. Efficient use of locally refined grids for multiphase reservoir simulation (with B.A. Boyett, D.K. Babu, and R.F. Heinemann), *SPE 18413, Proceedings Tenth SPE Symposium on Reservoir Simulation*, Houston, Texas, February 6–8, 1989, 55–70.
  97. Advances in reservoir simulation techniques for enhanced oil recovery, *Proceedings Third International Symposium on Enhanced Oil Recovery*, Maracaibo, Venezuela, February 19–27, 1989.
  98. Characteristic adaptive sub-domain methods for reservoir flow problems (with H.K. Dahle, M.S. Espedal, and O. Sævareid), *Numerical Methods for Partial Differential Equations* **6** (1990), 279–309.
  99. Adaptive mesh refinements for transient flow problems, *Finite Element Analysis in Fluids* (T.J. Chung and G.R. Kerr, eds.), University of Alabama in Huntsville Press, Huntsville, Alabama, 1989, 119–124.
  100. Finite element methods for chemical-flooding simulation (with Yirang Yuan and Gang Li), *Finite Element Analysis in Fluids* (T.J. Chung and G.R. Kerr, eds.), University of Alabama in Huntsville Press, Huntsville, Alabama, 1989, 1266–1271.
  101. Characteristic Petrov-Galerkin methods for advection-dominated flows, *Finite Element Analysis in Fluids* (T.J. Chung and G.R. Kerr, eds.), University of Alabama in Huntsville Press, Huntsville, Alabama, 1989, 959–964.
  102. Finite element methods in reservoir simulation, *Finite Element Analysis in Fluids* (T.J. Chung and G.R. Kerr, eds.), University of Alabama in Huntsville Press, Huntsville, Alabama, 1989, 1251–1257.
  103. Computational methods for nonlinear systems of partial differential equations arising in contaminant transport in porous media, *Computational Solution of Nonlinear Systems of Equations*, (E.L. Allgower and K. Georg, eds.), in *Lectures in Applied Mathematics Series* **26**, American Mathematical Society, Providence, Rhode Island, 1990, 151–164.
  104. Preconditioned conjugate gradient methods for large-scale fluid flow applications, *BIT* **29** (1989), 850–866.
  105. Laboratory and simulation investigation of increasing the sweep efficiency of CO<sub>2</sub> flooding by utilizing a horizontal injection well (with D.L. Whitman), *Proceedings 1989 AIChE National Meeting*, Houston, Texas, April 1989.
  106. Adaptive grid refinements for transient flow problems, *Adaptive Methods for Partial Differential Equations* (J.E. Flaherty, P.J. Paslow, M.S. Shephard, and J.D. Vasilakis, eds.), SIAM, Philadelphia, Pennsylvania, Chapter 14, 1989, 194–205.
  107. Superconvergence of the velocity along the Gauss lines in mixed finite element methods (with R.D.

- Lazarov and J. Wang), *SIAM J. Numer. Anal.* **28(4)** (1991), 1015–1029.
108. Large-scale scientific computation for distributed systems, *Distributed Parameter Control Systems, New Trends and Applications, Lecture Notes in Pure and Applied Mathematics* (C. Chen, E.B. Littman, and L. Markus, eds.), Marcel Dekker, Publishers, New York, New York, 1990, 139–170.
  109. Time stepping along characteristics for a mixed finite element approximation for compressible flow of contamination from nuclear waste in porous media (with Y. Yuan and G. Li), *SIAM J. Numer. Anal.* **26(6)** (1989), 1513–1524.
  110. Error estimation for determination of unknown coefficients in parabolic equations (with T. Lin), *Proceedings of Fifth Symposium on Control of Distributed Parameter Systems of the International Federation of Automatic Control*, Perpignan, France, June 25–29, 1989, 325–330; *Control of Distributed Parameter Systems 1989* (M. Amouroux and A. El-Jai, eds.), Pergamon Press, New York, 1989, 203–208.
  111. Localized adjoint methods: applications to multiphase flow problems (with I. Herrera), *Proceedings of the Fifth Wyoming Enhanced Oil Recovery Symposium*, Casper, Wyoming, May 10–11, 1989, 155–173.
  112. Status of the Enhanced Oil Recovery Institute (with D. Whitman, D. Copeland, and L. Kline), *Proceedings of the Fifth Wyoming Enhanced Oil Recovery Institute*, Casper, Wyoming, May 10–11, 1989, 1–16.
  113. The effect of carboxylic acid anions on the stability of framework mineral grains in petroleum reservoirs (with D.B. MacGowan and R.C. Surdam), *SPE Reservoir Evaluation*, (1990), 161–166.
  114. A survey of domain decomposition techniques and their implementation, *Special Issue on Supercomputing, Advances in Water Resources* **13** (1990), 117–125.
  115. Reservoir simulation using mixed methods, a modified method of characteristics, and local grid refinement (with M.S. Espedal, T.F. Russell, and O. Sævareid), *The Mathematics of Oil Recovery* (P.R. King, ed.), Clarendon Press, Oxford, United Kingdom, 1992, 617–630.
  116. Finite element methods for multiphase and multicomponent flows, *Finite Elements in Fluids* **8** (T.J. Chung, ed.), Hemisphere Publishing Corporation, Washington, DC, 1992, 165–176.
  117. Local refinement via domain decomposition techniques for mixed finite element methods with rectangular Raviart-Thomas Elements (with R.D. Lazarov, T.F. Russell, and P.S. Vassilevski), *Domain Decomposition Methods for Partial Differential Equations* (T.F. Chan, R. Glowinski, J. Periaux, and O. Widlund, eds), SIAM Publications, Philadelphia, Pennsylvania, 1990, 98–114.
  118. Preconditioning indefinite systems arising from mixed finite element discretization of second-order elliptic problems (with R.D. Lazarov, P. Lu, and P.S. Vassilevski), *Preconditioned Conjugate Gradient Methods, Lecture Notes in Mathematics* **1457** (O. Axelsson and L. Kolotilina, eds.), Springer Verlag, Berlin, 1990, 28–43.
  119. Some grid refinement schemes for hyperbolic equations with piece-wise constant coefficients (with T. Lin, J. Sochacki, and J. George), *Math. Comp.* **56** (1991), 61–86.
  120. Local refinement techniques for elliptic problems on cell-centered grids, I: Error analysis (with R.D. Lazarov and P.S. Vassilevski), *Math. Comp.* **56(194)** (1991), 437–461.
  121. Local refinement techniques for elliptic problems on cell-centered grids, II: Optimal order two-grid iterative methods (with R.D. Lazarov and P.S. Vassilevski), *Numer. Linear Algebra with Appl.* **1(4)** (1994), 337–368.
  122. Local refinement techniques for elliptic problems on cell-centered grids, III: Algebraic multilevel BEPS preconditioners (with R.D. Lazarov and P.S. Vassilevski), *Numerische Mathematik* **59**(1991), 431–452.
  123. Interface conditions for acoustic and elastic wave propagation (with J. Sochacki, J.H. George, and S. Smithson), *Geophysics* **56(2)** (1991), 168–181.
  124. Applications of adaptive grid refinement methods (with P. Jacobs, R. Parashkevov, and J. Shen), *Advances in Numerical Partial Differential Equations and Optimization* (S. Gómez, J.P. Hennart, and R.A. Tapia, eds.), SIAM, Philadelphia, 1991, 76–100.
  125. Application of domain decomposition techniques in large-scale fluid flow problems, *Applied Numerical Mathematics* **8** (1991), 375–388.
  126. Local grid refinement for reservoir simulation (with B.A. Boyett and M.S. El-Mandouh), *Computational Methods in Geosciences, Frontiers in Applied Mathematics* (W.E. Fitzgibbon and M.F. Wheeler, eds.), SIAM, Philadelphia, Pennsylvania, 1992, 15–28.
  127. Supercomputing in reservoir simulation, *Supercomputing in Engineering Analysis*, Marcel-Dekker, New

- York, New York, 1991, 325–359.
128. How aquifer heterogeneities affect numerical groundwater models (with M.B. Allen) *Proceedings of Groundwater Engineering and Management Conference*, Denver, Colorado, February 28–March 7, 1990, 161–170.
  129. A posteriori error estimation, *Computer Methods in Applied Mechanics and Engineering* **82**(1990), 59–72.
  130. Domain decomposition methods for problems with uniform local refinement in two dimensions (with J.H. Bramble, R.R. Parashkevov, and J.E. Pasciak), *Domain Decomposition Methods for Partial Differential Equations* (R. Glowinski, Y. Kuznetsov, G. Meurant, J. Périaux, and O. Widlund, eds.), SIAM Publications, Philadelphia, PA, 1991, 91–100.
  131. Finite difference schemes on grids with local refinement in time and space for parabolic problems, I. Derivation, stability, and error analysis (with R.D. Lazarov and P.S. Vassilevski), *Computing* **45** (1990), 193–215.
  132. Finite difference schemes on grids with local refinement in time and in space for parabolic problems, II. Optimal order two-grid iterative methods (with R.D. Lazarov and P.S. Vassilevski), *Lecture Notes in Fluid Mechanics* **31** (W. Hackbusch, ed.), Vieweg Publishers, 1991, 70–93.
  133. Domain decomposition methods for problems with partial refinement (with J.H. Bramble, R.R. Parashkevov, and J.E. Pasciak), *Proceedings of the Copper Mountain Conference on Iterative Methods*, Book 4 of 4, April 1–5, 1990, Copper Mountain, Colorado; and *SIAM J. Scientific and Statistical Computing* **13**(1) (1992), 397–410.
  134. Multiphase flow simulation in groundwater hydrology and petroleum engineering (with M.A. Celia), *Computational Methods in Subsurface Hydrology* (G. Gambolati, A. Renaldo, C. Brebbia, W. Gray, and G. Pinder, eds.), Springer Verlag, Berlin, 1990, 195–204.
  135. An Eulerian-Lagrangian localized adjoint method for the advection-diffusion equation (with M. Celia, T. Russell, and I. Herrera), *Advances in Water Resources* **13**(4) (1990), 187–206.
  136. Operator splitting and Eulerian-Lagrangian localized adjoint methods for multiphase flow, *The Mathematics of Finite Elements and Applications VII MAFELAP 1990* (J. Whiteman, ed.), Academic Press Inc., San Diego, California, 1991, 215–232.
  137. Indicator evaluation for self-adaptive grid methods (with J.C. Diaz and C.G. Macedo, Jr.), *Computational Methods in Geosciences, Frontiers in Applied Mathematics* (W.E. Fitzgibbon and M.F. Wheeler, eds.), SIAM, Philadelphia, Pennsylvania, 1992, 44–53.
  138. Seismic modeling and inversion on the NCUBE (with J. Sochacki, P. O’Leary, C. Bennett, and R. Sharpley), *The Fifth Distributed Memory Computing Conference* **1** (D. Walker and Q. Stout, eds.), IEEE Computer Society Press, 1990, 530–535.
  139. Mixed finite element solutions of second order elliptic problems on grids with regular local refinement (with R.D. Lazarov and P.S. Vassilevski), *Domain Decomposition Methods for Partial Differential Equations* (R. Glowinski, Y. Kuznetsov, G. Meurant, J. Périaux, and O. Widlund, eds.), SIAM Publishers, Philadelphia, PA, 1991, 206–212.
  140. Heterogeneous porous media and domain decomposition methods (with M.S. Espedal, R. Hansen, P. Langlo, and O. Sævareid), *nd European Conference on the Mathematics of Oil Recovery* (D. Guerillot and O. Guillon, eds.), Editors Technip, Paris, 1990, 157–163.
  141. Mixed methods, operator splitting, and local refinement techniques for simulation on irregular grids (with M.S. Espedal and T.F. Russell), *nd European Conference on the Mathematics of Oil Recovery* (D. Guerillot and O. Guillon, eds.), Editors Technip, Paris, 1990, 237–245.
  142. Simulation of multiphase flows in porous media, *Transport in Porous Media* **6** (1991), 479–499.
  143. Localized phenomena and scale-up in reservoir simulations, *Proceedings of Second World Congress on Computational Mechanics*, Stuttgart, Federal Republic of Germany, August 27–31, 1990, 734–737.
  144. Domain decomposition type iterative techniques for parabolic problems on locally refined grids (with R.D. Lazarov, J.E. Pasciak, and P.S. Vassilevski), *SIAM J. Num. Anal.* **30**(6) (1993), 1537–1557.
  145. A class of parameter estimation techniques for fluid flow in porous media (with T. Lin), *Advances in Water Resources* **14**(2) (1991), 89–97.
  146. Interface conditions for acoustic wave propagation (with J. Sochacki and T. Lin), *Mathematical and Numerical Aspects of Wave Propagation Phenomena* (G. Cohen, I. Halpern, and P. Joly, eds.), SIAM

- Publications, Philadelphia, Pennsylvania, 1991, 155–164.
147. Inverse problems in petroleum applications (with T. Lin and J. Sochacki), *Proceedings of Conference on Inverse Problems: Computational Algorithms*, Texas A&M University, March 11–14, 1991.
  148. Application of superconvergence to problems in the simulation of miscible displacement (with J. Shen and J. Wang), *Comp. Meth. Appl. Mech. Eng.* **89** (1991), 73–84.
  149. Eulerian-Lagrangian localized adjoint methods for linear advection equations (with H. Wang), *Computational Mechanics '91*, Springer International, 1991, 245–250.
  150. Well conditioned iterative schemes for mixed finite element models of porous-media flows (with M.B. Allen, III and P. Lu), *SIAM Journal of Scientific and Statistical Computing* **13**(3) (1992), 794–814.
  151. Status of the Enhanced Oil Recovery Institute (with H.A. Deans and D. Copeland), *Proceedings of the Seventh Enhanced Oil Recovery Symposium*, Laramie, Wyoming, May 1–2, 1991, 1–20.
  152. A multilevel technique for solving 2D unsteady Navier-Stokes equations (with O.P. Iliev, S.D. Margenov, and P.S. Vassilevski), *Adaptive, Multilevel, and Hierarchical Computational Strategies, AMD-Vol. 157* (A.K. Noor, ed.), American Society of Mechanical Engineers, New York, New York, 1992, 235–247.
  153. Nonisothermal two-phase filtration in porous media (with V.N. Monakhov), *International Series of Numerical Mathematics* **106**, Birkhäuser Verlag, Basel, Germany, 1992, 121–130.
  154. Approximation of parabolic problems on grids locally refined in time and space (with R.D. Lazarov), *Applied Numerical Mathematics* **14** (1994), 199–211.
  155. Analysis of mixed finite element methods on locally refined grids (with J. Wang), *Numerische Mathematik* **63** (1992), 183–194.
  156. Effective dispersion models for viscous fingering in heterogeneous media, *Proceedings IMACS '91, 13th World Congress on Computational and Applied Mathematics*, Dublin, Ireland, July 22–26, 1991, 615.
  157. Preconditioning of discretized parabolic problems on two-level grids with local refinement (with P.S. Vassilevski), *Proceedings IMACS '91, 13th World Congress on Computational and Applied Mathematics*, Dublin, Ireland, July 22–26, 1991, 670.
  158. Analysis of the Schwarz algorithm for mixed finite element methods (with J. Wang), *R.A.I.R.O. Modélisation Mathématique Analyse Numérique* **26** (1992), 739–756.
  159. Vector/parallel implementation of a porous media flow code (with P. O'Leary and J. Sochacki), *Proceedings Supercomputing '91*, Association for Computing Machinery, 1991, 294–303.
  160. Direct numerical method for an inverse problem of hyperbolic equations (with T. Lin), *Numerical Methods for PDE's* **8**(6) (1992), 551–574.
  161. Two-level iterative refinement preconditioners (with P. Vassilevski), *Fifth International Symposium on Domain Decomposition Methods for Partial Differential Equations* (T. Chan, G. Meurant, J. Scroggs, and R. Voigt, eds.), SIAM Publications, Philadelphia, Pennsylvania, 1992, 262–270.
  162. The Schwarz algorithm and multilevel decomposition iterative techniques for mixed finite element methods (with J. Wang), *Fifth International Symposium on Domain Decomposition Methods for Partial Differential Equations* (T. Chan, G. Meurant, J. Scroggs, and R. Voigt, eds.), SIAM Publications, Philadelphia, Pennsylvania, 1992, 48–55.
  163. The CoLib project: enabling digital botany for the 21st century (with J.L. Schnase, J.J. Leggett, E.S. Metcalf, N.R. Mosin, E.L. Curnius, J.S. Turner, R.K. Furuta, L. Ellis, M. Pilant, S.W. Hassan, and M. Frisse), *Proceedings of the Digital Libraries' 94 Conf.*, College Station, TX, June 19–21, (1994), 108–118.
  164. Adaptive techniques for time-dependent problems (with R.D. Lazarov and A.T. Vassilev), *Comp. Meth. Appl. Mech. Eng.* **101**(3) (1992), 113–126.
  165. Superconvergence of the mixed finite element approximations of parabolic problems using rectangular finite elements (with R.D. Lazarov), *Report #CMA-R35-90*, for Centre for Mathematical Analysis, Canberra, Australia; *East-West J. Numer. Math.* **1**(3) (1993), 199–212.
  166. Eulerian-Lagrangian localized adjoint methods for reactive transport in groundwater (with H. Wang), *Environmental Studies: Mathematical Computational, and Statistical Analysis* (M.F. Wheeler, ed.), *IMA Volume in Mathematics and its Applications*, **79**, Springer-Verlag, Berlin, 1995, 149–170.
  167. Vectorizable preconditioners for mixed finite element solution of second-order elliptic problems (with J. Shen and P.S. Vassilevski), *International Journal of Computer Mathematics* **44** (1992), 313–327.
  168. Recent developments in reservoir simulation, *North Sea Oil and Gas Reservoirs, III* (J.O. Aasen, E. Berg,

- A.T. Buller, O. Hjelmeland, R.M. Holt, J. Kleppe, and O. Torsaeter, eds.), Kluwer Academic Publishers, London, 1994, 233–246.
169. Compositional simulation of the CO<sub>2</sub> huff and puff process (with G. Qin), *Proceedings of the Eighth Enhanced Oil Recovery Symposium*, Laramie, Wyoming, May 20–21, 1992, 275–300.
  170. Numerical study of three multilevel preconditioners for solving 2D unsteady Navier-Stokes equations (with O.P. Iliev, S.D. Margenov, and P.S. Vassilevski), *Comput. Meth. Appl. Mech. Eng.* **121** (1995), 177–186.
  171. A multigrid algorithm for the cell-centered finite difference scheme (with J. Shen), Sixth Copper Mountain Conference on Multigrid Methods, *NASA Conference Publication 3224, Part 2* (1993), 583–592.
  172. Parallelization of multiphase models for contaminant transport in porous media (with M.A. Celia, P. O’Leary, J.E. Pasciak, and A.T. Vassilev), *Parallel Processing for Scientific Computing, Vol. 1* (R. Sincovec, D. Keyes, M. Leuze, L. Petzold, and D. Reed, eds.), SIAM, Philadelphia, Pennsylvania, 1993, 83–91.
  173. An Eulerian-Lagrangian localized adjoint method for variable-coefficient advection-reaction problems (with H. Wang), *Advances in Hydro-Science and Engineering, Vol. 1, Part B* (S. Wang, ed.), University of Mississippi Press, 1993, 2010–2015.
  174. Optimal-order convergence rates for Eulerian-Lagrangian localized adjoint method to reactive transport and contamination in groundwater (with H. Wang), *Numerical Methods in PDE’s*, **11(1)** (1995), 1–31.
  175. Two-level local refinement preconditioners for nonsymmetric and indefinite elliptic problems (with S.I. Petrova and P.S. Vassilevski), *SIAM Journal on Scientific Computing* **15(1)** (1994), 149–163.
  176. Eulerian-Lagrangian localized adjoint methods for a nonlinear advection-diffusion equation (with H. Dahle and T. Russell), *Comput. Meth. Appl. Mech. Eng.* **122(3–4)** (1995), 223–250.
  177. Eulerian-Lagrangian localized adjoint methods for variable-coefficient convection-diffusion problems arising in groundwater applications (with H. Wang and T. Russell), *Computational Methods in Water Resources IX, Vol. 1, Numerical Methods in Water Resources* (T.F. Russell, R.E. Ewing, C.A. Brebbia, W.G. Gray, and G.F. Pinder, eds.), Elsevier Applied Science, London, 1992, 25–32.
  178. Eulerian-Lagrangian localized adjoint methods with domain decomposition and local refinement techniques for advection-reaction problems with discontinuous coefficients (with T. Lin and H. Wang), *Computational Methods in Water Resources IX, Vol. 1, Numerical Methods in Water Resources* (T.F. Russell, R.E. Ewing, C.A. Brebbia, W.G. Gray, and G.F. Pinder, eds.), Elsevier Applied Science, London, 1992, 17–24.
  179. Numerical methods for reactive transport and biodegradation (with M. Celia), *Computational Methods in Water Resources IX, Vol. 1, Numerical Methods in Water Resources* (T.F. Russell, R.E. Ewing, C.A. Brebbia, W.G. Gray, and G.F. Pinder, eds.), Elsevier Applied Science, London, 1992, 51–58.
  180. Eulerian-Lagrangian localized adjoint methods for convection-diffusion equations and their convergence analysis (with H. Wang and T.F. Russell), *IMA J. Numerical Analysis* **15** (1995), 405–459.
  181. Analysis of multilevel decomposition iterative methods for mixed finite element methods (with J. Wang), *R.A.I.R.O. Mathematical Modeling and Numerical Analysis* **28(4)** (1994), 377–398.
  182. Aspects of parallel processing in reservoir simulation (with P. O’Leary and J. Sochacki), *Proceedings of the Ninth ASCE Engineering Mechanics Specialty Conference* (L.D. Lutes and J.M. Niedgwecki, eds.), College Station, Texas, May 24–27, 1992, ASCE, New York, 111–114.
  183. Two-dimensional modeling of microscale transport and biotransformation in porous media (with B. Chen, A. Cunningham, R. Peralta, and E. Visser), *Numer. Meth. in PDE’s* **10** (1993), 65–84.
  184. An optimal-order estimate for Eulerian-Lagrangian localized adjoint methods for variable-coefficient advection-reaction problems (with H. Wang), *SIAM J. on Numer. Anal.*, **33(1)** (1996), 318–348.
  185. Eulerian-Lagrangian localized adjoint methods for linear advection or advection-reaction equations and their convergence analysis (with H. Wang), *Computational Mechanics*, **12** (1993), 97–121.
  186. Finite difference scheme for parabolic problems on composite grids with refinement in time and space (with R.D. Lazarov and A.T. Vassilev), *SIAM J. Numer. Anal.*, **31** (1994), 1605–1622.
  187. Eulerian-Lagrangian localized adjoint method: The theoretical framework (with I. Herrera, M.A. Celia, and T.F. Russell), *Numer. Meth. for P.D.E.’s*, **9** (1993), 431–457.
  188. Contaminant transfer simulation of unsaturated and multiphase flows in porous media (with M.S. Espedal

- and R.C. Sharpley), *Advances in Hydro-Science and Engineering, Vol. 1, Part B* (S. Wang, ed.), University of Mississippi Press, 1993, 1867–1873.
189. Distributed computation of wave propagation models using PVM (with D. Mitchum, P. O’Leary, R.C. Sharpley, and J.S. Sochacki), *Proceedings of Supercomputing ’93*, 22–31; *IEEE Parallel and Distributed Technology*, **2(1)** (1994), 26–31.
  190. Eulerian-Lagrangian localized adjoint methods for variable coefficient advective-diffusive-reactive equations in groundwater contaminant transport (with H. Wang), *Advances in Optimization and Numerical Analysis, Vol. 275* (S. Gómez and J.P. Hennart, eds.), Kluwer Academic Publishers, Netherlands, 1994, 185–205.
  191. A three-dimensional finite element simulation for transport of nuclear waste contamination transport in porous media (with H. Wang, R. Sharpley, and M. Celia), *Computer Methods and Advances in Geomechanics* (H. Siriwardane and M. Zaman, eds.), A.A. Balkema, Rotterdam, Netherlands, 1995, 2673–2679.
  192. Parameter and system identification for fluid flow in underground reservoirs (with A.T. Watson and J.G. Wade), *Proceedings of the Conference, Inverse Problems and Optimal Design in Industry*, Philadelphia, PA, July 8–10, *Europ. Cons. for Math. Ind.* **10** (H.W. Engl and J. McLaughlin, eds.), B.G. Teubner, Stuttgart, Germany, 1994, 81–108.
  193. An Eulerian-Lagrangian localized adjoint method with exponential-along-characteristic test functions for variable-coefficient advection-diffusion-reaction equations (with H. Wang), *Proceedings of KAIST Mathematics Workshop in Analysis and Geometry, Vol. 8* (U.J. Choi, D.Y. Kwak, and J.W. Yim, eds.), Mathematics Research Center, Taejon, Korea, 1993, 77–92.
  194. Point-distributed algorithms for second order elliptic equations in mixed form (with J. Shen and J. Wang), *Proceedings of KAIST Mathematics Workshop in Analysis and Geometry, Vol. 8* (U.J. Choi, D.Y. Kwak, and J.W. Yim, eds.), Mathematics Research Center, Taejon, Korea, 1993, 53–76.
  195. ELLAM-based domain decomposition and local refinement techniques for advection-diffusion equations with interfaces (with H. Wang, H.K. Dahle, T. Lin, and J.E. Våg), *Contemporary Mathematics 180, Domain Decomposition Methods in Science and Engineering*, D.E. Keyes and J. Xu, eds.), American Mathematical Society, Providence, 1995, 361–366.
  196. Solution methods for multiscale porous media flow (with M.S. Espedal and M.A. Celia), *Computational Methods in Water Resources X, Vol. 1* (A. Peters, G. Wittum, B. Herrling, U. Meissner, C.A. Brebbia, W.G. Gray, and G.F. Pinder, eds.), Kluwer Academic Publishers, Netherlands, 1994, 449–456.
  197. Eulerian-Lagrangian localized adjoint methods for transport of nuclear-waste contamination in porous media (with H. Wang and R. Sharpley), *Computational Methods in Water Resources X, Vol. 1* (A. Peters, G. Wittum, B. Herrling, U. Meissner, C.A. Brebbia, W.G. Gray, and G.F. Pinder, eds.), Kluwer Academic Publishers, Netherlands, 1994, 241–248.
  198. Multiphase flow simulation with various boundary conditions (with Z. Chen and M.S. Espedal), *Computational Methods in Water Resources X, Vol. 2* (A. Peters, G. Wittum, B. Herrling, U. Meissner, C.A. Brebbia, W.G. Gray, and G.F. Pinder, eds.), Kluwer Academic Publishers, Netherlands, 1994, 925–932.
  199. Superconvergence of the mixed finite element approximations to parabolic equations (with H. Chen and R.D. Lazarov), *Advances in Numerical Methods and Applications  $O(h^3)$*  (I.T. Dimov, Bl. Sendov, and P.S. Vassilevski, eds.), World Scientific, Singapore, 1994, 63–69.
  200. Preconditioning the biharmonic equation by multilevel iterations (with S.D. Margenov and P.S. Vassilevski), *Mathematika Balkanica*, **10** (1996), 121–132.
  201. The analysis of multigrid algorithms for cell centered finite difference methods (with J.H. Bramble, J.E. Pasciak, and J. Shen), Mathematical Sciences Institute, *Technical Report 94–33*, Cornell University, 1994; and *Advances in Computational Mathematics*, **5(1)** (1996), 15–29.
  202. Eulerian-Lagrangian localized adjoint methods for reactive transport with biodegradation (with H. Wang and M.A. Celia), *Numer. Meth. for P.D.E.’s*, **11(3)** (1995), 229–254.
  203. Estimating parameters in scientific computation: A survey of experience from oil and groundwater modeling (with M.S. Pilant, J.G. Wade, and A.T. Watson), *IEEE Computational Science & Engineering*, **1(3)** (1994), 19–31.
  204. Computational techniques in multiphase flow and transport in porous media (with R.D. Lazarov, J.E. Pasciak, and A.T. Vassilev), *Proceedings Int. Conf. on Math. and Computations, Reactor Physics and*

- Environmental Analyses*, American Nuclear Society, 1995, 414–420.
205. Domain decomposition algorithms for mixed methods for second order elliptic problems (with Z. Chen and R.D. Lazarov), *Math. Comp.*, **65(214)** (1996), 467–490.
  206. Multilevel preconditioners for mixed methods for second order elliptic problems (with Z. Chen, Y. Kuznetsov, R. Lazarov, and S. Maliassov), *Numer. Lin. Alg. with Appl.*, **3(5)** (1996), 427–453.
  207. Stability and convergence of a finite element method for reactive transport in ground water (with Z. Chen), *SIAM J. Numer. Anal.*, **34(3)** (1997), 881–904.
  208. Continuous-time finite element analysis of multiphase flow in groundwater hydrology (with Z. Chen and M. Espedal), *Applications of Mathematics* **40(3)** (1995), 203–226.
  209. Preconditioning of nonconforming finite element approximations of second order elliptic problems (with Yu. Kuznetsov, R.D. Lazarov, and S. Maliassov), *Advances in Numerical Methods and Applications  $O(h^3)$*  (I.T. Dimov, Bl. Sendov, and P.S. Vassilevski, eds.), World Scientific, Singapore, 1994, 101–110.
  210. Identification and control problems in petroleum and groundwater modeling (with M.S. Pilant, J.G. Wade, and A.T. Watson), *Control Problems in Industry* (I. Lasiecka and B. Morton, eds.), *Progress in Systems and Control Theory*, Birkhauser, San Diego, California, **21** (1995), 119–149.
  211. Superconvergence of mixed finite element methods for parabolic problems with nonsmooth initial data (with H. Chen and R.D. Lazarov), *Numerische Mathematik*, **78** (1998), 495–521.
  212. Substructure preconditioning for porous flow problems (with S. Maliassov, Yu. Kuznetsov, and R.D. Lazarov), *Finite Element Modeling for Environmental Problems*, Chapter 17, John Wiley and Sons, New York, 1994, 303–332.
  213. Aspects of numerical methods in multiphase flows, *Subsurface Flow and Transport: A Stochastic Approach* (eds. Gedeon Dagan and Sholomo P. Neuman), Cambridge University Press, 1997, 92–100.
  214. Multigrid algorithms for the triangular-cell-centered finite difference schemes (with O. Sævareid and J. Shen), *IMACS Series in Computational and Applied Mathematics, Vol. 3, Iterative Methods in Linear Algebra II* (S. Margenov and P. Vassilevski, eds.), Int. Ass. for Math. and Comp. in Simulation, Piscataway, New Jersey, 1996, 254–269.
  215. Object-oriented programming for general mixed finite element methods (with Tong Sun, Hongsen Chen, Stephen Lyons and Guan Qin), *Object-Oriented Methods for Interoperable Scientific and Engineering Computing: Proceedings of the 1998 SIAM Workshop*, (Michael E. Henderson, Christopher R. Anderson, and Stephen L. Lyons, eds.), SIAM, Philadelphia, (1999), 184–193.
  216. Recent development of multigrid algorithms for mixed and nonconforming methods for second order elliptic problems (with Z. Chen), *Proceedings of 7<sup>th</sup> Copper Mountain Conference on Multigrid Methods*, (N. Nelson, et.al. eds.) NASA Conference Publications 33 39, **1** (1996), 183–197.
  217. Efficient numerical solution techniques for compositional model (with G. Qin, H. Wang, and M. Espedal), *IMACS Series in Computational and Applied Mathematics, Vol. 3, Iterative Methods in Linear Algebra II* (S. Margenov and P. Vassilevski, eds.), Int. Ass. for Math. and Comp. in Simulation, Piscataway, New Jersey, 1996, 427–439.
  218. An Eulerian-Lagrangian localized adjoint method for second-order hyperbolic equations (with H. Wang), *Advanced Mathematics: Computations and Applications* (A.S. Alekseev, N.S. Bakhvalov, eds.), NCC Publishers, Novosibirsk, Russia, 1995, 244–251.
  219. Recent development of domain decomposition methods and multilevel preconditioners for nonconforming and mixed methods for partial differential problems (with Z. Chen), *Domain Decomposition Methods in Sciences and Engineering* (R. Glowinski, et al., eds.), Wiley-Interscience-Europe, 1997, 213–220.
  220. A domain decomposition method for second-order hyperbolic equations with interfaces (with H. Wang and R. Sharpley), *Proceedings 8th International Conference on Domain Decomposition Methods*, Beijing, China, May 14–20, 1995.
  221. On different ELLAM schemes for reactive transport equations (with H. Wang and R.C. Sharpley), *Advanced Mathematics: Computations and Applications* (A.S. Alekseev, N.S. Bakhvalov, eds.), NCC Publishers, Novosibirsk, Russia, 1995, 252–262.
  222. Multiphase flows in porous media, *Advanced Mathematics: Computations and Applications* (A.S. Alekseev, N.S. Bakhvalov, eds.), NCC Publishers, Novosibirsk, Russia, 1995, 49–63.
  223. Mathematical modeling, numerical techniques, and computer simulation of flows and transport in porous

- media (with R.D. Lazarov, J.E. Pasciak, and A.T. Vassilev), *Proceedings of Computational Techniques and Applications: CTAC 95*, World Scientific, Singapore, 1996, 13–30.
224. Multidisciplinary interactions in energy and environmental modeling, *J. Comp. Appl. Math.*, **74(1–2)** (1996), 193–215.
  225. Aspects of upscaling in simulation of flow in porous media, *Advances in Water Resources*, **20(5–6)** (1997), 349–358.
  226. The need for multidisciplinary involvement in groundwater contaminant simulations, *Proceedings of Next Generation Environmental Models and Computational Methods* (G. Delic and M. Wheeler, eds.), SIAM, Philadelphia, PA, 1997, 227–245.
  227. Numerical simulation of the multiphase flow of contaminants in porous media, *Modeling and Computation in Environmental Sciences*, (R. Helmig, W. Jáger, W. Kingilbadn, P. Knabner, G. Wittum, eds.) *Notes on Numerical Fluid Mechanics*, Verlag Viewig, Wiesbaden, **59** (1997), 133–145.
  228. Superconvergence of mixed finite element approximations over quadrilaterals (with M.M. Liu and J. Wang), *SIAM J. on Numer. Anal.*, **36(3)** (1999), 772–787.
  229. Fully discrete finite element analysis of multiphase flow in groundwater hydrology (with Z. Chen), *SIAM J. Numer. Anal.*, **34(6)** (1997), 2228–2253.
  230. Three phase flow formulations, *Computational Methods in Subsurface Flow and Transport Problems, Vol. 1* (A.A. Aldama, J. Aparicio, C.A. Brebbia, W.A. Aray, I. Herrera, and G.F. Pinder, eds.) Computational Mechanics Publications, Southampton, U.K., 1996, 411–420.
  231. Mathematical modeling and simulation for applications of fluid flow in porous media, *Current and Future Directions in Applied Mathematics* (M. Alber, B. Hu, J. Rosenthal, eds.), Birkhauser, Berlin, Germany, 1997, 161–182.
  232. Comparison of various formulations of three-phase flow in porous media (with Z. Chen), *J. Comp. Phys.*, **132** (1997), 362–373.
  233. Preconditioning techniques for mixed and nonconforming finite elements methods (with S. Maliassov) *Proceedings Conf. Algebraic Multilevel Iteration Methods with Applications, Vol. 1* (O. Axelsson, B. Polman, eds.), University of Nijmegen, Nijmegen, The Netherlands, 1996, 7–22.
  234. TBONE-A high-speed (ATM) backbone for Texas (with J. Armstrong, L. Ellis, L. Flournoy, and M. Pilant) *First Annual Telecommunications Conf. Proceedings*, University of Texas at Austin, Austin, Texas, 1996, 179–186.
  235. An ELLAM scheme for advection-dispersion equations in two dimensions (with H. Wang, H.K. Dahle, M.S. Espedal, R.C. Sharpley, and S. Man), *SIAM J. of Sci. Computing*, **20(6)** (1999), 2160–2194.
  236. Computational sciences in environmental applications, *Computational Science for the 21<sup>st</sup> Century*, John Wiley & Sons, (J. Periaux et. al. eds.) Ltd., Sussex, England, 1997, 250–259.
  237. From single-phase to compositional flow: applicability of mixed finite elements (with Z. Chen), *Transport in Porous Media*, **27** (1997), 225–242.
  238. Discretization schemes on triangular grids (with O. Sævareid and J. Shen), *Comp. Meth. Appl. Mech. Eng.*, **152(1–2)** (1998), 219–238.
  239. Integration of contaminant transport simulators on parallel machines with a graphical user interface for remote interactive modeling (with L.S. Johnson, A. Kaulgud, R.C. Sharpley, Z. Leyk, J. Pasciak, M.A. Celia, and J.R. Brannan) (Adrian Tentner eds.), High Performance Computing, *Soc. for Computer Sim. Int.*, (1997), 319–324.
  240. An accurate simulator of compressible flow in porous media with wells (with H. Wang, D. Liang, S.L. Lyons, and G. Qin), *Computational Methods in Surface-Water Systems with Hydrology, Computational Methods in Water Resources, Vol. 2*, (L.R. Bentley, J.F. Sykes, C.A. Brebbia, W.G. Gray, and G.F. Pinder, eds.), Balkema, Rotterdam, (2000), 623–630.
  241. On the simulation of multicomponent gas flow in porous media (with J. Wang, and S. Weekes), *J. Appl. Numer. Math.*, **31** (1999), 405–427.
  242. A numerical approximation of nonFickian flows with mixing length growth in porous media (with Y. Lin and J. Wang), *Acta Mathematica Universitatis Comenianae*, **70 (1)** (2001), 75–84.
  243. Numerical methods for contaminant transport in porous media (with S. Weekes), *Computational Mathematics* (Z. Chen, et. al.), Vol. 202 (Marcel Decker, Inc., New York), 1998, 75–95.
  244. Numerical methods for three models of compositional flow in porous media (with Z. Chen) (J. Wang, et

- al. eds.), *Iterative Methods in Scientific Computation IMACS Series in Computational and Applied Mathematics*, **4** (1998), 85–90.
245. Upscaling issues in parameter estimation of models for flow in porous media, *Proceedings of Inverse Problem, Control, and Shape Optimization*, Carthage, Tunisia, April 8–10, 1998, 1–6.
  246. A study of free boundary problems of fluid flow in porous media by mixed methods (with L. Badea and J. Wang) *Proceedings of the 1997 Conference on Free Boundary Problems: Theory and Applications*, (I. Athanassopoulos, et. al. eds.) New York: Chapman & Hall/CRC (1999), 3–13.
  247. Degenerate two-phase incompressible flow III: optimal error estimates (with Z. Chen), *Numer. Math.*, **90**(2) (2001), 215–240.
  248. Mathematical analysis for reservoir models (with Z. Chen), *SIAM J. Math. Anal.*, **30**(2) (1999), 431–453.
  249. Superconvergent error estimates for a class of discretization methods for a coupled first-order system with discontinuous coefficients (with J. Shen), *Numer. Meth. in PDEs*, **15**(3) (1999), 267–284.
  250. Analysis of a compositional model for fluid flow in porous media (with Z. Chen and G. Qin), *SIAM J. of Appl. Math.*, **60** (2000), 747–777.
  251. A family of Eulerian-Lagrangian localized adjoint methods for multi-dimensional advection-reaction equations (with H. Wang, G. Qin, S. Lyons, and S. Man), *J. Comput. Phys.*, **152** (1999), 1–44.
  252. A mixed least-squares method for an inverse problem of a nonlinear beam equation (with T. Lin and Y. Lin), *Inverse Problems*, **15**(1) (1999), 19–32.
  253. Finite volume element approximations of nonlocal in time one-dimensional flows in porous media (with R. Lazarov, and Y. Lin), *Computing*, **64**(2000), 157–182.
  254. Mortar finite volume element approximations of second order elliptic problems, (with R. Lazarov, T. Lin, and Y. Lin), *East-West J. Numer. Math.*, **8**(2), (2000), 93–110.
  255. Finite volume element approximations of integro-differential parabolic problems, (with R. Lazarov and Y. Lin) *Proceedings of the 4<sup>th</sup> Int. Conf. on Numer. Method. and Appl.*, (O. P. Iliev, M. S. Kaschiev, S. D. Margenov, Bl. H. Sendov, and P. S. Vassilevski, eds.), Bulgaria Academy of Sciences, Sofia, Bulgaria, August 19, 1998, 3–15.
  256. Finite volume element approximations of nonlocal reactive flows in porous media (with R. Lazarov and Y. Lin), *Num. Meth. for PDEs*, **16**(3) (2000), 285–311.
  257. Degenerate two-phase incompressible flow IV: local refinement and domain decomposition (with Z. Chen), *J. Scientific Comp.*, **18** (2003), 329–360.
  258. A modified nonlinear Galerkin method for the viscoelastic fluid motion equations (with J.R. Cannon, Y. He, and Y. Lin), *Journal of Engineering Sciences*, **37** (1999) 1643–1662.
  259. Architecture of the modular program system MUFTE-UG for simulating multiphase flow and transport processes in heterogeneous porous media (with R. Helmig, R. Bastian, H. Class, R. Huber, H. Jacobs, H. Sheta, R. Henkelmann) *Mathematische Geologie*, **2** (1998), 123–131.
  260. The immersed finite volume element methods for the elliptic interface problems (with Z. Li, T. Lin, and Y. Lin), *Math. and Comp. in Simulation*, **1662** (1999), 1–14.
  261. Local mesh refinement for degenerate two-phase incompressible flow problems (with Z. Chen), *Proceedings of 9<sup>th</sup> Int. Coll. on Differential Equations* (D. Bainov, ed.), Sofia, Bulgaria, 1999, 85–90.
  262. A discretization scheme and error estimate for first-order systems and elliptic problems (with J. Shen), *Proceedings of 9<sup>th</sup> Int. Coll. on Differential Equations*, (D. Bainov, ed.), Sofia, Bulgaria, 1999, 127–132.
  263. A mathematical analysis for numerical well models non-Darcy flows, (with Y. Lin), *Applied Num. Mathematics*, **39** (2001), 17–30.
  264. Domain decomposition capabilities for the mortar finite volume element methods (with R. Lazarov, T. Lin, and Y. Lin), *th Inter. Conf. on Domain Decomposition Methods*, (Choi-Hong Lai, Petter E. Bjorstad, Mark Cross, and Olof B. Widlund, eds.),Bergen, Domain Decomposition Press, (1999), 220–227.
  265. An approximation to miscible fluid flows in porous media with point sources and sinks by an Eulerian-Lagrangian localized adjoint method and mixed finite methods (with H. Wang, D. Liang, S. Lyons, and G. Qin), *SIAM J. Sci. Comput.*, **22** (2000), 561–581.
  266. Numerical well model for non-Darcy flow through isotropic porous media (with R. Lazarov, S. Lyons, D. Papavassiliou, J. Pasciak, and G. Qin), *Comput. Geo. Sci.*, **3** (1999), 185–204.
  267. Difficulties and uncertainty in mathematical/numerical modeling fluid flow in fractured media (with Anna

- M. Spagnuolo), Fracture and In-situ Stress Characterization of Hydrocarbon Reservoirs, **209**, Geological Society of London, London, England (2003), 187–200.
268. A summary of numerical methods for time-dependent advection-dominated partial differential equations, (with H. Wang), *Journal of Computational and Applied Mathematics*, **128** (2000), 423–445.
  269. Modeling of flow and transport processes in the subsurface (with R. Helmig, S. Finsterle, and R. Hinkelmann), *Groundwater Updates*, (K. Soto and Y. Iwasa, eds.), Springer-Verlag, Tokyo, 2000, 477–480.
  270. An accurate approximation of compressible flow in porous media with wells (with H. Wang, D. Liang, S. Lyons, and G. Qin), *Lecture Notes in Physics*, (Z. Chen, R.E. Ewing, and Z.-C. Shi, eds.), Vol. 552, Springer-Verlag, 2000, 324–332.
  271. Mathematical and numerical techniques in energy and environmental modeling (with Z. Chen), *Lecture Notes in Physics*, (Z. Chen, R.E. Ewing, and Z.-C. Shi, eds.), Vol. 552, Springer-Verlag, 2000, 1–21.
  272. A numerical algorithm for single phase fluid flow in elastic porous media, (with H. Chen, S. L. Lyons, G. Qin, T. Sun, and D.P. Yale), *Lecture Notes in Physics*, (Z. Chen, R.E. Ewing, and Z.-C. Shi, eds.), Vol. 552, Springer-Verlag, 2000, 80–92.
  273. On the discretization of interface problems with perfect and imperfect contact, (with T. Chernogorova, O. Iliev and R. Lazarov), *Lecture Notes in Physics*, (Z. Chen, R.E. Ewing, and Z.-C. Shi, eds.), Vol. 552, Springer-Verlag, 2000, 93–103.
  274. Numerical simulation of compositional fluid flow in porous media, (with G. Qin, H. Wang, and M. Espedal), *Lecture Notes in Physics*, (Z. Chen, R.E. Ewing, and Z.-C. Shi, eds.), Vol. 552, Springer-Verlag, 2000, 232–243..
  275. Numerical simulation of multiphase flow in fractured porous media, (with P. Bastian, Z. Chen, R. Helmig, H. Jakobs, and V. Reichenberger), *Lecture Notes in Physics*, (Z. Chen, R.E. Ewing, and Z.-C. Shi, eds.), Vol. 552, Springer-Verlag, 2000, 80–92.
  276. Degenerate two-phase incompressible flow V: characteristic finite element methods (with Z. Chen, Q. Jiang, and A. Spagnuolo) *J. Numer. Math.*, **10(2)** (2002) 87–107.
  277. Upscaling of biological processes and multiphase flow in porous media, *Fluid Flow and Transport in Porous Media: Mathematical and Numerical Treatment*, Contemporary Mathematics **295**, American Math. Society, Providence, Rhode Island (2002), 195–216.
  278. A modified finite volume approximation of second-order elliptic equations with discontinuous coefficients (with O. Iliev and R. Lazarov), *SIAM J. of Sci. Comput.*, **23(4)** (2001), 1335–1351.
  279. Mathematical modeling and simulation for fluid flow in porous media. Mathematical Modeling, Russian Academy of Science (A.A. Samarskii, ed.), (2001), 117–127.
  280. On finite volume discretization of elliptic interface problems (with T.I. Cherovgorova, O.P. Iliev, and R.D. Lazarov) *Finite Volumes for Complex Applications III*, (R. Horbin and D. Kroner, eds.), Hermes Penton Science (2002), 301–308.
  281. An ELLAM approximation for highly compressible multicomponent flows in porous media, (with H. Wang, D. Liang, S.L. Lyons, and G. Qin), *J. Comp. Geosci.: Locally Conservative Numerical Methods for Flows in Porous Media*, **6** (2002), 227–251.
  282. An ELLAM scheme for multidimensional advection-reaction equations and its optimal-order error estimate (with H. Wang and X. Shi), *SIAM J. Num. Anal.*, **38** (2001), 1846–1885.
  283. An ELLAM-MFEM solution technique for compressible fluid flows in porous media with point sources and sinks (with H. Wang, D. Liang, S.L. Lyons, and G. Qin) *J. Comput. Phys.*, **159** (2000), 344–376.
  284. Long-time error estimation and stability-smoothing indicator (with T. Sun), *Dynamics of Continuous, Discrete and Impulsive Systems*, **9** (2002), 115–129.
  285. On the accuracy of the finite volume element method based on piecewise linear polynomials, (with T. Lin and Y. Lin), *SIAM J. Num. Anal.*, **39 (6)** (2002), 1865–1888.
  286. Point-distributed algorithms on locally refined grids for second order elliptic equations (with J. Shen and J. Wang), *Scientific Computing and Applications*, (P. Minev, Y. Wang, and Y. Lin, eds.), Advances in Computation: theory and practice, v. 7, Nova Science Publishers, Huntington, (2001) 37–52.
  287. Error analysis for characteristics-based methods for degenerate parabolic problems. (with Z. Chen, E. Jiang, and A.M. Spagnuolo), *SIAM J. Num. Anal.*, **40, 4** (2002), 1491–1515.
  288. A practical three-dimensional estimation technique for spatial distribution of groundwater contaminant

- concentrations, (with S. Kang, J. Kim and T. Stauffer,) *J. Korean Math. Soc.*, 38 (2001) 3, 523–559.
289. An improved numerical simulator for compressible flows in porous media, (with H. Wang, D. Liang, S.L. Lyons, and G. Qin), *Num. Meth. for PDEs*, 19, 3 (2003), 343–362.
  290. Upscaling of biological processes and multiphase flow in highly porous media, *Confinement and Remediation of Environmental Hazards Resources, Recovery*, IMA Volumes in Mathematics and its Applications, 131 (J. Chadam, A. Cunningham, R.E. Ewing, P. Ortoleva, and M.F. Wheeler, eds), Springer-Verlag, New York, New York, (2002) 57–80.
  291. 3-D simulation of the pressure drop along horizontal wells in a bounded reservoir, (with A. Ibragimov and R.D. Lazarov), *Proceedings of the Fourth Conference on Horizontal Wells Technology*, SPE, SPE65505 (CD-ROM publication), www.spe.org. (2000), 93–103.
  292. Integrated two-dimensional modeling of fluid flow and compaction in a sedimentary basin (with Z. Chen, H. Lu, S. Lyons, S. Maliassov, M. Ray, and T. Sun), *J. Comp. Geosci.: Locally Conservative Numerical Methods for Flows in Porous Media*, 6 (2002), 545–564.
  293. An ELLAM simulator for highly-compressible flow through three dimensional porous media with multiple wells (with H. Wang, W. Zhao, S.L. Lyons, and G. Qin). *Computational Methods in Water Resources 14, Developments in Water Science 47* (S.M. Hassanezadeh, R.J. Schotting, W.A. Aren and G. Pinder, eds.), Elsevier, Amsterdam, 2002, 1051–1058.
  294. A Eulerian-Lagrangian substructuring domain decomposition method for multidimensional, unsteady-state advection-diffusion equations (with H. Wang, J. Liu, and M.S. Espedal), *Fluid Flow and Transport in Porous Media: Mathematical and Numerical Treatment, Contemporary Mathematics 295*, American Math. Society, Providence, Rhode Island (2002), 469–480.
  295. An ELLAM simulator for highly compressible flow in porous media with multiple wells (with H. Wang, W. Zhao, S.L. Lyons, and G. Qin), *Fluid Flow and Transport in Porous Media: Mathematical and Numerical Treatment, Contemporary Mathematics 295*, American Math. Society, Providence, Rhode Island (2002), 481–488.
  296. Domain decomposition algorithm and analytical simulation of coupled flow in reservoir/well system, (with A. Ibragimov and R. Lazarov), *J. Korean SIAM*, , No. 2 (2001), 71–99.
  297.  $L^\infty$  error-estimates and superconvergence in maximum norm of mixed finite element methods for non-Fickian flows in porous media (with Y. Lin, J. Wang, and S. Zhang), *Int. J. Numer. Anal. Modeling* 2, No. 3, (2005), 301–328.
  298. Sharp  $L^2$ -error estimates and superconvergence of mixed finite element methods for non-Fickian flows in porous media (with Y. Lin, T. Sun, J. Wang, and S. Zhang), *SIAM J. Numer. Anal.* 40, 4 (2002), 1538–1560.
  299. A numerical simulation of multicomponent gas flow in porous media by projection methods (with J. Wang, S.L. Weeks, and Y. Yang). *Fluid Flow and Transport in Porous Media: Mathematical and Numerical Treatment, Contemporary Mathematics 295*, American Math. Society, Providence, Rhode Island (2002), 217–228.
  300. A new superconvergence for mixed finite element approximations (with M. Liu and J. Wang) *SIAM J. Num. Anal.* 40, 6 (2002), 2133–2150.
  301. A stabilized discontinuous finite element method for elliptic problems (with J. Wang and Y. Yang) *Numer. Linear Algebra App.* 10 (2003), 83–104.
  302. A numerical modeling of multicomponent compressible flows in porous media with multiple wells by a Eulerian-Lagrangian method (with H. Wang and W. Zhao) *Computing and Visualization in Science*, 8 (2) (2005), 69–81.
  303. Using a virtual telemetry methodology for dynamic data-driven application simulations-ICCS (with C. Douglas, Y. Efendiev, V. Ginting, R. Lazarov, M.J. Cole, G.M. Jones, C. R. Johnson, and J. Simpson). *Dynamic Data Driven Application Systems*, (F. Darema, ed.) Kluwer Academic Publishers, Amsterdam (2004), 1–16.
  304. Adaptive biorthogonal spline schemes for advection-reaction equations (with J. Liu and H. Wang). *J. Comp. Physics*, 193, 1 (2003), 21–39.
  305. A note on dynamic data driven application simulations using virtual telemetry (with C. Douglas, Y. Efendiev, V. Ginting, R. Lazarov, M. Cole, G. Jones, C. Johnson, and J. Simpson) *Proceedings of ICSPACE 2003* (J. Zou and X. Chi, eds.), Chinese University of Hong Kong, 2003, 193–198.

306. High performance computing in petroleum applications (with G. Qin and W. Zhao), *Special Issue on Scientific Computing in Petroleum Industry (SCPI)*, *Int. J. of Numerical Analysis and Modeling*, **2** (2005), 43–57.
307. Adaptive wavelet schemes for advection-reaction equations (with J. Liu and H. Wang). *Contemporary Mathematics*, Proceeding ICM2002 - Beijing Satellite Conference on Scientific Computing, AMS, **329** (2003), 119–130.
308. Parallel computing in the black oil model (with J. Liu, Z. Chen, G. Huan, B. Li, and Z. Wang), *Contemporary Mathematics*, AMS, **329** (2003), 253–262.
309. Upscaled modeling in multiphase flow applications (with V. Ginting, Y. Efendiev, and R. Lazarov), *J. Computational and Applied Mathematics*, **23** (2004), 213–233.
310. Virtual telemetry middleware for dynamic data driven application simulations (with C. Douglas, Y. Efendiev, R. Lazarov, M. Cole, G. Jones, and C. Johnson), *Computational Sciences - ICCS*, 2003, **4**, 279–288.
311. Comparison of the GMRES and ORTHOMIN for the black oil model in porous media (with W. Li, Z. Chen, G. Huan, and B. Li), *Internat. J. for Num. Meth. in Fluids*, **48**, (2005), 501–519.
312. Convergence analysis of wavelet schemes for convection-reaction equations under minimal regularity assumptions (with J. Liu, B. Popov, and H. Wang), *SIAM Journal on Numerical Analysis*, **43**, 2 (2005), 521–539.
313. A characteristic nonoverlapping domain decomposition method for multidimensional convection-diffusion equations (with H. Wang, J. Liu, M. Espedal). *Numer. Meth. PDE's*, **21**(1) (2005), 89–103.
314. An operator splitting method for nonlinear reactive transport equations and its implementation based on DLL and COM (with J. Liu), *Lect. Notes in Comp. Sci. and Eng.*, Springer-Verlag, New York, 2005, 93–102.
315. Numerical simulation for fractured porous media (with G. Huan, G. Qin, and Z. Chen), *Current Trends in High Performance Computing and Its Applications*, Proceedings of the International Conference on High Performance Computing and Applications; Zhang, W., Chen, Z., Glowinski, R., Tong, W. (Eds.), Springer-Verlag, Heidelberg, 2005, 47–58.
316. Backward Euler mixed FEM and regularity of parabolic integro-differential equations with non-smooth data (with Y. Lin, J. Wang and X. Yang), *Dynamics of Continuous, Discrete and Impulsive Systems, Series B: Applications and Algorithms*, **13** (2006) 283-295.
317. Coupled cellular models for biofilm growth and hydrodynamic flow in a pipe (with J. Eberhard, Y. Efendiev, and A. Cunningham), *Int. J. for Multiscale Comp. Engineering*, **4** (2005), 496–516.
318. Some new error estimates on the semidiscrete finite volume element method for parabolic integro-differential equations with nonsmooth initial data (with R.K. Sinha and R.D. Lazarov), *SIAM J. Numer. Anal.* **43** (6) (2006), 2320–2344.
319. A note on data-driven contaminant simulation. (with C. Douglas, C. Shannon, Y. Efendiev, V. Ginting, R. Lazarov, M. Cole, G. Jones, C. Johnson, and J. Simpson), *Lecture Notes in Computer Science* **3038** (M. Bubak, G. van Albada, P. Sloot, and J. Dongarra, eds.), Springer Berlin/ Heidelberg, (2004), 701–708.
320. Multiscale interpolation, backward in time error analysis for data-driven contaminant simulation (with C. Douglas, Y. Efendiev, V. Ginting, R. Lazarov, M. Cole, G. Jones, and C. Johnson), *Lectures in Computer Science* 3515, Springer-Verlag (2005), 640–647.
321. A multiscale Eulerian-Lagrangian localized adjoint method for transient advection-diffusion equations with oscillatory coefficients (with H. Wang, Y. Ding, K. Wang and Y. Effendiev), *Computing and Visualization in Science*, (Internet publication on <http://www.springerlink.com/content/100525/>, October 2007, hardcopy to appear) .
322. An Eulerian-Lagrangian solution technique for single-phase compositional flow in three-dimensional porous media (with H. Wang, W. Zhao, M. Al-Lawatia, M. Espedal and A.S.Telyakovskiy), *Computers and Math with Appl.* **52** (2006), 607–624.
323. Multilevel numerical solutions of convection-dominated diffusion problems by spline wavelets (with J. Liu and G. Qin), *Num. Meth. for PDEs*, **22** (4) (2006), 994–1006.
324. Least squares approach for initial data recovery in dynamic data-driven applications simulations (with C. Douglas, Y. Efendiev, V. Ginting, R. Lazarov, M. Cole, and G. Jones), *Computing and Visualization in*

- Science* (submitted).
325. The use of sampling techniques in dynamic data driven simulations (with C. Douglas, D. Li, Y. Efendiev, V. Ginting and R. Lazarov). *Proceedings of the 7th China-Japan Joint Seminar for Computational Mathematics and Scientific Computing*, (Z. Shi and H. Okamoto, eds.), Science Press, Beijing, 2006, 211–220.
  326. DDDAS approaches to wildfire modeling (with C. Douglas, D. Li, R. Lodder, J. Beezley, J. Mandel, Y. Efendiev, G. Qin, M. Iskandarani, J. Coen, A. Vodacek, M. Kritz, and G. Haase), *Proceedings of the 1st China-Japan-Korea Joint Conference on Numerical Mathematics*, (H. Okamoto, D. Sheen, Z. Shi, T. Ozawa, T. Sakajo, and Y. Chen, eds.), Hokkaido University Mathematics Report 112, Sapporo, Japan, 2006, 23–26.
  327. On convergence of certain finite volume difference discretizations for 1-D poroelasticity interface problems (with O. Iliev, R. Lazarov, and A. Naumovich), *Num. Meth. for PDEs*, 23 (2007), 652–671.
  328. Accurate multiscale finite element methods for two-phase flow simulations (with Y. Efendiev, V. Ginting and T. Hou), *Journal of Computational Physics*, **220** (1) (2006), 155–174.
  329. An optimal-order  $L_q$  error estimate and superconvergence estimate for finite element approximations to miscible displacement of compressible flow in the subsurface (with Q. Li, H. Wang, S. Li, and K. Wang) (in preparation).
  330. Dynamic data driven applications in stochastic environments (with C. Douglas, Y. Efendiev, V. Ginting, and R. Lazarov), *Computing*, **77** (4) (2006), 321–333.
  331. An efficient algorithm for characteristic tracking in 2-dimensional triangular meshes (with J. Liu, H. Chen, and G. Qin), *Computing*, **80**(2) (2007), 121–136.
  332. An Eulerian-Lagrangian formulation for compositional flow in porous media (with H. Wang, G. Qin, and S.L. Lyons ), SPE 102512-MS (Internet and CD-ROM publication: [www.spe.org](http://www.spe.org)), *SPE Annual Technical Conference*, San Antonio, Texas, September 24–27, 2006.
  333. Upscaling of transport equations for multiphase and multicomponent flows (with Y. Efendiev, V. Ginting and H. Wang), *Domain Decomposition Methods in Science and Engineering XVII Series: Lecture Notes on Computational Science and Engineering, Vol. 60* (V. U. Langer, M. Discacciati, D.E. Keyes, O.B. Widlund, W. Zulehner, eds.), *Proceedings of 17<sup>th</sup> International Conference on Domain Decomposition Methods*, Wolfgang/Strobl, Austria, July 2006 (to appear).
  334. Contaminant identification in water (with C. Douglas, J. Harris, M. Iskandarani, C. Johnson, R. Lodder, S. Parker, M. Cole, Y. Efendiev, R. Lazarov and G. Qin), *Computational Science-ICCS 2006* (V. Alexandrov, G. van Albada, P. Sloot, and J. Dongarra, eds.), Springer-Verlag, Berlin, 3 (2006), 393–400.
  335. DDDAS approaches to wildland fire modeling and contaminant tracking (with C. Douglas, R. Lodder, J. Beezley, J. Mandel, Y. Efendiev, G. Qin, M. Iskandarani, J. Coen, A. Vodacek, M. Kritz and G. Haase), *Proceedings of the 2006 Winter Simulation Conference* (L. Perrone, F. Wieland, J. Liu, B. Lawson, D. Nicol and R. Fujimoto, eds.), INFORMS, (2006) 2117–2124.
  336. Dynamic Data-driven application systems for empty houses, contaminate tracking, and wildland fireline prediction (with C. Douglas, D. Bansal, J. Beezley, L. Bennethum, S. Chakraborty, J. Coen, Y. Efendiev, J. Hatcher, M. Iskandarani, C. Johnson, M. Kim, L. Deng, R. Lodder, J. Mandel, G. Qin and A. Vodacek), *Proceedings of WoCo9, 2006*, (P. Gaffney, eds.), IFIP series, Springer-Verlag, Berlin, 2006 (submitted).
  337. A multiple-continuum approach for modeling multiphase flow in naturally fractured vuggy petroleum reservoirs (with Y. Wu, G. Qin, Y. Efendiev, Z. Kang and Y. Ren), SPE 104173 (Internet and CD-ROM publication: [www.spe.org](http://www.spe.org)), *Proceedings of SPE International Oil and Gas Conference and Exhibition*, Beijing, P.R. China, December 5–7, 2006.
  338. Multi-physics and multi-scale methods for modeling fluid flow through naturally-fractured vuggy carbonate reservoirs (with P. Popov, L. Bi, Y. Efendiev, G. Qin., J. Li and Y. Ren), SPE 105378-MS (Internet and CD-ROM publication: [www.spe.org](http://www.spe.org)), *SPE Middle East Oil & Gas Show and Conference*, Manama, Bahrain, March 11-14, 2007.
  339. An accurate multiphase upscaling for flow and transport in heterogeneous porous media (with Y. Li, Y. Efendiev, G. Qin and X. Wu), SPE 105377-MS (Internet and CD-ROM publication: [www.spe.org](http://www.spe.org)), *SPE Middle East Oil & Gas Show and Conference*, Manama, Bahrain, March 11-14, 2007.
  340. Adaptive finite element approximations on non-matching grids for second-order elliptic problems (with H. Chen and G. Qin), *Numerical Methods for Partial Differential Equations* (submitted).
  341. An alternating direction galerkin method combined with a modified method of characteristics for miscible

- displacement influenced by mobile and immobile water (with M. Cui, H. Chen and G. Qin), *International Journal of Numerical Analysis and Modeling*, **5** (4) (2007), 659–672.
342. Multiscale methods for modeling fluid flow through naturally fractured carbonate Karst reservoirs (with P. Popov, G. Qin, L. Bi, Y. Efendiev), SPE 110778 (Internet and CD-ROM publication: www.spe.org), *Proceedings of SPE Annual Technical Conference and Exhibition*, Anaheim, California, November 11–14, 2007.
  343. Interpolation and update in dynamic data-driven application simulations (with C. Douglas, Y. Efendiev, R. Lazarov, M. Cole, G. Jones and C. Johnson), *Air, Water and Soil Quality Modelling for Risk and Impact Assessment* (A. Ebel and T. Davitashvili eds.), Springer, Dordrecht, 2007, 235–246.
  344. Mixed finite element approximations of parabolic, integro-differential equations with nonsmooth initial data (with R. Sinha and R. Lazarov) (in preparation).
  345. Numerical simulation of contaminant transport due to flow in liquid and porous media (with O. Iliev and R. Lazarov) (in preparation).

#### BOOKS AND SPECIAL VOLUMES:

1. *The Mathematics of Reservoir Simulation*, Volume I, Frontiers in Applied Mathematics, Society for Industrial and Applied Mathematics, Philadelphia, Pennsylvania, 1983 (editor).
2. *Special Issue on Oil Reservoir Simulation*, Computer Methods in Applied Mathematics and Engineering, Volume 47, Nos. 1–2, North Holland, Amsterdam, 1984 (editor).
3. *Proceedings of the First Wyoming Enhanced Oil Recovery Symposium*, Enhanced Oil Recovery Institute, Laramie, Wyoming, 1985 (editor).
4. *The Merging of Disciplines: New Directions in Pure, Applied, and Computational Mathematics*, Springer-Verlag, New York, 1986 (R.E. Ewing, K.I. Gross, and C.F. Martin, editors).
5. *Proceedings of the Second Wyoming Enhanced Oil Recovery Symposium*, Enhanced Oil Recovery Institute, Laramie, Wyoming, 1986 (R.E. Ewing and L.I. Kline, editors).
6. *Proceedings of the Third Wyoming Enhanced Oil Recovery Symposium*, Enhanced Oil Recovery Institute, Laramie, Wyoming, 1987 (R.E. Ewing and L.I. Kline, editors).
7. *Proceedings of the Fourth Wyoming Enhanced Oil Recovery Symposium*, Enhanced Oil Recovery Institute, Laramie, Wyoming, 1988 (R.E. Ewing and D.C. Copeland, editors).
8. *Inverse Problems in Partial Differential Equations*, SIAM, Philadelphia, Pennsylvania, 1990 (D. Colton, R.E. Ewing and W. Rundell, editors).
9. *Proceedings of the Fifth Wyoming Enhanced Oil Recovery Symposium*, Enhanced Oil Recovery Institute, Laramie, Wyoming, 1989 (R.E. Ewing, D.A. Copeland, and L.I. Kline, editors).
10. *Proceedings of the Sixth Wyoming Enhanced Oil Recovery Symposium*, Enhanced Oil Recovery Institute, Laramie, Wyoming, 1990, (R.E. Ewing, L.I. Kline, and D.A. Copeland, editors).
11. *Proceedings of the Seventh Wyoming Enhanced Oil Recovery Symposium*, Enhanced Oil Recovery Institute, Laramie, Wyoming, 1991, (R.E. Ewing and D.A. Copeland, eds.).
12. *Computational Methods in Water Resources IX, Vol. 1: Numerical Methods in Water Resources* (T.F. Russell, R.E. Ewing, C.A. Brebbia, W.G. Gray, and G.F. Pinder, eds.), Elsevier Applied Science, London, 1992.
13. *Computational Methods in Water Resources IX, Vol. 2: Mathematical Modeling in Water Resources* (T.F. Russell, R.E. Ewing, C.A. Brebbia, W.G. Gray, and G.F. Pinder, eds.), Elsevier Applied Sciences, London, 1992.
14. *Numerical Treatment of Multiphase Flows in Porous Media* (Z. Chen, R.E. Ewing, and Z.-C. Shi, eds.), *Lecture Notes in Physics* Vol. 552, New York, Springer-Verlag, 2000.
15. *Fluid Flows and Transport in Porous Media: Mathematical and Numerical Treatment*, Contemporary Mathematics, Vol. 295 (Z. Chen and R. Ewing, Eds.) AMS, 2002.

#### TECHNICAL REPORTS PUBLISHED ELSEWHERE:

1. Efficient time-stepping procedures for miscible displacement problems in porous media, Mathematics Research Center Report No. 1934, University of Wisconsin, Madison (1979).

2. Efficient time-stepping methods for miscible displacement problems with nonlinear boundary conditions, Mathematics Research Center Report No. 1952, University of Wisconsin, Madison (1979).
3. Techniques and analysis for conductivity measurements in Antarctica (with R.S. Falk, J.F. Bolzan and I.M. Whillans), Technical Report No. 74, Institute of Polar Studies, Ohio State University, Columbus, 1981.
4. Development of a compositional reservoir simulator–III, linear applied techniques (with R.F. Heinemann), Mobil Research and Development Corp., Field Research Lab Memo No. 78, Dallas, Texas, 1982.
5. Development of a compositional reservoir simulator–IV, comparison of algorithms (with R.F. Heinemann), Mobil Research and Development Corp., Lab Memo No. 41, Dallas, Texas, 1983.
6. Data structures for adaptive local grid refinement in reservoir simulation (with L.M. Uhler, R.W. Jones and J.C. Diaz), Mobil Research and Development Corp., Lab Memo No. 23, Dallas, Texas, 1984.
7. A study of the effects of the proposed 6% severance tax on CO<sub>2</sub> (with C.A. Scharton, R.E. Terry and J.K. Varma), Enhanced Oil Recovery Institute Report for Exxon Company, U.S.A., Laramie, Wyoming, 1985, 77 pages.
8. Forecasting oil and gas employment and electricity use in Wyoming (with S.D. Gerking), Enhanced Oil Recovery Institute Report for Pacific Power and Light Company, Laramie, Wyoming, 1985, 123 pages.
9. Production and taxation in Wyoming's energy industry: the case of crude oil, natural gas, and carbon dioxide (with S.D. Gerking), Enhanced Oil Recovery Institute Report, Laramie, Wyoming, 1986.
10. Drillstring computer simulation project (with K. Hulsebosch and J. Koebbe), Enhanced Oil Recovery Report for Teleco Oil Field Services, Laramie, Wyoming, 1987, 124 pages.
11. Comparative evaluation of selected continuum and discrete-fracture models for application to fractured-rock geologic media, Creston Study Area, Washington (with J.R. Kunkel and C.R. McKee), U.S. Nuclear Regulatory Commission Report for Contract #NRC-04-85-114, 1987, 45 pages.
12. Alternate methods for upstream weighting in immiscible displacement simulation (with J.V. Koebbe), Technical Memorandum, Chevron Oil Field Research Company, La Habra, California, 1988.
13. Local refinement techniques for elliptic problems on cell-centered grids (with R.D. Lazarov and P.S. Vassilevski), *ISC Report #1988-16*, Laramie, Wyoming, 1988.
14. Substructuring preconditioning for finite element approximations of second order elliptic problems. I. Nonconforming linear elements for the Poisson equation in parallelepiped (with Yu. Kuznetsov, R.D. Lazarov, and S. Maliassov), Institute for Scientific Computation, *ISC-94-02-MATH*, Texas A&M University, College Station, Texas, 1994.
15. Asymptotic error expansion for the lowest order Raviart-Thomas rectangular mixed finite elements (with H. Chen and R.D. Lazarov), Institute for Scientific Computation, *ISC-97-01-MATH*, Texas A&M University, College Station, Texas, 1997.
16. Numerical well model for non-Darcy flow (with R.D. Lazarov, and J.E. Pasciak), Institute for Scientific Computation, *ISC-97-03-MATH*, Texas A&M University, College Station, Texas, 1997.
17. A modified nonlinear galerkin method for the viscoelastic fluid motion (with J.R. Cannon, Y. He, and Y. Lin), Institute for Scientific Computation, *ISC-98-02-MATH*, Texas A&M University, College Station, Texas, 1998.
18. Numerical well model for non-Darcy flow (with R.D. Lazarov, S.L. Lyons, D.V. Papavassiliou, J.E. Pasciak, and G.X. Qin), *ISC-98-05-MATH*, Texas A&M University, College Station, Texas, 1998.
19. Finite volume element approximations of nonlocal in time one-dimensional flows in porous media (with R.D. Lazarov, and Y. Lin), *ISC-98-06-MATH*, Texas A&M University, College Station, Texas, 1998.
20. Finite volume element approximations of nonlocal reactive flows in porous media (with R.D. Lazarov, and Y. Lin), *ISC-98-07-MATH*, Texas A&M University, College Station, Texas, 1998.
21. Finite volume element approximations of integro-differential parabolic problems (with R.D. Lazarov, and Y. Lin), *ISC-98-09-MATH*, Texas A&M University, College Station, Texas, 1998.
22. Numerical Well Model for Non-Darcy Flow through isotropic porous media (with R. Lazarov, S.L. Lyons, D.V. Papavassiliou, J. Pasciak, G. Qin), *ISC-98-11-MATH*, Texas A&M University, College Station, Texas, 1998.

**Invited Named Lectures:**

1. Presidential Lecture: "Enhanced Oil Recovery: Addressing the Energy Crisis," University of Wyoming, Laramie, Wyoming, October 12, 1988.
2. Frontiers Lecture: "Numerical Analysis in Large-Scale Simulation," Texas A&M University, February 16, 1989.
3. Boeing Lecture: "Mathematical Modeling in Energy and Environmental Applications," Wichita State University, Wichita, Kansas, December 6, 1991.
4. Miles Distinguished Lecture: "Understanding Bioremediation: Combining Laboratory, Field, and Computational Experiments," Notre Dame University, South Bend, Indiana, September 1, 1992.
5. Philosophae Doctorem Honoris Causa Lecture: "Mathematical Modeling for Multiphase and Multicomponent Flows in Porous Media," University of Bergen, Bergen, Norway, August 23, 1996.
6. Tennessee Distinguished Lecture: "Mathematical Modeling and Simulation in Environmental Applications," University of Tennessee, Knoxville, Tennessee, April 17, 1998.
7. Dresdener Mathematisches Lecture: "Mathematical Modeling and Simulation in Environmental Application," Technische Universität of Dresden, Dresden, Germany, July 9, 1998.
8. Berlin Distinguished Computational Sciences Lecture, "Computational Sciences in Energy and Environmental Applications," Konrad-Zuse-Zentrum für Informationstechnik Berlin, Berlin, Germany, July 10, 1998.
9. Arne Magnus Distinguished Lecture Series (3 lectures), Colorado States University, Ft. Collins, Colorado, April 12–14, 2006.

**Invited Talks:**

1. "Location and strengths of point sources," CBMS/NSF Conference on Improperly Posed Problems, Albuquerque, New Mexico, May 20–24, 1974.
2. "A coupled nonlinear hyperbolic Sobolev system," Special Session on Sobolev Partial Differential Equations, AMS Meeting, Urbana, Illinois, May 19–20, 1976.
3. "The Cauchy problem for a linear parabolic partial differential equation," Special Session on Ill-Posed Problems for Partial Differential and Integrodifferential Equations, AMS Annual Meeting, Atlanta, Georgia, January 4–8, 1978.
4. "Alternating-direction Galerkin methods for some third-order and fourth-order equations," Special Session on Finite Element Approximations for Partial Differential Equations, AMS Meeting, Houston, Texas, April 7–8, 1978.
5. "Numerical simulation of miscible displacement problems in porous media," Special Session on Computational Fluid Dynamics, AMS Summer Meeting, Duluth, Minnesota, August 21–25, 1979.
6. "Mixed and interior penalty Galerkin methods for miscible displacement problems in porous media," International Conference on Progress in the Theory and Practice of the Finite Element Method, Goteborg, Sweden, August 27–29, 1979.
7. "On some ill-posed problems arising in glaciology," International Symposium on Ill-Posed Problems: Theory and Practice, Newark, Delaware, October 2–6, 1979.
8. "Efficient time-stepping procedures for miscible displacement problems in porous media," International Conference on Finite Elements, Mathematisches Forschungsinstitut, Oberwolfach, West Germany, August 24–30, 1980.
9. "Alternating direction multistep procedures for nonlinear parabolic partial differential equations," Special Year in Numerical Analysis, University of Maryland, College Park, Maryland, February 26, 1981.
10. "Miscible displacement problems in porous media," Workshop on Control and Identification of Distributed Parameter Systems, ICASE, NASA Langley Research Center, Hampton, Virginia, April 7, 1981.
11. "Techniques and analysis for conductivity measurements in Antarctica," Third International Symposium on Antarctic Glaciology, Columbus, Ohio, September 7–12, 1981.
12. "Numerical approximation of parabolic partial differential equations backward in time," Special Session on Inverse and/or Not Well Posed Problems in Partial Differential Equations, AMS Meeting, Austin, Texas, November 6–7, 1981.

13. "Numerical simulation of miscible displacement problems in porous media," Texas-Oklahoma Section of SIAM, Dallas, Texas, April 30, 1982.
14. "Determination of coefficients in reservoir simulation," Workshop on Numerical Treatment of Inverse Problems in Differential and Integral Equations, Heidelberg, West Germany, August 30–September 4, 1982.
15. "Mathematics of reservoir simulation," Special Year in Energy-Related Mathematics, University of Wyoming, October 19, 1982.
16. "Mathematical modeling in petroleum reservoir simulation," 66th Annual Meeting of Mathematical Association of America, Denver, Colorado, January 5–9, 1983.
17. "Mathematics of reservoir simulation," 1983 SIAM National Meeting, Denver, Colorado, June 6–8, 1983.
18. "Short course on mathematics of large scale simulation," Rocky Mountain Mathematics Consortium, Laramie, Wyoming, June 13–July 1, 1983.
19. "Numerical approximation of parabolic partial differential equations backwards in time," Workshop on Computational Methods in Ill Posed and Inverse Problems, Cornell University, Ithaca, New York, July 25–August 5, 1983.
20. "Mathematics of large-scale simulation," Symposium of Rocky Mountain Mathematics Consortium, Joint AMS-Meetings, Louisville, Kentucky, January 26–28, 1984.
21. "Mathematical aspects of reservoir simulation," Visiting Professor, Institut National de Recherche en Informatique et en Automatique, Paris, France, June 9–16, 1984.
22. Keynote Address: "Adaptive mesh refinement in reservoir simulation applications," International Conference on Accuracy Estimates and Adaptive Refinements in Finite Element Computations (ARFEC), Lisbon, Portugal, June 19–22, 1984.
23. "Mixed finite element methods in fluid flow problems," Visiting Professor, Istituto per le Applicazioni del Calcolo (IAC), Mauro Picone, del Consiglio Nazionale delle Ricerche, Rome, Italy, July 1–7, 1984.
24. "Some applications to determination of distributed parameters in porous media flow," Second International Conference on Control Theory for Distributed Parameter Systems and Applications, Vorau, Austria, July 8–15, 1984.
25. "Finite element discretization for simulation of porous media flow," Gordon Research Conference on Modeling of Flow in Permeable Media, Andover, New Hampshire, July 30–August 3, 1984.
26. "Finite element methods for nonlinear flows in porous media," International Conference on Finite Element Methods in Nonlinear Mechanics (FENOMECH '84), Stuttgart, West Germany, September 10–14, 1984.
27. "The potential of finite element methods in reservoir simulation," Visiting Professor, Chevron Oil Field Research Company, La Habra, California, September 24, 1984.
28. "Mixed finite-element methods for computing groundwater velocities," International Conference Series on Advances in Numerical Methods in Engineering: Theory and Applications (NUMETA 85), Swansea, United Kingdom, January 7–11, 1985.
29. "Status of Enhanced Oil Recovery Institute," First Wyoming Enhanced Oil Recovery Symposium, Casper, Wyoming, May 21–22, 1985.
30. "Parameter estimation in large-scale simulation," Institute for Computation in Science and Engineering, NASA Langley, Hampton, Virginia, June 10–14, 1985.
31. "Efficient adaptive procedures for fluid flow applications," Symposium on Computational Mechanics, Second Joint ASCE/ASME Mechanics Conference, Albuquerque, New Mexico, June 23–26, 1985.
32. "Status of the oil and gas industry," Visiting Professor, Pacific Power and Light Company, Portland, Oregon, August 7, 1985.
33. "Mathematical modeling and large-scale computing in energy and environmental research," Conference on New Directions in Applied and Computational Mathematics, Laramie, Wyoming, August 8–10, 1985.
34. "Mathematics and engineering in large-scale computational science," National Science Foundation, Washington, D.C., October 11, 1985.
35. "Project type and multi-agency grants," 1985 National Chairmen's Research Colloquium for the Mathematical Sciences, Washington, D.C., October 12, 1985.
36. "Variational methods for petroleum reservoir simulation," Keynote Address, International Symposium on Variational Methods in Geosciences, Cooperative Institute for Mesoscale Meteorological Studies,

- Norman, Oklahoma, October 14–17, 1985.
37. “Large-scale simulation in enhanced oil recovery research,” Annual Meeting Wyoming Colleges and Universities, Cheyenne, Wyoming, February 21, 1986.
  38. “Finite element techniques for reservoir simulation” Fourth International Symposium on Numerical Methods for Engineers, Atlanta, Georgia, March 24–28, 1986.
  39. “Adaptive local grid refinement” Third Stanford Reservoir Simulation Workshop Program, Stanford, California, March 31 - April 1, 1986.
  40. “Introduction and overview of the Enhanced Oil Recovery Institute,” Second Wyoming Enhanced Oil Recovery Symposium, Casper, Wyoming, May 15–16, 1986.
  41. “Parameter estimation for fluid flow problems,” Inverse Problems, Oberwolfach, West Germany, May 18–24, 1986.
  42. “Numerical solution of partial differential equations,” Fourth Army Conference on Applied Mathematics and Computing, Ithaca, New York, May 27–30, 1986.
  43. “Mathematical modeling in the energy and environmental sciences.” (Series of 10 invited lectures) Principal Lecturer at NSF-CBMS Conference, Morgantown, West Virginia, June 2–6, 1986.
  44. “Estimation of spatially dependent parameters in parabolic partial differential equations,” Alpine-U.S. Seminar on Inverse and Ill-posed Problems, St. Wolfgang, Austria, June 8–13, 1986.
  45. “Adaptive local grid refinement,” 3rd Mexican–American Conference on Computational Modeling in Science and Engineering, Avandaro, Mexico, July 22, 1986.
  46. “Modeling of multiphase contaminant flows,” Forum on NSF Research Activities in Subsurface Systems, Ann Arbor, Michigan, July 24, 1986.
  47. “Domain decomposition method for adaptive local grid refinement,” Workshop on Preconditioned Iterative Methods and Domain Decomposition, Mathematical Sciences Institute, Ithaca, New York, August 12, 1986.
  48. “Adaptive grid refinement methods for time dependent flow problems,” First World Congress on Computational Mechanics, University of Texas, Austin, Texas, September 25, 1986.
  49. “Velocity weighting techniques for fluid displacement problems,” First World Congress on Computational Mechanics, University of Texas, Austin, Texas, September 25, 1986.
  50. “Optimization techniques in reservoir simulation,” Special Session on Optimization and Inverse Problems in Reservoir Aquifer Modeling, Operations Research Society of America ORSA/TIMS National Meeting, Miami Beach, Florida, October 28, 1986.
  51. “Large-scale computing in fluid flow problems,” Special Session on Mathematics for Large-Scale Computing, 830th Meeting of the American Mathematical Society, Denton, Texas, October 31, 1986.
  52. “Techniques for treating heterogeneities and dispersion in reservoir simulation,” Symposium on Numerical Simulation in Oil Recovery, Institute for Mathematics and Its Applications, University of Minnesota, Minneapolis, Minnesota, December 1–12, 1986.
  53. “The use of mixed finite element methods for accurate fluid velocities,” Workshop on Recent Developments in Leaky Aquifer Mechanics, Instituto de Geofisica, Universidad Nacional de Mexico, Mexico City, Mexico, January 20–21, 1987.
  54. “Simulation techniques for multiphase and multicomponent flows,” Invited Lecture Series, IBM Bergen Scientific Center, Bergen, Norway, March 23–24, 1987.
  55. “Parallel computation in operator splitting and self adaptive local grid refinement,” Workshop on Special Topics in Computational Mechanics, Dallas, Texas, April 13–14, 1987.
  56. “Status of the Enhanced Oil Recovery Institute,” Third Wyoming Enhanced Oil Recovery Symposium, Casper, Wyoming, May 13–14, 1987.
  57. “Reservoir Simulation at the University of Wyoming,” Third Wyoming Enhanced Oil Recovery Symposium, Casper, Wyoming, May 13–14, 1987.
  58. “Mathematics and Mathematical Modeling in Interdisciplinary Research and Large Scale Computation,” Address to National Science Foundation, Washington, D.C., May 27, 1987.
  59. “Analysis and Computation for a Model for Possible Contamination by Nuclear Waste-Disposal in Porous Media,” 12th Biennial Conference on Numerical Analysis, University of Dundee, Scotland, June 23–24, 1987.
  60. “Parameter Estimation Problems for Parabolic Problems,” Workshop on Applications and Algorithms for

- Optimal Control and Parameter Identification, Universität Trier, Trier, West Germany, June 25–26, 1987.
61. “A Survey of Reservoir Simulation,” Minisymposium on Simulation of Petroleum Reservoirs, First International Conference on Industrial and Applied Mathematics, Paris, France, June 29–July 3, 1987.
  62. “Techniques for Multiphase and Multicomponent Flows,” Fourth Mexican American Exchange in Mathematics and its Applications, Two Bars Seven Ranch, Colorado, August 3–6, 1987.
  63. “Nonlinear Convection Diffusion Equations Arising in Multiphase Flows,” Nonlinear Parameter Dependent PDE’s and Their Effective Solution, Arizona State University, Tempe, Arizona, November 6, 1987.
  64. “Domain Decomposition Techniques for Efficient Adaptive Local Grid Refinement,” Second International Symposium on Domain Decomposition Methods, UCLA, Los Angeles, California, January 14–16, 1988.
  65. Keynote Address: “Finite Element Techniques for Multiphase Flows in Porous Media,” Finite Element Methods in South Africa ’88 Symposium and Exhibition, Pretoria, South Africa, January 27–29, 1988.
  66. “Mathematical Modeling and Large-Scale Computing in Energy and Environmental Research,” Branch Meeting, South African Institution of Mechanical Engineers, Cape Town, South Africa, February 2, 1988.
  67. “A Modified Method of Characteristics for Transport of Nuclear-Waste Contamination in Porous Media,” Session of New Developments on Numerical Treatment of Advection Dominated Flows, International Conference on Computational Engineering Science, Atlanta, Georgia, April 10, 1988.
  68. “An Overview of A-posteriori Analysis and its Use in Adaptivity,” Reliability of Finite Element Method Workshop, University of Maryland, College Park, Maryland, April 17–19, 1988.
  69. “Adaptive Local Grid Refinement,” 1988 Rocky Mountain Regional Meeting of SPE and Fourth Enhanced Oil Recovery Institute Symposium, Casper, Wyoming, May 12, 1988.
  70. Keynote Address, “Modern Trends in Reservoir Modeling,” VISTA Conference on Fundamental Oil and Gas Research, Stavanger, Norway, June 1–3, 1988.
  71. “Large-Scale Computing in Reservoir Simulation,” The Second International Conference on Vector and Parallel Computing Issues in Applied Research and Development, Tromso, Norway, June 6–10, 1988.
  72. “Trends in Reservoir Simulation,” The Second International Conference on Vector and Parallel Computing Issues in Applied Research and Development, Tromso, Norway, June 6–10, 1988.
  73. “Finite Element Techniques for Convective-Diffusive Transport in Porous Media,” VII International Conference on Computational Methods in Water Resources, Massachusetts Institute of Technology, Boston, Massachusetts, June 13–17, 1988.
  74. “Parameter Estimation for Multi-Phase Flow,” Fourth International Conference on Control of Distributed Parameter Systems, Vorau, Austria, July 11–15, 1988.
  75. “Nonlinear Systems of Partial Differential Equations Arising in Multiphase Flow in Porous Media,” AMS-SIAM Seminar on Computational Solution of Nonlinear Systems of Equations, Colorado State University, Fort Collins, Colorado, July 18–29, 1988.
  76. “Adaptive Grid Refinement Methods for Contaminant Transport,” Fifth Mexican-American Exchange in Mathematics and Applications, Cocoyoc, Mexico, August 1–5, 1988.
  77. “Aspects of Multiphase Flow in Porous Media,” Workshop on Applications of Science in Petroleum Reservoir Engineering, Rio de Janeiro, Brazil, August 15–19, 1988.
  78. “Local Refinement Techniques in the Finite Element and Finite Difference Methods,” Conference on Numerical Methods and Applications, Sofia, Bulgaria, August 22–27, 1988.
  79. “Numerical Solution of Partial Differential Equations Arising in Multiphase Flow,” Conference on Numerical Solutions of Partial Differential Equations, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, September 26, 1988.
  80. “Enhanced Oil Recovery: Addressing the Energy Crisis,” 1988 Presidential Speaker Series, Special Address, University of Wyoming, October 12, 1988.
  81. “Adaptive Methods for Large-Scale Time-Dependent Applications,” Adaptive Methods for Partial Differential Equations, Rensselaer Polytechnic Institute, Troy, New York, October 15, 1988.
  82. “A Direct Numerical Method for an Inverse Problem for the Heat Equation via Hyperbolic Perturbation,” Special Session on Inverse Problems in Modeling and Control, 27th IEEE Conference on Decision and Control, Austin, Texas, December 7, 1988.
  83. “A Direct Method for Parameter Estimation in a Hyperbolic Partial Differential Equation,” Special

- Session on Identification of Distributed Parameter Systems, 27th IEEE Conference on Decision and Control, Austin, Texas, December 8, 1988.
84. "Adaptive Grid Refinement Methods for Time-Dependent Flow Problems," Fifth IIMAS Workshop on Numerical Analysis, Mérida, Yucatán, Mexico, January 4, 1989.
  85. "Aspects of Multiphase Flow in Heterogeneous Media," Workshop on Mathematical Modeling for Preferential Groundwater Flow and Contaminant Transport, Utah State University, Logan, Utah, March 10–11, 1989.
  86. Keynote Address: "Finite Element Methods in Reservoir Simulation," Address, Seventh International Conference on Finite Element Methods in Flow Problems, Huntsville, Alabama, April 2–8, 1989.
  87. "Characteristic Petrov-Galerkin Methods for Advection-Dominated Flow," Special Session on Mathematics of Finite Elements, Seventh International Conference on Finite Element Methods in Flow Problems, Huntsville, Alabama, April 2–8, 1989.
  88. "Adaptive Mesh Refinements for Transient Flow Problems," Special Session on Adaptive Mesh Methods, Seventh International Conference on Finite Element Methods in Flow Problems, Huntsville, Alabama, April 2–8, 1989.
  89. "Finite Element Methods for Chemical-Flooding Simulation," Special Session on Reservoir Simulation, Seventh International Conference on Finite Element Methods in Flow Problems, Huntsville, Alabama, April 2–8, 1989.
  90. "Status of the Enhanced Oil Recovery Institute," Fifth Wyoming Enhanced Oil Recovery Symposium, Casper, Wyoming, May 10, 1989.
  91. "Simulation of Multiphase Flow," International Workshop on Mathematical Modeling for Flow and Transport Through Porous Media, Irsee, West Germany, May 15–19, 1989.
  92. "Preconditioned Conjugate Gradient Methods for Mixed Finite Element Methods," Conference on Preconditioned Conjugate Gradient Methods, University of Nijmegen, Nijmegen, The Netherlands, June 15–17, 1989.
  93. "Error Estimation of a Numerical Scheme for the Initial Value Identification of Parabolic Equations," International Conference on Numerical Methods in Optimization and Optimal Control, University of Trier, Trier, Federal Republic of Germany, June 20–23, 1989.
  94. "Adaptive Local Grid Refinement Techniques for Multiphase Flow," Institut Francais du Petrole (IFP), Paris, France, June 23, 1989.
  95. "Error Estimation for Determination of Unknown Coefficients in Parabolic Equations," Fifth IFAC Symposium on Control of Distributed Parameter Systems, Palais des Congrès, Perpignan, France, June 26–29, 1989.
  96. "Effective Preconditioners for Block Systems," Minisymposium on Optimal Preconditionings, SIAM 1989 Annual Meeting, San Diego, California, July 17–21, 1989.
  97. "Application of Domain Decomposition Techniques for Efficient Adaptive Local Grid Refinement," Minisymposium on Domain Decomposition and Applications, SIAM 1989 Annual Meeting, San Diego, California, July 17–21, 1989.
  98. "Supercomputing: Vectorization, Parallelism, Applications," Short Course on Finite Element Analysis in Fluid Mechanics and Heat Transfer, Knoxville, Tennessee, July 25, 1989.
  99. "Large-Scale Scientific Computation of Distributed Systems," Workshop on New Trends and Applications of Distributed Parameter Control Systems, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, Minnesota, August 7–11, 1989.
  100. "Preconditioning Methods for Saddle-Point Problems," Sixth Mexican-American Exchange in Mathematics and Applications (MAXIMA), University of Vermont, Burlington, Vermont, August 8–11, 1989.
  101. "Gridding Methods in Reservoir Simulation," First Workshop on Modeling Flow through Porous Media with Application to Oil Reservoir Simulation, Los Alamos National Laboratory, Los Alamos, New Mexico, August 16–18, 1989.
  102. Plenary Lecture: "Mechanics and Numerical Modeling of Petroleum Recovery," Sixth National Congress of Theoretical and Applied Mechanics, Varna, Bulgaria, September 25–30, 1989.
  103. "A Posteriori Error Estimation Techniques," Workshop in Reliability in Computational Mechanics, Austin, Texas, October 26–28, 1989.

104. "Mixed Finite Element Methods for Flow and Transport in Porous Media," Special Session in Advances in Numerical Modeling of Contaminant Transport, 1989 Fall Meeting of the American Geophysical Union, San Francisco, California, December 4–8, 1989.
105. "Treatment of Localized Phenomena in Transport of Oil or Contaminants in Porous Media," 1990 Annual Meeting American Association for the Advancement of Science, New Orleans, Louisiana, February 18–21, 1990.
106. Keynote Address: "Mathematical Modeling and Scientific Computation in Energy and Environmental Research," 14th Meeting of Southeastern Atlantic Section of the Society for Industrial and Applied Mathematics, Aiken, South Carolina, March 23, 1990.
107. "Operator Splitting in Petrov-Galerkin Methods for Multiphase Flow," The Mathematical Finite Elements and Application (MAFELAP), Brunel, Uxbridge, United Kingdom, April 24–27, 1990.
108. "Status of the Enhanced Oil Recovery Institute," Sixth Wyoming Enhanced Oil Recovery Conference, Casper, Wyoming, May 3–4, 1990.
109. Plenary Lecture: "Local Refinement and Domain Decomposition in Mixed Finite Element Methods," Fourth International Conference on Domain Decomposition Methods, Moscow, USSR, May 21–25, 1990.
110. "Operator Splitting and Local Refinement Techniques for Multiphase Flow in Porous Media," Miniconference on Applied Mathematics, Computer Center, Novosibirsk, USSR, May 28–29, 1990.
111. "Multiphase Flow Simulation in Groundwater Hydrology and Petroleum Engineering," Seventh International Symposium on Computational Methods in Water Resources, Venice, Italy, June 11–15, 1990.
112. "Adaptive Computational Methods for Transient Problems," Minisymposium on Reliability of Finite Element Computations, 1990 SIAM Annual Meeting, Chicago, Illinois, July 17–20, 1990.
113. "Multiphase Transport of Contaminants in Porous Media," Workshop on Modeling of Contaminant Transport, Oak Ridge National Laboratory, Oak Ridge, Tennessee, July 23–24, 1990.
114. "Adaptive and Operator-Splitting Techniques for Multiphase Flow in Heterogeneous Porous Media," Gordon Research Conference on Modeling of Flow in Permeable Media, New Hampshire, August 13–17, 1990.
115. Keynote Address: "Localized Phenomena and Scale-up in Reservoir Simulation," Second World Congress on Computational Mechanics, Stuttgart, Fed. Rep. Germany, August 27–31, 1990.
116. "Scale-up of Effects of Heterogeneity and Viscous Fingering in Miscible and Immiscible Flow," Session on Oil Technology, Flow in Porous Media, Second World Congress on Computational Mechanics, Stuttgart, Fed. Rep. Germany, August 27–31, 1990.
117. "Localization in Space and Time via Domain Decomposition Techniques," Seminar on Local Grid Refinement and Domain Decomposition in Reservoir Simulation, Société Nationale Elf Aquitaine, Pau, France, September 10–11, 1990.
118. Keynote Address: "Mixed Methods, Operator-Splitting and Local Refinement Techniques for Simulation on Irregular Grids," 2nd European Conference on the Mathematics of Oil Recovery, Arles, France, September 12–15, 1990.
119. "Domain Decomposition Preconditioners for Adaptive Grid Refinement," Workshop on Mathematics of Computation in Partial Differential Equations, Cornell University, Ithaca, New York, January 25–27, 1991.
120. "Numerical Methods for Parameter Estimation Problems," Inverse Problems: Computational Algorithms, Texas A&M University, College Station, Texas, March 10–14, 1991.
121. "Status of the Enhanced Oil Recovery Institute," Seventh Wyoming Enhanced Oil Recovery Symposium, Casper, Wyoming, May 1–2, 1991.
122. "Algorithms and Parallel Computation for Groundwater Modeling," Grand Challenge Workshop for Partnership in Computational Sciences, Columbia, South Carolina, June 6–7, 1991.
123. "Mathematics of Large-Scale Computation," International Seminar on Computational Mathematics, Moscow, USSR, June 17–19, 1991.
124. "Parameter Estimation in Petroleum Applications," Conference on Numerical Optimization Methods in Differential Equations and Control, Raleigh, North Carolina, July 15–17, 1991.
125. "A-posteriori Error Estimation in Computational Mechanics," First U.S. Congress on Computational Mechanics, Chicago, Illinois, July 22, 1991.

126. "Preconditioning of Discretized Parabolic Problems on Two-level Grids with Local Refinement," Symposium on Parallel Computing, 13th IMACS World Congress on Computation and Applied Mathematics, Trinity College, Dublin, Ireland, July 22–26, 1991.
127. "Effective Dispersion Models for Viscous Fingering in Heterogeneous Media," Session on Computational Aspects of Modeling Heterogeneous Porous Media, 13th IMACS World Congress on Computational and Applied Mathematics, Trinity College, Dublin, Ireland, July 22–26, 1991.
128. "Adaptive *A-posteriori* Error Estimation," Second Workshop on Reliability and Adaptive Methods in Computational Mechanics, Cracow, Poland, October 12–17, 1991.
129. "Graduate and Post-Graduate Education," Panel on Math Education, AMS-MAA Joint Meetings, Baltimore, Maryland, January 10, 1992.
130. "Development of Nonlinear Flow Codes," Partnership in Computational Science, Rice University, Houston, Texas, January 15, 1992.
131. "Transport of Hydrocarbons and Contaminants in Porous Media," American Association for the Advancement of Science, Annual Meeting, Chicago, Illinois, February 7, 1992.
132. "Parallel Methods for Reservoir Simulation," Numerical Methods for Parallel Computers, Mathematisches Forschungsinstitut, Oberwolfach, Germany, February 11, 1992.
133. "Domain Decomposition Techniques for Moving Fluid Interfaces," International Workshop on Domain Decomposition Methods for Free Boundary Problems, Jyväskylä, Finland, March 24, 1992.
134. "Domain Decomposition Techniques for Multiphase Flow Problems in Groundwater Contamination," Partnership in Computational Science, Brookhaven National Laboratory, New York, May 5–6, 1992.
135. "Space/Time Adaptive Techniques," Workshop on Adaptive Methods for Partial Differential Equations, Rensselaer Polytechnic Institute, Troy, New York, May 17, 1992.
136. "Status of the Enhanced Oil Recovery Institute," Eighth Wyoming Enhanced Oil Recovery Symposium, Casper, Wyoming, May 20–21, 1992.
137. "Aspects of Parallel Processing in Reservoir Simulation," 9th ASCE Engineering Mechanics Specialty, Texas A&M University, College Station, Texas May 25–27, 1992.
138. "Numerical Methods for Reactive Transport and Biodegradation," Special Session on Eulerian-Lagrangian Localized Adjoint Methods, Computational Methods in Water Resources, IX, Denver, Colorado, June 9–12, 1992.
139. "Aspects of Scale-Up for Nonlinear Coupled Systems," Special Session on Scaling in Porous Media, Computational Methods in Water Resources, IX, Denver, Colorado, June 9–12, 1992.
140. "Multiphase Transport of Contaminants in Groundwater," Meeting on Porous Media, Oberwolfach, Germany, June 19–27, 1992.
141. "Eulerian-Lagrangian Localized Adjoint Methods for Reactive Transport in Groundwater," Environmental Studies: Mathematical Computational and Statistical Analysis, Institute for Mathematics and its Applications, Minneapolis Minnesota, July 17, 1992.
142. "Determination of Flow Parameters in Porous Media Applications," Inverse Coefficient Problems for Systems, SIAM 40th Anniversary Meeting, Los Angeles, California, July 21, 1992.
143. "Computation in Petroleum Engineering: Minimizing Dry Holes to Maximizing Recovery," 1992 National Academy of Engineering Annual Meeting, Washington, DC, September, 28–30, 1992.
144. "Status of Groundwater Contamination Modeling," Partnership in Computational Sciences, Ames National Laboratory, Ames, Iowa, November 5–6, 1992.
145. Keynote Address: "Recent Developments in Reservoir Simulation," 3rd International Conference on North Sea Oil and Gas Reservoirs, Trondheim, Norway, December 1, 1992.
146. "Status of Groundwater Contamination Modeling," High Performance Computing Research Center, Oak Ridge National Laboratory, Oak Ridge, Tennessee, January 26, 1993.
147. "Parallelization of Multiphase Models for Contaminant Transport in Porous Media," Sixth SIAM Conference on Parallel Processing for Scientific computing, Norfolk, Virginia, March 23, 1993.
148. "Simulation of Contaminant Transport in Saturated/Unsaturated or Multiphase Flow Regimes," Special Session on Multiphase Flow and Transport in Porous Media, American Geophysical Union Meeting, Baltimore, Maryland, May 24, 1993.
149. "Contaminant Transport Simulation of Unsaturated and Multiphase Flows in Porous Media," Advances in Hydro-Science and Engineering, ICHE-'93, Washington, DC, June 9, 1993.

150. "Multiphase Flow Modeling," Workshop in Numerical Methods for Transport Processes, Bergen, Norway, June 14–15, 1993.
151. "Inverse Problems in Petroleum Applications," Symposium on Inverse Problems and Optimal Design in Industry, 1993 SIAM Annual Meeting, Philadelphia, Pennsylvania, July 10, 1993.
152. "Adaptive Grid Refinements for Transient Flow Problems," Modeling, Mesh Generation, and Adaptive Numerical Methods for Partial Differential Equations, Institute for Mathematics and its Applications, Minneapolis, Minnesota, July 20, 1993.
153. "Domain Decomposition," Fifth Korean Advanced Institute for Science and Technology International Workshop on Analysis, Taejon, Korea, August 3, 1993.
154. "Mixed Finite Element Methods," Fifth Korean Advanced Institute for Science and Technology International Workshop on Analysis, Taejon, Korea, August 4, 1993.
155. "Eulerian-Lagrangian Localized Adjoint Methods," Fifth Korean Advanced Institute for Science and Technology International Workshop on Analysis, Taejon, Korea, August 5, 1993.
156. Congress of Association of Mathematics Teachers, Dallas, Texas, August 13, 1993.
157. "Potential of TAAAMS for Texas," Texas Association of Academic Administrators in the Mathematical Sciences, Austin, Texas, October 15, 1993.
158. "Domain Decomposition Techniques for Multiphase Flow in Porous Media," 7th International Conference on Domain Decomposition, Pennsylvania State University, State College, Pennsylvania, October 28, 1993.
159. Plenary Lecture: "High Performance Computing in Degree Programs," DOE High Performance Computing Conference, University of New Mexico, Albuquerque, New Mexico, February 10, 1994.
160. "Modeling the Transport and Remediation of Contaminants in Groundwater," Mardi Gras Conference on "Toward Teraflop Computing and New Grand Challenge Applications," Baton Rouge, Louisiana, February 11, 1994.
161. Plenary Lecture: "Mathematical Modeling of Multiphase Flow and Bioremediation," Annual Meeting, Texas Section, Mathematics Association of America, College Station, Texas, April 9, 1994.
162. "Scientific Computation and Visualization in Bioremediation," University Associates, College of Science, Texas A&M University, College Station, Texas, April 9, 1994.
163. "Modeling and Bioremediation in Multiphase Contaminant Flows," Geological Association of Canada Annual Meeting, Waterloo, Canada, May 18, 1994.
164. "Modeling Multiphase Flows in Porous Media," AMIGO, Applied Mathematics in Geology and Ecology, Oberwolfach, Germany, July 15–17, 1994.
165. "Solution Methods for Multiscale Porous Media," X International Conf. on Comp. Meth. in Water Resources, Heidelberg, Germany, July 19, 1994.
166. "Use of Control Theory in the Petroleum Industry," Symposium on Control Problems in Industry, 1994 SIAM Annual Meeting, San Diego, California, July 23, 1994.
167. "Modeling of Flow and Transport of Contaminants in 3D Aquifers," Symposium on Computational Methods in Geosciences: Porous Media, 1994 SIAM Annual Meeting, San Diego, California, July 26, 1994.
168. "Preconditioning of nonconforming finite element approximations of second order elliptic problems," 3rd International Conference on Numerical Methods and Applications, Sofia, Bulgaria, August 21–22, 1994.
169. "Modeling the Transport and Remediation of Contaminants in Porous Media," Numerical Modelling in Continuum Mechanics, Prague, Czech Republic, August 23–25, 1994.
170. "Multiphase Flows in Porous Media," 31st Annual Technical Meeting of the Society of Engineering Science, Texas A&M University, College Station, Texas, October 12, 1994.
171. "Three-Dimensional Simulation of Transport of Dense Contaminants with Variable Bedrock Topography," Special Session on Visualization of Geological Data, National Meeting of Geological Society of America, Pulman, Washington, October 24, 1994.
172. "Aspects of Numerical Methods for Multiphase Flows," Second IHP/IAHS George Kovacs Colloquium on Subsurface Flow and Transport: The Stochastic Approach, UNESCO, Paris, France, January 26–28, 1995.
173. Invited Address: "Mathematical Modeling and Simulation for Applications of Fluid Flow in Porous Media," Third SIAM Conference on Mathematical and Computational Issues in the Geosciences, San

- Antonio, Texas, February 8–10, 1995.
174. “Inverse Problems in Bioremediation of Groundwater Contamination,” Special Session on Inverse and Ill-Posed Problems,” 899th Meeting of the American Mathematical Society, Orlando, Florida, March 17–18, 1995.
  175. Keynote Address: “Multidisciplinary Interaction in Environmental Modeling,” Symposium on Advances and Trends in Computational and Applied Mathematics,” Austin, Texas, April 20–22, 1995.
  176. “Modeling and Simulation of Multiphase Contaminant Transport in Porous Media,” International Conference on Mathematical Modeling of Flow and Transport in Porous Media, St. Etienne, France, May 22–26, 1995.
  177. Keynote Lecture: “Application of Computational Mechanics Techniques in Energy and Environmental Applications,” Third U.S. National Congress of Computational Mechanics,” Dallas, Texas, June 12–14, 1995.
  178. Plenary Lecture: “Linear Algebra Aspects of Large-Scale Models for Fluid Flow in Porous Media,” Second IMACS International Symposium on Iterative Methods in Linear Algebra, Blagoevgrad, Bulgaria, June 17, 1995.
  179. Plenary Lecture: “Mathematical Modeling and Simulation for Applications of Fluid Flow in Porous Media,” International Conference on Advanced Mathematics, Computations, and Applications, AMCA–95, Novosibirsk, Russia, June 21, 1995.
  180. “Substructuring Preconditioners for Mixed Finite Element Methods for General Domains,” International Conference on Advanced Mathematics, Computations, and Applications, AMCA–95, Novosibirsk, Russia, June 23, 1995.
  181. “Finite Element Methods for Multiphase Transport of Contaminants in Porous Media,” USEPA Workshop on Next Generation Environmental Models and Computational Methods (NGEMCOM), Bay City, Michigan, August 7–9, 1995.
  182. Plenary Lecture: “Multiphase Flow Simulation for Petroleum Applications,” Modeling and Numerical Methods in Petroleum Engineering, La Marsa, Tunisia, September 20–21, 1995.
  183. “Modeling and Simulation for Multiphase Transport of Contaminants in Porous Media,” Modeling and Computation in Environmental Sciences, Institut für Computeranwendungen, Stuttgart, Germany, October 12–13, 1995.
  184. “Key Telecommunications Initiatives,” The New World of Telecommunications: Redefining Roles in the Era of Technological Advances, The Woodlands, Texas, November 3, 1995.
  185. “Simulation of Compositional Aspects of Porous Media Flow,” Joint Meeting American Math. Society and Mexican Math. Society, Guanajuato, Mexico, November 30, 1995.
  186. “Inverse Problems for Groundwater Contamination and Petroleum Problems,” SIAM Conference on Inverse Problems: Geophysical Applications, Yosemite, California, December 16–18, 1995.
  187. “Simulation of Multiphase Flow and Transport of Groundwater Contaminants,” Conference on Fluid Flow in Porous Media, Oberwolfach, Germany, February 25–March 1, 1996.
  188. “Mathematical Modeling and Simulation for Applications of Fluid Flow in Porous Media,” Symposium on Current and Future Directions in Applied Mathematics, University of Notre Dame, South Bend, Indiana, April 18–21, 1996.
  189. “Preconditioning Techniques for Mixed and Nonconforming Finite Element Methods,” Conference on Algebraic Multilevel Iteration Methods with Applications, Catholic University of Nijmegen, Nijmegen, The Netherlands, June 13–15, 1996.
  190. “Three-phase Flow Formulation,” Computational Methods in Water Resources XI, Cancún, Mexico, July 22–24, 1996.
  191. “T-BONE – A high-speed (ATM) backbone for Texas,” First Annual Telecommunications Conference, Austin, Texas, October 22–23, 1996.
  192. “Current Simulation Capabilities and Future Needs,” Advanced Simulation of Subsurface Flow and Contaminant Transport, NCNC’s North Carolina Supercomputer Center, Research Triangle Park, North Carolina, December 5, 1996.
  193. Plenary Lecture: “Mathematical Modeling and Simulation for Applications of Fluid Flow in Porous Media,” 1996 Winter Meeting of the Canadian Mathematical Society, London Ontario, December 9, 1996.

194. "Mathematical Modeling and Simulation for Applications of Fluid Flow in Porous Media," *Advances in Computational Mechanics*, Austin, TX, January 15, 1997.
195. "The Role of Scientific Computation in Energy and Environmental Applications," Symposium on Scientific Computing in Baden–Wurttemberg, Stuttgart, Germany, February 4, 1997.
196. "Applications of Adaptive Refinement Methods," Meeting on Adaptive Methods for Partial Differential Equations, Oberwolfach, Germany, February 17, 1997.
197. Plenary Lecture: "Computational Sciences in Environmental Applications," *Computational Science for the 21st Century*, Tours, France, May 7, 1997.
198. Plenary Lecture: "Free Boundary Problems in Flow in Porous Media," 1997 Congress on Free Boundary Problems: Theory and Applications, Heracleon, Crete, June 10, 1997.
199. "Eulerian Lagrangian Localized Adjoint Methods for Two-Dimensional Convection-Diffusion Problems," SIAM Geosciences Conference, Albuquerque, New Mexico, June 16, 1997.
200. Keynote Address: "Linear Algebra Aspects of Large-Scale Models for Fluid Flow in Porous Media," Third IMACS International Symposium on Iterative Methods in Scientific Computation, Jackson Hole, Wyoming, July 10, 1997.
201. "Bioremediation Concepts in Multiphase Flow Processes," (week course) (with Al Cunningham and Rainer Helmig) University of Stuttgart, Stuttgart, Germany, July 21–25, 1997.
202. Plenary Lecture: "Numerical Analysis for Simulation of Multiphase Flow" Guangzhou International Symposium on Computational Mathematics, Guangzhou, P.R. China, August 12, 1997.
203. "Mathematical Modeling in Porous Media Applications," *II. Pan American Workshop on Applied and Computational Mathematics*, Gramados, Brazil, September 12, 1997.
204. "Computational Methods for Modeling and Remediating Groundwater Contamination," *Third Workshop on Computational Methods for Oceanic, Atmospheric, and Groundwater Flows*, Rio de Janeiro, Brazil, September 15, 1997.
205. "Problems with Scale-up, Heterogeneities, and Multiphase Flow," 3<sup>rd</sup> Dunwalke Workshop, Dunwalke, New Jersey, October 17–19, 1997.
206. "Cross-cutting Research Issues," DOE Computational Science Initiative: Workshop on Environmental Sciences, Germantown, Maryland, January 28, 1998.
207. "Computational Sciences in Environmental Applications," DOE Computational Sciences Initiative: Workshop 7 – Mathematics and Computer Science, Berkeley, California, February 9, 1998.
208. "Networking – State, Nation, and World," Texas Research Executives Symposium, Texas A&M University, College Station, Texas, February 23, 1998.
209. "Networking – State, Nation, and World," Networking: Yesterday, Today, and Tomorrow," Texas A&M University, College Station, Texas, March 2, 1998.
210. "Seismic Exploration Issues," DOE/NSF Data and Visualization Corridors for Large Scale Computation Workshop, Santa Fe, New Mexico, March 4, 1998.
211. "Upscaling Issues in Parameter Estimation of Models for Flow in Porous Media," PICOF '98 Conference on Inverse Problems, Control, and Shape Optimization, Carthage, Tunisia, April 8, 1998.
212. "Networking – State, Nation, and World," Texas Telehealth Education, San Antonio, Texas, June 26, 1998.
213. "Iterative Methods for Multiphase Flows in Porous Media," Modeling '98 – 1<sup>st</sup> IMACS Conference on Mathematics, Prague, Czech Republic, July 7, 1998.
214. "Domain Decomposition Methods in Porous Media Simulations," 11<sup>th</sup> International Conference on Domain Decomposition Methods, University of Greenwich, London, United Kingdom, July 23, 1998.
215. "Scientific Computations in Energy and Environmental Applications," 8<sup>th</sup> International Congress on Computational and Applied Mathematics, Katholieke Universiteit Leuven, Leuven, Belgium, July 28, 1998.
216. Key Lecture: "Numerical Analysis of Multiphase Models in Reservoir Simulation," Seventh International Colloquium on Numerical Analysis and Computer Science with Applications, Plodiv, Bulgaria, August 17, 1998.
217. Plenary Lecture: "Applications of Domain Decomposition Methods to Flows in Porous Media," NMA '98: 4<sup>th</sup> International Conference on Numerical Methods and Applications, Bulgarian Academy of

- Sciences, Sofia, Bulgaria, August 19, 1998.
218. "Mathematical Modeling and Reservoir Simulation for Super-K Reservoirs," Mathematical Modeling of Fluid Flow in Super-K Reservoirs, 1998 Saudi Aramco Technical Meeting, Dhahran, Saudi Arabia, September 13, 1998.
  219. Keynote Speaker: "Mathematical Modeling and Simulation in Energy and Environmental Applications," Workshop on Scientific Computing and Applications, City University of Hong Kong, Hong Kong, December 7, 1998.
  220. "Network for Advanced Learning Technologies," TASSCUBO Winter Meeting, Austin, Texas, January 27, 1999.
  221. (ISDN Telecast) "Collaboration Application for I2: CUDI and UCAID," Mexico City, Monterrey, Mexico, February 19, 1999.
  222. "Subsurface Microbial Processes: Multiphase Flow, Mass Transport and Bioremediation," (week course) (with Al Cunningham and Rainer Helmig), International Association for Hydraulics Research, University of Braunschweig, Braunschweig, Germany, March 1–5, 1999.
  223. "Mathematical Modeling and Simulation for Applications of Multiphase Fluid Flow in Porous Media, SIAM Geosciences Conference, San Antonio, Texas, March 24, 1999.
  224. (ISDN Telecast) "Aspects of Numerical Simulation in Environmental Engineering: an Experiment in Teleteaching". Kolloquium on Computeranwendungen in Baingenieurwesev, Braunschweig, Germany, May 18, 1999.
  225. Plenary Lecture: "Mathematical Modeling and Simulation for Applications of Fluid Flow in Porous Media", International Conference on Environmental Mathematical Modeling and Numerical Analysis, Rostov-on-Don, Russia, May 28, 1999.
  226. "Upscaling Issues." Workshop on Flow and Transport in Porous Media, Bergen, Norway, June 5, 1999.
  227. "Difficulties and Uncertainty in Mathematical/Numerical Modeling of Fluid Flow in Fractured Media," Fracture and *in situ* Stress Characterization of Hydrocarbon Reservoirs, Geological Society, London, United Kingdom, June 28, 1999.
  228. "Mathematical Modeling and Simulation for Applications of Fluid Flow in Porous Media," 4<sup>th</sup> Int. Congress on Ind. and Appl. Math., Edinburgh, Scotland, July 7, 1999.
  229. "Simulation of Contaminant Transport Involving Two-Phase Flows," 4<sup>th</sup> Int. Congress on Ind. and Appl. Math., Edinburgh, Scotland, July 8, 1999.
  230. "Mathematical Modeling and Simulation for Multiphase Flow in Porous Media," International Workshop on Computational Physics: Fluid Flow and Transport in Porous Media, Beijing, People's Republic of China, August 3, 1999.
  231. "Finite Volume Element Methods in Porous Media Flow," Special Session on Numerical Methods for PDE, 946<sup>th</sup> AMS Meeting, Salt Lake City, Utah, September 25, 1999.
  232. "Finite Volume Element Methods for Fluid Flows," Special Session on Advances in the Mathematics and Applications of Finite Elements, AMS Meeting, Austin, Texas, October 10, 1999.
  233. "Aplicaciones de Internet2 en Texas A&M University," Internet2 Seminar at the Rectoria General de La Universidad Autonoma Metropolitana, University of Mexico, Mexico City, November 15, 1999.
  234. "Biocomplexity in Subsurface Bioremediation Problems," IMA–NSF Workshop in Biocomplexity, Special Competition 2000: Opportunities in the Mathematical Sciences, Minneapolis, Minnesota, January 14, 2000.
  235. "Bioremediation of Multiphase Flows in Porous Media," IMA Conference on Confinement and Remediation of Environmental Hazards, Minneapolis, Minnesota, January 15, 2000.
  236. "Simulation of Multiphase Flow in Highly Heterogeneous Media," IMA Conference on Resource Recovery, Minneapolis, Minnesota, February 12, 2000.
  237. "Interactive Control of Large-scale Simulations," NSF Workshop on Dynamic, Data-Driven Application Systems, Washington, D.C., March 8, 2000.
  238. "Internet 2 Applications at Texas A&M University," Reunion Primavera, CUDI 2000, Puerto Vallarta, Mexico, April 3, 2000.
  239. Plenary Lecture: "Expanding Use of Telecommunications, Information Technology, and Distance Education," National Education Technology Conference, College Station, Texas, May 24, 2000.

240. Plenary Lecture: "Modeling and Simulation of Multiphase Flow in Porous Media," Workshop on Scientific Computing, Kananaskis, Canada, May 29, 2000.
241. Keynote Lecture: "Advanced Technologies: Impact of Future Trends on Research and Education," Association of American Medical Centers Group on Business Affairs Regional Meeting, San Antonio, Texas, June 18, 2000.
242. "An Accurate Simulator of Compressible Flow in Porous Media with Wells," XIII International Conference on Computational Methods in Water Resources, Calgary, Alberta, Canada, June 28, 2000.
243. Keynote Address: "An Innovative Management Paradigm for Motivating Research and Technology Developments in the Information Age," Association of Management/International Association of Management Annual Meeting, San Antonio, Texas, August 11, 2000.
244. Plenary Address: "Simulation of Multiphase Flows in Porous Media," ALGORITMY 2000, Podbanske, Slovakia, September 2000.
245. "Inverse Problems for Groundwater Contamination and Petroleum Applications," Computational Sciences and Engineering Meeting, SIAM, Washington, D.C., September 22, 2000.
246. "Texas A&M University: Enabling Technology Access," Texas Technology Summit, Austin, Texas, October 9, 2000.
247. "Trends and Directions in Computational Sciences," Dedication of the Applied Computational Engineering and Sciences Building, Austin, Texas, October 19, 2000.
248. "Optimal-order Error Estimates for Non-Fickian Flows in Porous Media," Numerical Methods in Differential Equations, Joint Meeting AMS-SMM, Morelia, Mexico, May 24, 2001.
249. "The DREAMS Program: Enhancing Emergency Medical Care with Advanced Telecommunications Technologies," National Meeting of the American Telemedicine Association, Ft. Lauderdale, Florida, June 3, 2001.
250. "Upscaling in the Modeling of Multiphase Flows in Porous Media," Sixth SIAM Conference on Mathematical and Computational Issues in Geosciences, Boulder, Colorado, June 12, 2001.
251. "An Improved Numerical Simulator for Compressible Flows in Porous Media," Sixth SIAM Conference on Mathematical and Computational Issues in Geosciences, Boulder, Colorado, June 13, 2001.
252. "Upscaling Methods for Multiphase Flows," AMS, SIAM, and IMS Joint Summer Research Conference, Mt. Holyoke, Massachusetts, June 17, 2001.
253. (Plenary Lecture) "Upscaling Methods for Multiphase Flows," International Symposium on Computational and Applied PDE's, Zhangjiajie, Hunan, China, July 2, 2001.
254. "Prospects for State/Industry/University Partnerships," Government/University/Industry Research Roundtable, Washington, DC, March 13, 2002.
255. "Upscaling in Multiphase Flow Applications," SIAM 50th Anniversary Conference, Philadelphia, Pennsylvania, July 10, 2002.
256. "Proposed agenda on Seminar: Science and Technology as an Engine for Economic Development in Mexico," Guanajuato, Mexico, August 2, 2002.
257. Keynote Address "Upscaled Modeling in Multiphase Flow Applications," 2nd Symposium on Computational Modeling of Multi-Scale Phenomena, Petropolis, Brazil, August 5, 2002.
258. Plenary Lecture: "Upscaling in Multiphase Flow Applications," Satellite Conference on Scientific Computing, International Congress on Mathematics 2002–Beijing, Xi'an, China, August 18, 2002.
259. Workshop: The State-of-the-Art of Information Technology and Its Impact on the Petroleum Industry, Petro China," Beijing, China, August 19, 2002.
  - a) "Today's Information Technology and Petroleum Industry Concerns"
  - b) "Reservoir Simulation Techniques"
  - c) "Industry Outlook"
260. "Modeling of Multiphase Flows in Porous Media," International Conference for Magne Espedal, Bergen, Norway, August 29–31, 2002.
261. Keynote Address: "Research on Built and Virtual Environments Global Symposium," College Station, Texas, November 15, 2002.
262. "Multiphase Flow in Porous Media," Numerical Analysis Conference Honoring Raytcho Lazarov, College Station, TX, January 24–25, 2003.
263. Keynote Address: "Recent Developments in Eulerian-Lagrangian Localized Adjoint Methods," Seventh

- U.S. National Congress on Computational Mechanics, Albuquerque, New Mexico, July 27–31, 2003.
264. “Enhancing Research in Texas,” Texas Higher Educational Coordinating Board, Austin, Texas, January 28, 2004.
  265. Keynote Address: “Enhancing China-U.S. Relations Through Research Partnerships,” CAST Convention, Dallas, Texas, March 13, 2004.
  266. Keynote Address: “Aspects of Scientific Computing in Petroleum Applications,” International Conference on Scientific Computing in Petroleum Industry, Beijing, China, August 4, 2004.
  267. Plenary Lecture: “High Performance Computing for Energy Applications,” International Conference on High Performance Computing and Applications, Shanghai, China, August 9, 2004.
  268. “Integrative Framework for Reservoir Simulation,” Workshop on Modeling and Computation in Environmental Science, Hohenwart, Germany, October 21, 2004.
  269. Plenary Lecture: “Advances and Hot-Topics in Reservoir Simulation,” Guiyang, Guizhou, China, July 14, 2005.
  270. “Environmental Modeling of Integrated Systems,” Workshop on Advanced Modeling in Environmental Science, Southern Methodist University, August 24, 2005.
  271. “Developing an Academic Framework for Biodefense,” Homeland Security Conference on Biosecurity, Washington DC., April 6, 2005.
  272. “From Research and Development to the Commercialization of Intellectual Property,” Economic Development in Texas, Austin, Texas, February 28, 2005.
  273. “Alternating Direction Methods for Quasi-Linear Partial Differential Equations,” 50 Years of Alternating Direction Methods, Rice University, November 4, 2005.
  274. “International Collaboration Contacts Through Research Roundtables,” Plenary Session: Scientific and Technological Cooperation, China-U.S. Relations: Trade, Diplomacy and Research, Beijing, China, November 15, 2005.
  275. Plenary Lecture: “Building Research Capacity at Texas A&M University,” Critical Roles in Building Research Capacity, National Academy of Educational Administration, Beijing, China, November 16, 2005.
  276. Keynote Address: “Better Learning Through Technology,” 18th International Conference on Technology in Collegiate Mathematics, Orlando, Florida, March 17, 2006.
  277. “Mathematical Modeling and Scientific Computation in Energy Applications,” 2006 NSF-CMS Conference on Fluid Flow and Transport in Porous Media, Las Vegas, Nevada, May 23, 2006.
  278. “Domain Decomposition Techniques for Modeling Multiscale Physics,” 17<sup>th</sup> International Conference on Domain Decomposition Methods, Strobl, Austria, July 3-4, 2006.
  279. “Dynamic Data Driven Application in Porous Media Flow,” Workshop on DDDAS Methods, Petropolis, Brazil, July 11-15, 2006.
  280. “Competitiveness of the Border Region,” Border Governors’ Conference Science and Technology Committee Meeting, Monterey, Mexico, August 1-2, 2006.
  281. “Technology Needs for the Border Region,” Border Governors’ Conference, Austin, Texas, August 25, 2006.
  282. “Mathematical Modeling in Energy and Environmental Applications,” Chinese Academy of Sciences, Beijing, China, September 8, 2006.
  283. “Computational Sciences in Environmental Applications,” Xiamen University, Xiamen, China, September 10, 2006.
  284. “Global Strategic Partnership in Critical Regions,” NASULGC National Conference, Houston, Texas, November 13, 2006.
  285. “Coupled Nonlinear Processes in Subsurface modeling,” Computational Subsurface Sciences Workshop, Washington DC, January 10, 2007.
  286. “An Accurate Multiphase Upscaling for Flow and Transport in Heterogeneous Porous Media,” SPE Middle East Oil and Gas Show and Conference, Manama, Bahrain, March 14, 2007.
  287. “Fate and Transport of Groundwater Contamination,” Groundwater as a Main Water Source for Agriculture in Qatar, Doha, Qatar, March 22, 2007.
  288. “Future of High Performance Computing,” High Performance Computing Day, Texas A&M University,

- College Station, Texas, May 2, 2007.
289. Plenary Lecture: "Mathematical Modeling in Energy and Environmental Applications," 6<sup>th</sup> International Conference on Large-scale Scientific Computing, Sozopol, Bulgaria, June 6, 2007.
  290. Plenary Lecture: "Mathematical Modeling in Environmental Applications," 33<sup>rd</sup> International Conference on Applications of Mathematics in Engineering and Economics, Sozopol, Bulgaria, June 9, 2007.
  291. Plenary Lecture: "Mathematical Modeling and Computational Simulation in Energy and Environmental Applications," Inaugural Conference on Computational Methods in Energy and Environmental Research, Peking University, Beijing, China, July 9, 2007.
  292. "Optimizing Water Policy Decisions through Modeling," Mexico-U.S. Binational Water Conference: First Planning Meeting, Stillo, Mexico, November 28-30, 2007.

#### **Invited Colloquia and Special Seminars:**

1. Texas Tech University, January 23, 1974.
2. Oakland University, February 21, 1974.
3. University of Kentucky, February 10, 1977.
4. The Ohio State University, February 22, 1977.
5. University of South Carolina, February 24, 1977.
6. Indiana University, March 16, 1977.
7. Rice University, December 19, 1977.
8. University of Chicago, July 6, 1978.
9. Texas A&M University, August 18, 1978.
10. MRC-University of Wisconsin, October 9, 1978.
11. Southern Methodist University, November 15, 1978.
12. Kent State University, January 8, 1979.
13. Michigan State University, January 18, 1979.
14. University of Michigan, October 24, 1979.
15. University of Chicago, December 13, 1979.
16. University of Cincinnati, January 24, 1980.
17. University of Toronto, April 1, 1980.
18. University of Texas at Arlington, December 3, 1980.
19. Rice University, October 14, 1981.
20. Yale University, February 17, 1982.
21. University of Maryland, February 18, 1982.
22. University of Wyoming, March 18, 1982.
23. Rice University, November 15, 1982.
24. University of Houston, November 17, 1982.
25. University of Wyoming, December 6, 1982.
26. University of Texas at Dallas, January 2, 1983.
27. Duke University, April 12–13, 1983.
28. Katholieke University, Nijmegen, The Netherlands, June 7, 1984.
29. Institut National des Sciences Appliquees de Lyon, Lyon, France, June 12, 1984.
30. INRIA, Paris, France, June 15, 1984.
31. Albert-Ludwigs Universitat, Freiburg, Germany, June 26, 1984.
32. Istituto di Analisi Numerica, Pavia, Italy, June 29, 1984.
33. Istituto per le Applicazioni de Calcolo (IAC), Rome, Italy, July 6, 1984.
34. Chevron Oil Field Research Co., La Habra, California, February 1, 1985.
35. University of Colorado, Boulder, February 8, 1985.
36. Denelcor Corporation, Denver, Colorado, February 27, 1985.
37. University of Houston, April 16, 1985.

38. Colorado State University, April 18, 1985.
39. University of Colorado, Boulder, May 2, 1985.
40. Pacific Power and Light Corp., Portland, Oregon, September 10, 1985.
41. Chevron Oil Field Research Co., La Habra, California, December 17, 1985.
42. University of Minnesota, Minneapolis, Minnesota, December 19, 1985.
43. University of Wyoming Foundation, Houston, Texas, February 11, 1986.
44. University of Wyoming, Laramie, Wyoming, February 17, 1986.
45. Chevron Oil Field Research Co., La Habra, California, March 27, 1986.
46. INRIA, Le Chesnay, France, June 24, 1986.
47. University of Colorado, Denver, Colorado, September 10, 1986.
48. National University of Mexico, Mexico City, Mexico, September 29, 1986.
49. Tulsa University, Tulsa, Oklahoma, October 29, 1986.
50. University of Minnesota, Minneapolis, Minnesota, December 4, 1986.
51. University of Wyoming, Laramie, Wyoming, February 10, 1987.
52. Utah State University, Logan, Utah, February 12, 1987.
53. University of Wyoming, Laramie, Wyoming, February 17, 1987.
54. Koninklijke/Shell Exploratie en Produktie Laboratorium, Rijswijk, The Netherlands, March 9, 1987.
55. Norsk Hydro Petroleum Research Centre, Bergen, Norway, March 20, 1987.
56. Universitetet Bergen, Bergen, Norway, March 23, 1987.
57. IBM, Bergen Scientific Centre, Bergen, Norway, March 24, 1987.
58. Christian Michelson Institute, Bergen, Norway, March 27, 1987.
59. Uppsala University, Uppsala, Sweden, March 31, 1987.
60. Chalmers University of Technology and The University of Göteborg, Göteborg, Sweden, April 1, 1987.
61. University of California at Berkeley, Berkeley, California, April 29, 1987.
62. Arizona State University, Tempe, Arizona, April 30, 1987.
63. Montana State University, Bozeman, Montana, May 21, 1987.
64. Montana State University, Bozeman, Montana, May 22, 1987.
65. DOE, Morgantown Energy Technology Center, Morgantown, West Virginia, July 31, 1987.
66. Research Institute of Petroleum Exploration and Development, Beijing, People's Republic of China (4 talks), September 15-20, 1987.
67. Nankai University, Tianjin, People's Republic of China (2 talks), September 21-23, 1987.
68. Shandong University, Jinan, Shandong, People's Republic of China (3 talks), September 24-27, 1987.
69. Xian Petroleum Institute, Xian, Shaanxi, People's Republic of China, September 29, 1987.
70. Chengdu Branch of Academia Sinica, Chengdu, Sichuan, People's Republic of China, October 2, 1987.
71. Colorado State University, Fort Collins, Colorado, October 12, 1987.
72. University of South Carolina, Columbia, South Carolina, December 11, 1987.
73. University of Stellenbosch, Stellenbosch, South Africa, February 3, 1988.
74. Soeker Oil Company, Cape Town, South Africa, February 4, 1988.
75. Shell Development Corporation, Houston, Texas, February 16, 1988.
76. Texaco E&P Technology Division, Houston, Texas, February 16, 1988.
77. Tenneco Oil Exploration and Production, Houston, Texas, February 17, 1988.
78. Arco Oil and Gas Company, Plano, Texas, February 18, 1988.
79. Sun Exploration and Production Company, Richardson, Texas, February 18, 1988.
80. Mobil Research and Development Company, Farmers Branch, Texas, February 19, 1988.
81. Wyoming Economic Development Board, Casper, Wyoming, May 12, 1988.
82. Chevron Oil Field Research Co., La Habra, California, May 16, 1988.
83. Statoil, Stavanger, Norway, June 3, 1988.
84. Tulsa University, Tulsa, Oklahoma, September 8, 1988.
85. University of Texas at Austin, Austin, Texas, September 19, 1988.

86. Chevron Oil Field Research Co., La Habra, California, October 31, 1988.
87. University of Wyoming, Laramie, Wyoming, November 15, 1988.
88. Marathon Oil Company, Littleton, Colorado, January 17, 1989.
89. Reservoir Simulation Research Corporation, Tulsa, Oklahoma, February 13, 1989.
90. Texas A&M University, College Station, Texas (three talks), February 14–17, 1989.
91. Bureau of Economic Geology, Austin, Texas, June 15, 1989.
92. Mobil Research and Development Corporation, Farmers Branch, Texas, June 16, 1989.
93. INRIA, Le Chesnay, France, June 26, 1989.
94. Chevron Oil Field Research Co., La Habra, California, July 24, 1989.
95. University of Colorado at Denver, Denver, Colorado, September 6, 1989.
96. Marathon Oil Company, Littleton, Colorado, September 13, 1989.
97. Universitetet Bergen, Bergen, Norway, September 18, 1989.
98. Gesellschaft für Mathematik und Dalenverarbeitung, Sankt Augustin, West Germany, September 22, 1989.
99. University of Colorado at Denver, Denver, Colorado, October 4, 1989.
100. Reservoir Simulation Research Corporation, San Antonio, Texas, October 12, 1989.
101. University of Colorado at Boulder, Boulder, Colorado, October 20, 1989.
102. Amoco Production Company, Tulsa, Oklahoma, December 6, 1989.
103. Montana State University, Bozeman, Montana, February 26, 1990.
104. University of North Carolina, Charlotte, North Carolina, March 20, 1990.
105. Princeton University, Princeton, New Jersey, April 9, 1990.
106. Savannah River Research Corporation, Aiken, South Carolina, April 18, 1990.
107. Mathematical Institute, Leningrad, USSR, May 31, 1990.
108. Bulgarian Academy of Sciences, Sofia, Bulgaria, June 6, 1990.
109. Universität Heidelberg, Heidelberg, West Germany, August 27, 1990.
110. IBM Scientific Center, Heidelberg, West Germany, August 28, 1990.
111. IBM Bergen Scientific Center, Bergen, Norway, September 6, 1990.
112. Virginia Polytechnic Institute and State University, Blacksburg, Virginia (3 talks), October 18–19, 1990.
113. Purdue University, West Lafayette, Indiana, January 28, 1991.
114. University of South Carolina, Columbia, South Carolina, March 15, 1991.
115. University of South Carolina, Columbia, South Carolina, May 9, 1991.
116. USSR Academy of Sciences, Moscow, USSR, June 20, 1991.
117. Bulgarian Academy of Sciences, Sofia, Bulgaria, June 25, 1991.
118. IBM T. J. Watson Research Center, Yorktown Heights, New York, September 16, 1991.
119. Texas A&M University, College Station, Texas, September 19, 1991.
120. Chevron Oil Field Research Co., La Habra, California, September 25, 1991.
121. University of Southern California, Los Angeles, California, September 26, 1991.
122. Westinghouse Savannah River Corporation, Aiken, South Carolina, April 2, 1992.
123. Montana State University, Bozeman, Montana, April 23–24, 1992.
124. Brookhaven National Laboratory, Islip, New York, May 5, 1992.
125. IBM Scientific Center, Heidelberg, Germany, June 24, 1992.
126. Chevron Oil Field Research Co., La Habra, California, July 20, 1992.
127. Westinghouse Savannah River Corporation, Aiken, South Carolina, September 28, 1992.
128. Texas A&M University, College Station, Texas, October 7, 1992.
129. James Madison University, Harrisonburg, Virginia, October 8, 1992.
130. Oak Ridge National Laboratory, Oak Ridge, Tennessee, January 26, 1993.
131. Houston Advanced Research Center, The Woodlands, Texas, February 8, 1993.
132. Pittsburgh Supercomputing Center, Pittsburgh, Pennsylvania, March 5, 1993.
133. Westinghouse Savannah River Corporation, Aiken, South Carolina, April 26, 1993.

134. Oak Ridge National Laboratory, Oak Ridge, Tennessee, May 20, 1993.
135. Academia Sinica, Beijing, People's Republic of China, July 31, 1993.
136. Chonnam National University, Kwangju, Korea, August 6, 1993.
137. Dunwalke, Princeton University, Princeton, New Jersey, November 1, 1993.
138. Texas A&M University, College Station, Texas, December 1, 1993.
139. Tulane University, New Orleans, Louisiana, December 6, 1993.
140. Montana State University, Bozeman, Montana, January 6, 1994.
141. Texas A&M University, College Station, Texas, January 14, 1994.
142. Mitchell Energy, Galveston, Texas, June 6, 1994.
143. Exploration Research Committee Meeting, Houston, Texas, June 10, 1994.
144. Comermex of Mexico, College Station, Texas, July 1, 1994.
145. DOE PICS Project, Washington, DC, July 13, 1994.
146. University of South Carolina, Columbia, South Carolina, August 14, 1994.
147. Telecommunications, Texas A&M University, College Station, Texas, April 25, 1995.
148. Universitet Bergen, Bergen, Norway, August 17, 1995.
149. AIRES Project, Institute for Biosciences and Technology, Houston, Texas, September 13, 1995.
150. Universitet Aachen, Aachen, Germany, October 17, 1995.
151. E-Systems, Garland, Texas, October 26, 1995.
152. Department of Meteorology, Texas A&M University, College Station, Texas, November 7, 1995.
153. Keck Seminar, Institute for Biosciences and Technology, Houston, Texas, November 9, 1995.
154. Texas A&M University, College Station, Texas, March 20, 1996.
155. University of Alberta, Edmundton, Canada, April 2, 1996.
156. Texas A&M University Mexico Center, Mexico City, Mexico, April 8, 1996.
157. University of Stuttgart, Stuttgart, Germany, April 15, 1996.
158. INRIA, Le Chenay, France, June 10, 1996.
159. Woodlands Corporation, The Woodlands, Texas, October 14, 1996.
160. Weierstrauss Institute, Berlin, Germany, February 7, 1997.
161. Universitetet, Bergen, Norway, February 11, 1997.
162. University of Heidelberg, Heidelberg, Germany, February 14, 1997.
163. Princeton University, Princeton, New Jersey, August 18, 1997.
164. Southern Methodist University, Dallas, Texas, September 3, 1997.
165. Mobil Oil Corporation, Dallas, Texas, September 4, 1997.
166. National Plutonium Reserve, Amarillo, Texas, September 23, 1997.
167. Texas Tech University, Lubbock, Texas, September 24, 1997.
168. Texas A&M System Executive Council, College Station, Texas October 14, 1997.
169. Institute for Biosciences and Technology, Houston, Texas, October 23, 1997.
170. Institute for Biosciences and Technology, Houston, Texas, December 12, 1997.
171. College of Medicine, Texas A&M University, College Station, Texas, December 18, 1997.
172. UT Strategic Leadership Council, Texas Medical Center, Houston, Texas, January 30, 1998.
173. Supercomputing Center, University of Kentucky, Lexington, Kentucky, March 12, 1998.
174. Institut Francais du Pétrole, Paris, France, April 6, 1998.
175. INRIA, Rocquencourt, France, April 7, 1998.
176. Technical University of Braunschweig, Braunschweig, Germany, July 17, 1998.
177. International Center, Mexico City, Mexico, October 13, 1998.
178. (ISDN Telecast) IIACA Headquarters, San Jose, Costa Rica, October 13, 1998.
179. Lawrence Livermore Laboratory, Livermore, California, January 15, 1999.
180. Texas A&M University Distance Learning Committee, College Station, Texas, January 26, 1999.
181. Texas A&M University, College Station, Texas, February 16, 1999.
182. Texas A&M University, College Station, Texas, February 17, 1999.

183. Technical University of Braunschweig, Germany, March 1, 1999.
184. Universitetet of Bergen, Bergen, Norway, July 1, 1999.
185. University of Montevideo, Montevideo, Uruguay, June 30, 2000.
186. Army Materiel Command, College Station, Texas, August 8, 2000.
187. Brazos Valley Community Network, Austin, Texas, August 11, 2000.
188. AggieInfoTech, KAMU TV, College Station, Texas, August 30, 2000.
189. Military University of Mexico, Mexico city, Mexico, September 15, 2000.
190. D.H. Anadstani Foundation, India, College Station, Texas, September 26, 2000.
191. College of Agriculture and Life Sciences, Texas A&M University, College Station, Texas, September 27, 2000.
192. College of Engineering, Texas A&M University, College Station, Texas, October 4, 2000.
193. College of Science, Texas A&M University, College Station, Texas, October 13, 2000.
194. Dwight Look College of Engineering, Texas A&M University, College Station, Texas, October 4, 2000.
195. College of Education, Texas A&M University, College Station, Texas, November 10, 2000.
196. TAMU Muster, San Jose, Costa Rica, April 21, 2001.
197. National Taiwan Ocean University, Keelung, Taiwan, April 30, 2001.
198. National Cheng Kung University, Tainan, Taiwan, May 2, 2001.
199. National Chiao-Tung University, Hsinchu, Taiwan, May 2, 2001.
200. National Tsing Hua University, Hsinchu, Taiwan, May 2, 2001.
201. National Science Council, Taipei, Taiwan, May 3, 2001.
202. Chinese Petroleum Corporation, Taipei, Taiwan, May 3, 2001.
203. Ocean Drilling Program Symposium, National Taiwan University, Taipei, Taiwan, May 4, 2001.
204. IT/Policy Research Symposium, College Station, Texas, October 8, 2001.
205. International Programs Council, College Station, Texas, October 25, 2001.
206. Homeland Security Task Force, Austin, Texas, November 1, 2001.
207. Chinese Petroleum Engineering, Inc., Beijing, China, November 6, 2001.
208. Peking University, Beijing, China, November 8, 2001.
209. Chinese Academy of Sciences, Peking, China, November 9, 2001.
210. CONACyT Symposium, College Station, Texas, November 16, 2001.
211. Texas A&M University Mexico City Center, Mexico City, Mexico, December 12, 2001.
212. Texas Telecommunications Engineering Consortium, College Station, Texas, January 25, 2002.
213. Chinese/U.S. Higher Education Policy Makers, College Station, Texas, March 4, 2002.
214. Chinese and U.S. Higher Education Policy Makers on IP Rights and Technology Transfer, Washington, DC, March 8, 2002.
215. Board of Regents, Texas A&M University, College Station, Texas, March 21, 2002.
216. SINOPEC Petroleum Company, Beijing, China, March 25, 2002.
217. Presentation to President of Bolivia, College Station, Texas, April 9, 2002.
218. Cambridge Network, Cambridge, England, April 29, 2002.
219. Board of Regents, Texas A&M University, College Station, Texas, May 23, 2002.
220. CONACyT Presentation, Cozumel, Mexico, June 7, 2002.
221. Homeland Security Needs, Senate Building, Washington, DC, May 21, 2002.
222. Qatar Foundation, Doha, Qatar, June 15, 2002.
223. Community Mayors and Leaders, College Station, Texas, July 18, 2002.
224. Brazos Valley Telecommunications Authority, College Station, Texas, September 24, 2002.
225. Department of Public Safety Agency Heads, Austin, Texas, October 30, 2002.
226. Center for New Venture and Entrepreneurship Advisory Council, College Station, Texas, November 7, 2002.
227. NSF/CIA Physical Sciences Workshop, Alexandria, Virginia, November 20, 2002.
228. Techpiphany and Startech, Richardson, Texas, January 16, 2003.

229. Texas Research Executives Meeting, Arlington, Texas, February 28, 2003.
230. Carnegie-Mellon University, Pittsburg, Pennsylvania, August 22, 2003.
231. DHS Advanced Scientific Computing Conference, Washington, DC, October 8, 2003.
232. Institute for Wasserbau, University of Stuttgart, Stuttgart, Germany, February 6, 2004.
233. Fraunhofer Institute, Kaiserslautern, Germany, February 6, 2004.
234. Qatar Education City Advisory Council, Doha, Qatar, March 9, 2004.
235. Texas Research Executives Conference, Brownsville, Texas, April 15, 2004.
236. Center for New Ventures and Entrepreneurship, College Station, Texas, May 4, 2004.
237. NSF Approaches to Combat Terrorism Workshop, Washington, DC, June 8, 2004.
238. Xian Jao-tung University, Xian, China, August 3, 2004.
239. Institute for Water Engineering, University of Stuttgart, Stuttgart, Germany, June 30, 2005.
240. University of Bergen, Bergen, Norway, September 19, 2005.
241. Mexico City Center, Texas A&M University, Mexico City, Mexico, October 4, 2005.
242. Border Governors Meeting, Bush School of Government & Public Service, Texas A&M University, College Station, Texas, November 3, 2005.
243. Education City, Texas A&M University at Qatar, Advisory Board, Doha, Qatar, November 21, 2005.
244. University of Bergen, Bergen, Norway, January 16, 2006.
245. University of Heidelberg, Heidelberg, Germany, January 18, 2006.
246. Fraunhofer Institute, Kaiserslautern, Germany, January 23, 2006.
247. Institute for Water Engineering, University of Stuttgart, Stuttgart, Germany, February 3, 2006.
248. Joint Advisory Board, Texas A&M University at Qatar, College Station, Texas, March 2, 2006.
249. Aggie Summit, San Salvador, El Salvador, February 17, 2006.
250. Bi-National Sustainability Laboratory, Santa Teresa, New Mexico, March 27, 2006.
251. International Program Office, Board Meeting, College Station, Texas, April 7, 2006.
252. Border Governors Conference Committee on Science and Technology, College Station, Texas, May 5, 2006.
253. Monterey Tech University, Monterey, Mexico, May 15, 2006.
254. University of Nuevo León, Monterey, Mexico, May 16, 2006.
255. Faculty Abroad Seminar, Palenque, Mexico, May 21, 2006.
256. TGen, College Station, Texas, September 30, 2006.
257. Joint Advisory Board, TAMU-Qatar, Doha, Qatar, November 8, 2006.
258. CONACyT, Mexico City, Mexico, February 9, 2007.

**Panel Presentations and Discussions:**

1. Role of Supercomputing in Petroleum Engineering, Workshop on Applications of Science in Petroleum Engineering, Rio de Janeiro, Brazil, August 19, 1988.
2. Role of Large-Scale Computing in Ship Design, Sixth National Congress of Theoretical and Applied Mechanics, Varna, Bulgaria, September 30, 1989.
3. Panel on Math Education: Graduate and Post-Graduate, AMS-MAA Joint Meetings, Baltimore, Maryland, January 10, 1992.
4. Panel on Industry-University Collaborations (Moderator), Forum on Industrial and Applied Mathematics, Indianapolis, Indiana, May 15, 1992.
5. Panel on the National High Performance Computing and Communication Initiative, Forum on Industrial and Applied Mathematics, Indianapolis, Indiana, May 15, 1992.
6. Chair, Panel on Scientific Computation and Graphics, Hazardous Waste Conference, University of Notre Dame, South Bend, Indiana, September 2, 1992.
7. Plenary Panel: Science and Policy: Who's Driving Groundwater Management, 1995 Rocky Mountain Groundwater Conference, Jackson Hole, Wyoming, October 4, 1995.
8. Panel on Bioterrorism, National Power Conference, College Station, Texas, January 9, 2002.

9. Panel on Interdisciplinary Food Safety Program, College Station, Texas, March 4, 2002.
10. Panel on Protection of Intellectual Property, NASULGG Conference, Chicago, Illinois, November 11, 2002.
11. Panel on University Research and Development, Texas Workforce Investment Council, Austin, Texas June 15, 2006.

#### **Editorial Work:**

1. SIAM Series, *Research Frontiers in Applied Mathematics*, Editor 1983–, Managing Editor 1985–1988.
2. Volume Editor, *Mathematics of Reservoir Simulation*, Volume I, Research Frontiers in Applied Mathematics.
3. *Computer Methods in Applied Mechanics and Engineering*, Editor of Special Issue on Reservoir Simulation.
4. Editorial Committee of *Proceedings of Symposia in Applied Mathematics* for the American Mathematical Society 1984–85, Chair of Committee, 1985–1986.
5. Editorial Advisory Committee, *Natural Resource Modeling*, 1984–1988.
6. Editorial Board, *Computer Methods in Applied Mechanics and Engineering*, 1985–2005.
7. Editorial Board, *Numerical Methods for Partial Differential Equations*, 1986–2007.
8. Editorial Advisory Committee, *In-Situ*, 1986–2007.
9. Editorial Board, *SIAM Journal on Numerical Analysis*, 1987–1998.
10. Editorial Board, *Journal of Numerical Linear Algebra and Applications*, 1990–1993.
11. Editorial Board, *Environmental Software*, 1990–2007.
12. Editorial Board, *Surveys on Mathematics for Industry*, 1991–2002.
13. Editorial Board, *Advances in Water Research*, 1991–1994.
14. Editorial Board, *Nonlinear World*, 1992–2007.
15. Editorial Board, *Computational Mechanics Advances*, 1993–2002.
16. Editorial Board, *Communications on Applied Nonlinear Analysis*, 1994–2007.
17. Editorial Board, *Mathematical Modeling and Computational Experiment*, 1995–2007.
18. Editorial Board, *Computing and Visualization in Science*, 1996–2007.
19. Editorial Board, *Optimization and Engineering*, 1999.
20. Associate Editor, *Optimization and Engineering*, 1999–2000.
21. Editorial Board, *International Journal of Computational and Numerical Analysis and Applications*, 2000–2007.
22. Editorial Board, *International Journal of Pure and Applied Mathematics*, 2002–2007.
23. Editorial Board, *International Journal of Computational Engineering Science*, 2003–2007.
24. Editorial Board, *International Journal of Numerical Analysis and Modeling*, 2003–2007.
25. Editorial Board, *International Journal for Rapid Publications in Mathematics*, 2004–2007.
26. Editorial Board, *International Journal of Information and System Sciences*, 2005–2007.

#### **Ph.D. Students:**

1. E. Carlson, Department of Petroleum Engineering, University of Wyoming, 1986 (joint with R. Terry).
2. C.P. Angelos, Department of Chemical Engineering, University of Wyoming, 1988.
3. J.V. Koebbe II, Department of Mathematics, University of Wyoming, 1988 (Outstanding Thesis Award).
4. L.R. Smylie, Department of Mathematics, University of Wyoming, 1989.
5. T. Lin, Department of Mathematics, University of Wyoming, 1990.
6. G. Li, Department of Mathematics, University of Wyoming, 1990 (Outstanding Thesis Award).
7. T. Jensen, Department of Petroleum Engineering, University of Wyoming, 1991 (joint with M.P. Sharma).
8. J. Shen, Department of Mathematics, University of Wyoming, 1992.
9. H. Wang, Department of Mathematics, University of Wyoming, 1992.

10. P. Jacobs, Department of Mathematics, University of Wyoming, 1995.
11. G. Qin, Department of Petroleum and Chemical Engineering, University of Wyoming, 1995.
12. A. Vassilev, Department of Mathematics, Texas A&M University, 1996.
13. R. Parashkevov, Department of Mathematics, University of Wyoming, 1999.

#### **M.S. Students**

1. C. Bidinger, Department of Petroleum Engineering, University of Wyoming, 1984.
2. U.B. Obeysekare, Department of Petroleum Engineering, University of Wyoming, 1985.
3. M.U. Olaware, Department of Mathematics, University of Wyoming, 1985.
4. J. Shen, Department of Mathematics, University of Wyoming, 1988.

#### **Research Grants and Contracts:**

1. Oakland University Research Grant, 1976.
2. U.S. Army Research Grant, DAAG29-78-G-0161, 1978-1979.
3. U.S. Army Contract, DAAG29-79-C-0120, 1979-1982.
4. NSF Grant, DPP-78-23834, 1979-1981.
5. NSF Grant, DPP-80-08356, 1980-1983 (with I. Whillans and J. Bolzan).
6. NSF Grant, 8206192, 1982-1985 (with K. Gross).
7. U.S. Army Contract, DAAG29-84-K-0002, 1983-1986.
8. NSF Grant, DMS-8404527, 1984-1985.
9. DOE Contract, DE-AC21-84MC21207, 1984-1987 (with D. Whitman and R. Terry).
10. Western Research Institute, 1984-1985 (with J. George).
11. Institute for Computational Studies, 1984-1985.
12. Chevron Oil Field Research Company, 1984-1985.
13. Exxon U.S.A., 1984-1985.
14. Teleco/Drilltech, 1984-1985.
15. Wyoming State Legislature, 1984-1986 (with R. Terry).
16. Denelcor Corporation, 1985-1986.
17. U.S. Air Force Office of Scientific Research Contract AFOSR-85-0117, 1985-1987.
18. NSF Grant, ISI-8418094, 1985-1986 (with G. Rosenwald and R. Terry).
19. NSF Contract, DMS-8504360, 1985-1988 (with M. Allen and J. Djomehri).
20. Sloan Foundation, 1985 (with K. Gross).
21. DOE-SBIR Grant, DE-AC03-84ER, 1985-1987 (with S. McCormick, B. Briggs, T. Manteufel, and J. Thomas).
22. Nuclear Regulatory Commission Contract, NRC-04-85-114, 1985-88 (with S.C. Way, C.R. McKee, and J.I. Drever).
23. Pacific Power and Light Company, 1985-1986.
24. NSF Grant, INT-8514247, 1986-1988 (with M. Allen).
25. DOD Equipment Grant DAA LO3-86-G-0164, 1986-1987.
26. Wyoming State Legislature, 1986-1988.
27. Chevron Oil Field Research Company, LH-1671, 1986-1987.
28. Chevron Oil Field Research Company, LH-1673, 1986-1987.
29. NSF EPSCoR Grant RII-8610680, Wyoming, 1986-1991.
30. NSF Grant CDR-8614115, 1986-1988 (with G. Harris).
31. True Oil Company, 1986-1987.
32. Pacific Power and Light Company, 1986-1987.
33. Graham Resources, 1986-1987.

34. Woods Petroleum, 1986–1987.
35. Chevron Oil Field Research Company, LH-1773, 1987–1988.
36. DOD DURIP Equipment Grant, 1988–1989.
37. Wyoming Economic Development and Diversification Program, 1988–1990 (with G. Harris, S. Smithson, R. Surdam, and D. Whitman).
38. Chevron Oil Field Research Company, LH-1774, 1987–1988.
39. Amoco Production Research Company, 1987–1989.
40. Marathon Oil Company, 1987–1988.
41. Exxon Production Research Company, 1987–1988.
42. NSF Grant DMS-8712021, 1987–1988 (with S. Smithson, R. Inguva, J. George, M. Allen, and E. Isaacson).
43. Pacific Power and Light Company, 1987–1988.
44. Chevron Oil Field Research Company, LH-1774-1, 1988–1989.
45. Mobil Research and Development Corporation, 1988–1989.
46. Office of Naval Research Contract, No. 0014-88-K-0370, 1988–1990 (with M.B. Allen, E. Isaacson, J. Puckett, and M. Stephens).
47. Marathon Oil Company, 1988–1989.
48. Wyoming Economic Development and Diversification Program, 1988–1989 (with L. Flournoy and D. Whitman).
49. Shell Development Company, 1988–1989.
50. Exxon U.S.A., 1988–1989.
51. Chevron Oil Field Research Company, 1989–1990.
52. Pacific Power and Light Company, 1989–1991.
53. Wold Oil Company, 1989–1991.
54. Marathon Oil Company, 1989–1990.
55. Mobil Research and Development Corporation, 1989–1990.
56. Shell Development Company, 1989–1990.
57. Exxon U.S.A., 1989–1990.
58. Chevron Oil Field Research Company, 1990–1991.
59. Reservoir Simulation Research Corporation, 1990–1991.
60. Amoco Production Research Company, 1990–1991.
61. Pacific Power and Light, 1989–1990 (with R. King and H.A. Deans).
62. Science and Technology Energy Authority, 1990.
63. Marathon Oil Company, 1990–1991.
64. Exxon U.S.A., 1990–1991.
65. Amoco Production Company, 1990–1991.
66. NSF Grant DMS-8922865, 1990 (with M.B. Allen and J. George).
67. NSF Grant, INT-8914472, 1990–1993.
68. Mobil Research and Development Corp., 1990–1991.
69. Conoco, 1990–1991.
70. Intevep, 1990–1991.
71. Shell Research and Development, 1990–1991.
72. IBM Bergen Scientific Centre, 1990–1991.
73. Westinghouse Savannah River Corporation, 1991–1996.
74. Westinghouse Savannah River Corporation, 1991–1993.
75. State of Wyoming, Stripper Well Rebate Grant, 1991–1992.
76. Western Research Institute, 1991–1992.
77. DOE, DE-AC05-84OR21400, Martin Marietta, Subcontract No. 19X-SJ068V, 1991–1992.
78. Mobil Research and Development Corporation, 1991–1992.

79. Amoco Production Company, 1991–1992.
80. Pacific Power and Light Company, 1991–1992.
81. DOE, DE-AC05-840R21400, Martin Marietta, Subcontract, SK966V, 1992–1993.
82. DOE, DE-FG05-92ER25143, Partnership in Computational Science, 1992–1998.
83. DOE, DE-AC05-840R21400, Martin Marietta, Subcontract SK966C, 1993–1995.
84. NSF Grant, INT-9310529, INRIA, France-U.S. Collaboration, 1993–1996.
85. NSF, Texas Alliance for Minority Participation, 1994–1996.
86. DOE, Agreement #UTA94-100, 1994–1995.
87. ARP/ATP Grant, 1994–1996 (with A.J. Kurdila).
88. NSF Grant, DMS-9626179, 1996–1999 (with Z. Chen).
89. EPA Grant, 825207, 1996–2000 (with R. Lazarov).
90. NSF Grant, 1996–1999 (with M. Pilant, P. Stiller).
91. Mobil Research and Development 1996.
92. Mobil Research and Development 1997.
93. NSF Grant, DMS-9706985, 1997–2000 (with J. Wang and W. Rundell).
94. NSF Grant, DMS-9707930, 1997 (with W. Rundell, J. Bramble, and R. Lazarov).
95. ARP/ATP Grant, 010366-168, 1998–2000 (with J. Pasciak).
96. Mobil Research and Development 1998.
97. NSF Grant, NCR9710337, 1997–1999 (with L. Ellis, P. Cantrell, J. Leggett, and M. Pilant).
98. NSF Grant, DMS-9972147, 1999–2002 (with Z. Chen).
99. ARP/ATP Grant, 010366-0336, 11-1-2000-12-31-2001 (with X. Zhang).
100. U.S. Army Medical Research and Materiel Command, DREAMS: Disaster Relief and Emergency Medical Services, 1998–2000.
101. NSF Grant, INT-9901498, 1999–2002, (with Z. Chen, I. Gladwell, R. Lazarov, and J. Pasciak).
102. U.S. Army Medical Research and Materiel Command, DREAMS: Disaster Relief and Emergency Medical Services, 2000–2001.
103. Saudi-Aramco, 2000–2001.
104. Telecommunications Infrastructure Fund Board, Community Networking Planning Grant, 2000.
105. Telecommunications Infrastructure Fund Board, “Brazos Valley Community Network,” 2000–2002.
106. NSF Grant, EHR 00-08-8726, (with J. Conoley, J. Denton, H.J. Newton, and J. Schielack), 2000–2005.
107. U.S. Army Medical Research and Material Command, DREAMS: Disaster Relief and Emergency Medical Services, 2001–2002.
108. Exxon-Mobil Upstream Research Company, 2002.
109. NSF Grant, EIA-0219627, EIA-0218229 and EIA-0218721 (with C. Douglas, R. Lazarov, Y. Efendiev, and C. Johnson) 2002–2004.
110. NSF Grant, INT-0218797 (with R. Nader, E. Ashworth, D. Prior), 2002–2004.
111. U.S. Army Medical Research and Material Command, DREAMS, Disaster Relief and Emergency Medical Services, 2002–2004.
112. NSF CNS-0540178, DDDAS-TMRP (with C. Douglas, R. Lazarov, Y. Efendiev, C. Johnson and G. Qin), 2004–2005.
113. U.S. Army Medical Research and Material Command, DREAMS, Disaster Relief and Emergency Medical Services, 1999–2006.
114. NSF Grant, 32536-6269C IT (with H.J. Newton and J.J. Denton), 2003–2006.
115. NOAA-SURA, SCOOP Project, 2004–2006.
116. DOD-ONR N00014-04-100721, 2004–2006.
117. NSF Grant, 01SE-0218797 (with R. Nader, E. Funkhouser and E. Ashworth), 2005–2006.
118. ONR-SURA, N00014-05-1-0831, 2006.