

CURRICULUM VITAE

Richard S. Falk

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Education:

B.S., Applied Mathematics, Brown University, 1966
Ph.D., Applied Mathematics, Cornell University, 1971

Employment:

Research Associate, Brown University, 1971-72
Assistant Professor, Rutgers University, 1972-76
Associate Professor, Rutgers University, 1976-82
Professor I, Rutgers University, 1982-89
Professor II, Rutgers University, 1989-

Grant Funding:

NSF Grant, "*Finite element methods for partial differential equations*," 2006-2009
NSF Grants: 1975-1976, 1978-2005
NSF Special projects grant, computer equipment, 1985-86
New Jersey Dept. of Higher Ed. Computers in Curricula, 1985-86

Honors:

Daniel Gorenstein Memorial Award, April 24, 2007: (given for outstanding scholarly achievement to a Rutgers faculty member who has also performed exceptional service to the University community).

Professional Activities:

Member: SIAM Science Policy Committee, January 2009-present
Associate Editor, Mathematics of Computation, February, 1996-December, 2004
Member: Editorial Board: SIAM Journal on Numerical Analysis, January, 1989-December, 1997
Co-organizer: Mini-symposium on Advances in the Mathematics of the Finite Element Method, at 8th US National Congress on Computational Mechanics, July 25-27, 2005, Austin Texas.
Co-organizer: Finite Element Circus, 1996 - present (meetings in my field of specialization held twice yearly at rotating locations)
Member: Society of Industrial and Applied Mathematics

Member: American Mathematical Society

Visiting Positions:

April 20 – May 20, 1998: Mittag-Leffler Institute, Stockholm
September – December, 1994: The Pennsylvania State University
September, 1986 – May, 1987: Courant Institute of Mathematical Sciences
October, 1986 and April, 1987: Institute for Mathematics and its Applications,
University of Minnesota
September – December 1983: University of Maryland
April – May, 1983: Göteborg University, Sweden
June, 1979: Université de Rennes, France
February – May 1979: Université Paris VI
September, 1978-January 1979: Mathematics Research Center,
University of Wisconsin
January, 1976: École Polytechnique, Palaiseau, France

Recent Rutgers Activities: 1996-2009

2008-2009

Chair: Committee on Academic Planning and Review
Chair: OIT Review Committee
Member: RU FAIR ADVANCE: Advisory Board
Member: Computer Coordinating Council
Member: Department of Mathematics Personnel Planning Committee
Member: Department of Mathematics Personnel Evaluation Committee
Chair: Mathematics Department Computer Committee

2007-2008

Chair: Committee on Academic Planning and Review
Member: Information Technology Project Governance Committee
Member: Steering Committee of the Supplemental Systems Committee
Member: Computer Coordinating Council
Member: Department of Mathematics Personnel Planning Committee
Chair: Mathematics Department Computer Committee
Member: Department of Mathematics Personnel Evaluation Committee

2006-2007

Chair: Committee on Academic Planning and Review
Member: Information Technology Project Governance Committee
Member: Steering Committee of the Supplemental Systems Committee
Member: Computer Coordinating Council
Member: Department of Mathematics Personnel Planning Committee
Chair: Mathematics Department Computer Committee

2005-2006

Chair: Committee on Academic Planning and Review (formerly CSPAD)

Member: Information Technology Strategic Planning Committee;
Chair: Subcommittee on IT Governance
Member: Information Technology Project Governance Committee
Member: Computer Coordinating Council
Member: Department of Mathematics Personnel Planning Committee
Member: Department of Mathematics Personnel Evaluation Committee
Member: Nominating Committee of the Graduate School

2004-2005

Chair: Department of Mathematics
Chair: Committee on Standards and Priorities in Academic Development
Member: Information Technology Strategic Planning Committee;
Chair: Subcommittee on IT Governance
Member: Information Technology Project Governance Committee
Member: Nominating Committee of the Graduate School

2003-2004

Sabbatical Leave: Fall 2003
Chair: Department of Mathematics
Member: FAS Ad Hoc Committee on Restructuring
Member: Nominating Committee of the Graduate School (3-year term)

2002-2003

Chair: Department of Mathematics
Co-Chair: Information Technology Coordinating Committee

2001-2002

Chair: Department of Mathematics
Co-Chair: Information Technology Coordinating Committee

2000-2001

Acting Executive Dean, Faculty of Arts of Sciences
Acting Dean of the Graduate School, New Brunswick

1999-2000

Chair: Department of Mathematics
Member: Committee on Standards, Priorities, and Academic Development
Chair: New Brunswick Computing Advisory Committee
Member: High-Speed Network Applications Committee

1998-1999

Chair: New Brunswick Computing Advisory Committee
Member: Committee on Standards, Priorities, and Academic Development
Member: Mathematics Department Personnel Planning Committee
Member: Mathematics Department Undergraduate Committee
Member: Mathematics Department FASIP salary committee
Course Coordinator – Math 244, Math 251

1997-1998

Member: Committee on Standards, Priorities, and Academic Development
Member: RUNet 2000 Project Advisory Committee
Chair: New Brunswick Computing Advisory Committee
Member: FAS Computer Advisory Committee
Member: Mathematics Department Personnel Planning Committee
Member: Mathematics Department Undergraduate Committee
Member: Mathematics Department FASIP salary committee
Course Coordinator – Math 251

1996-1997

Acting Chair of the Department of Mathematics
Member: RUNet 2000 Project Advisory Committee
Member: Information Systems/Information Technology Self-Study Committee
(MSA accreditation)

Doctoral Students:

Tong Tu, “Performance of Reissner-Mindlin Elements,” October, 1998.
Jian Ming Xu, “An Analysis of the Dynamical Equations of Elastic Rods and Their Numerical Approximation,” May, 1992.
Stephen M. Alessandrini, “Some Two-dimensional Plate Models: Derivation, Asymptotic Properties, and Numerical Approximation, October, 1991.
Da-mu Cai, Reduced Continuity Finite Element Methods for Hyperbolic Equations, October, 1990.
Peter B. Monk, “Some Finite Element Methods for the Approximation of the Biharmonic Equation,” January, 1983.
Jin-Sheng Jiang, “A Lagrange Multiplier Finite Element Method for the Stationary Stokes Problem,” May, 1983.

Recent Talks:

“Bounded cochain projections and approximations of the Hodge Laplacian,” Conference on Compatible and Innovative Discretizations for Partial Differential Equations, CMA, Oslo, Norway, June 18, 2009.
“Finite Element Exact Sequences and Applications,” Seminar, Institute for Computational Engineering and Sciences (ICES), Univ. of Texas, November 6, 2008.
“Geometric decompositions and bases for spaces of piecewise polynomial differential forms,” Workshop on Nonstandard Finite Element Methods, Mathematisches Forschungsinstitut, Oberwolfach Germany, August 12, 2008.
“Geometric decompositions and bases for spaces of piecewise polynomial differential forms,” Minisymposium on Mathematical Foundations of Computational Mechanics at IACM/ECCOMAS 2008, Venice, Italy, July 3, 2008.
“A new approach to finite element methods for the equations of linear elasticity,” Numerical analysis seminar, University of Maryland, April 22, 2008.
“Numerical Stability is a Subtle Issue,” Rees Distinguished Lecture, Department of Mathematical Sciences, University of Delaware, November 9, 2007.

- “Mathematical Modeling and Numerical Approximation,” Rees Distinguished Lecture, Department of Mathematical Sciences, University of Delaware, November 7, 2007.
- “Finite element methods for problems in elasticity,” Bernard Coleman symposium, 44th Technical Meeting, Society of Engineering Science, Texas A&M University, October 23, 2007.
- “A new approach to finite element methods for the equations of linear elasticity,” seminar, Department of Mathematics, Texas A&M University, October 22, 2007.
- “Finite element methods for problems in elasticity,” Seminar, Army Research Laboratory, Aberdeen, Maryland, October 9, 2007.
- “Simplicial finite element families: properties and connections,” 9th US National Congress on Computational Mechanics, San Francisco, July 23, 2007.
- “Application of Finite Element Exterior Calculus to Elasticity,” 6th International Congress on Industrial and Applied Mathematics, Zurich, Switzerland, July 19, 2007.
- “Finite element exterior calculus and numerical stability,” Seminar, Tsinghua University, Beijing, China, May 31, 2007.
- “Finite element exterior calculus and numerical stability,” International Conference on Partial Differential Equations and Applications, Beijing Normal University, May 30, 2007.
- “Mixed finite element methods for the equations of linear elasticity with weakly imposed symmetry,” Computational and Applied Mathematics Colloquium, Penn State University, April 13, 2007.
- “Finite element exact sequences,” Graduate Student Pizza Luncheon Seminar, Penn State University, April 13, 2007.
- “A Fortin operator for Taylor-Hood elements,” Finite Element Circus, Penn State University, November 4, 2006.
- “A Fortin operator for Taylor-Hood elements,” Finite Element Circus, Penn State University, November 4, 2006.
- “Finite Element Methods for Linear Elasticity,” C.I.M.E. Summer School on Mixed Finite Elements, Compatibility Conditions, and Applications, Cetraro, Italy, June 26-July 1, 2006.
- “Finite Elements for the Reissner-Mindlin Plate,” C.I.M.E. Summer School on Mixed Finite Elements, Compatibility Conditions, and Applications, Cetraro, Italy, June 26-July 1, 2006.
- “Mixed Finite Elements For Elasticity: A Constructive Approach,” Conference on Compatible Discretizations for Partial Differential Equations, Centre of Mathematics for Applications, University of Oslo, September 27, 2005.
- “Mixed Finite Elements With Weak Symmetry For Linear Elasticity: A Constructive Approach,” 8th US National Congress on Computational Mechanics, Austin, Texas, July 5, 2005.
- “Mixed finite element methods for linear elasticity with weakly imposed symmetry,” Finite Element Circus, Syracuse University, April 30, 2005.
- “Finite Element Methods for Hyperbolic Systems,” Conference on Numerical Relativity, Banff International Research Station, Banff, Canada, April 19, 2005.

- “Mixed Finite Element Methods for the Equations of Linear Elasticity with Weakly Imposed Symmetry,” Applied Mathematics Seminar, University of Delaware, November 9, 2004.
- “Approximation by Piecewise Polynomials and Applications,” College of Science and Mathematics Seminar, Montclair State University, September 23, 2004.
- “Locking Free Discontinuous Galerkin Methods for the Reissner-Mindlin Plate Without Reduced Integration,” European Congress on Computational Methods in Applied Sciences and Engineering, Jyväskylä, Finland, July 25, 2004.
- “Remarks on Irregular Hexahedral Finite Elements,” 7th U.S.National Congress on Computational Mechanics, Albuquerque, NM, July 29, 2003.
- “Finite element approximation theory using families of reference elements,” Finite Element Circus, Wayne State Univ., March 28, 2003.
- “Remarks on Quadrilateral Reissner-Mindlin Plate Elements,” Seminar, University of Pavia, July 23, 2002.
- “Remarks on Quadrilateral Reissner-Mindlin Plate Elements,” Fifth World Congress on Computational Mechanics, Vienna, Austria, July 8, 2002.
- “Overview of Finite Element Methods for Linear Hyperbolic Problems, Workshop on Numerical Relativity, IMA, University of Minnesota, June 28, 2002.
- “Quadrilateral Finite Elements,” Numerical Analysis Seminar, University of Maryland, March 19, 2002.
- “Quadrilateral $H(\text{div})$ Finite Elements,” Finite Element Circus, University of Maryland, March 8, 2002.
- “An Overview of Reissner-Mindlin Plate Elements,” Conference on Mixed Finite Element Methods, Oberwolfach, Germany, February 5, 2001.
- “An Overview of Reissner-Mindlin Plate Elements,” Conference on Finite Element Analysis and Eigenvalue Problems, University of Maryland, September 16, 2000.
- “Analysis of Finite Element Methods for Linear Hyperbolic Problems,” International Symposium on Discontinuous Galerkin Methods: Theory, Computation, and Applications, Newport, R.I., May 26, 1999.
- “Locking-Free Finite Elements for the Reissner-Mindlin Plate”, Special Session on Finite Elements in Mechanics, SIAM National Meeting, Atlanta, GA, May 14, 1999.
- “Locking-Free Finite Elements for the Reissner-Mindlin Plate Model,” Applied and Computational Math Seminar, Penn State University, October 16, 1998.
- “The Reissner-Mindlin Plate Model: Derivation, Properties, and Finite Element Approximation,” Workshop on State of the Art in Finite Element Method – Theory, Algorithm, and Applications, City University of Hong Kong, July 21, 1998.
- “Equilibrium Shape of Deformable Elastic Crystals,” Mittag-Leffler Mathematics Institute, Stockholm, May 5, 1998.
- “Nonconforming Finite Elements: Be Careful When You Use Them,” Session on Mixed, Hybrid and Special Finite Element Methods, Congress ISAAC’97, University of Delaware, June 5, 1997.
- “Equilibrium Shape of Deformable Elastic Crystals,” Finite Element Circus, Courant Institute, April 19, 1997.

- “Preconditioning Mixed and Least Squares Finite Element Methods,” AMS Meeting, Special Session on Numerical Solution of Differential Equations, University of Maryland, April 12-13, 1997.
- “Nonconforming Finite Elements: Properties and Applications,” Numerical Analysis Seminar, Courant Institute, March 28, 1997.
- “Space-Time Finite Elements for a Problem in Surface Diffusion,” AMS Meeting, Special Session on Numerical Solutions for Partial Differential Equations, University of Memphis, March 22, 1997.
- “Nonconforming Finite Elements: Properties and Applications,” Colloquium, University of Maryland, Baltimore County, November 15, 1996.
- “Nonconforming Finite Elements: Properties and Applications,” Numerical Analysis Seminar, University of Oslo, Norway, June 11, 1996.
- “Preconditioning in $H(\text{div})$ and Applications,” Ninth International Conference on Domain Decomposition Methods, Ullensvang, Norway, June 6, 1996.
- “Preconditioning in $H(\text{div})$ and Applications,” Numerical Analysis Seminar, Göteborg University, Sweden, May 31, 1996.
- “Nonconforming Finite Elements: Properties and Applications,” Numerical Analysis Seminar, Inst. for Math. and its Applications, Univ. of Minnesota, March 11, 1996.
- “Preconditioning discrete approximations of the Reissner-Mindlin plate model,” Conference on Mathematics and its Application to Numerical Analysis and to Physical Problems, Univ. of Maryland, May 7, 1995.
- “Discrete Helmholtz decompositions and applications,” Numerical Analysis Seminar, Univ. of Maryland, April, 13, 1995.
- “Preconditioning discrete approximations of the Reissner-Mindlin plate model,” Finite Element Circus, Brookhaven National Laboratory, March 25, 1995.
- “Discrete Helmholtz decompositions and applications,” Colloquium, Univ. of Tennessee, March, 15, 1995.
- “Surface Diffusion: Perturbation Analysis and Finite Element Approximation,” Applied Math Seminar, Univ. of Tennessee, March, 17, 1995.
- “Surface Diffusion: Perturbation Analysis and Finite Element Approximation,” Applied Math Seminar, Texas A & M Univ., February, 15, 1995.
- “Surface Diffusion: Perturbation Analysis and Finite Element Approximation,” Colloquium, Southern Methodist Univ., February, 9, 1995.
- “Surface Diffusion: Perturbation Analysis and Finite Element Approximation,” Applied Math Seminar, Penn State Univ., December 2, 1994.
- “Derivation and Asymptotic Properties of Some Two Dimensional Plate Models,” Conference on the Mathematics of Finite Elements and Applications, Brunel University, April 27, 1993.
- “Derivation of Some Two Dimensional Plate Models,” Finite Element Circus, University of Maryland, April 16, 1993.
- “Derivation, Asymptotic Properties, and Numerical Approximation of Some Two Dimensional Plate Models,” Conference on Asymptotics and Adaptivity in Computational Mechanics, Oberwolfach, Germany, February 3, 1993.

- “Comments on Mixed Finite Element Methods for Problems with Rough Coefficients,” 7th IMACS International Conference on Computer Methods for Partial Differential Equations, June 23, 1992.
- “A Finite Element Method for a Minimum Energy Plate Model,” 7th IMACS International Conference on Computer Methods for Partial Differential Equations, June 23, 1992.
- “Some Two-dimensional Plate Models: Derivation, Asymptotic Properties, and Numerical Approximation,” Numerical Analysis Seminar, University of Maryland, November 21, 1991.
- “Two-dimensional Plate Models: Derivation, Asymptotic Properties, and Numerical Approximation,” Finite Element Circus, Penn State Univ., November 8, 1991.
- “The Reissner-Mindlin Plate Model: Numerical Methods and Boundary Layers,” Applied Math Seminar, University of Delaware, November 14, 1990.
- “Remarks on Finite Element Methods for Elasticity Problems,” Applied Math Seminar, Penn State University, September 7, 1990.
- “The Reissner-Mindlin Plate Model: Numerical Methods and Boundary Layers,” Math Dept. Colloquium, Temple University April 30, 1990.

Publications:

1. Approximation of a class of optimal control problems with order of convergence estimates, *J. Math. Anal. & Appl.*, 44(1) (1973), 28-47.
2. Error estimates for the approximation of a class of variational inequalities, *Math. of Comp.*, 28 (1974), 963-971.
3. Approximation of an elliptic boundary value problem with unilateral constraints, *R.A.I.R.O.*, 9e annee, aout 1975, R-2, 5-12.
4. An analysis of the penalty method and extrapolation for the stationary Stokes equations, *Proc. of AICA Int. Symp.*, R. Vichnevetsky, ed., 66-69.
5. A penalty and extrapolation method of the stationary Stokes equations (with J.T. King), *SIAM J. on Numerical Analysis*, 13 (1976), 814-829.
6. A finite element method for the stationary Stokes equations using trial functions which do not have to satisfy $\operatorname{div} v = 0$, *Math. of Comp.*, 30 (1976), 698-702.
7. A Ritz method based on a complementary variational principle, *R.A.I.R.O.*, 10 (1976), 39-48.
8. An analysis of the finite element using Lagrange multipliers for the stationary Stokes equations, *Math. of Comp.*, 30 (1976), 241-249.
9. Approximation of the biharmonic equation by a mixed finite element method, *SIAM J. on Numerical Analysis*, 15 (1978), 556-567.
10. Error estimates for elasto-plastic problems (with B. Mercier), *R.A.I.R.O.*, 11 (1977), 135-144.
11. An error estimate for the truncation method for the solution of a parabolic variational inequality (with A.E. Berger), *Math. of Comp.*, 31 (1977), 619-628.
12. Error estimates for the approximate identification of a constant coefficient from boundary flux data, *Numer. Funct. Anal. & Optimization*, 2(2 & 3) (1980), 121-153.

13. Error estimates for the approximation of an unknown constant coefficient in a partial differential equation, MRC Technical Report 1902.
14. Numerical approximation of a Cauchy problem for a parabolic partial differential equation (with R.E. Ewing), *Math. of Comp.*, 33 (1979), 1125-1144.
15. Error estimates for mixed methods (with J.E. Osborn), *R.A.I.R.O.*, 14 (1980), 249-277.
16. Error estimates for the numerical identification of a variable coefficient, *Math. of Comp.*, 40 (1983), 537-546.
17. On some ill-posed problems arising in glaciology (with R. Ewing), to appear in *Proc. of the Symp. on Ill-posed Problems: Theory & Practice*, Newark, Delaware, October, 1979.
18. Techniques for conductivity measurements in Antarctica (with R. Ewing, J. Bolzan, and I. Whillans), *Annals of Glaciology*, 3 (1982), 96-102.
19. Techniques and analysis for conductivity measurements in Antarctica (with R. Ewing, J. Bolzan, and I. Whillans), *Inst. of Polar Studies, Technical Report No. 74*, Ohio State University, Columbus, Ohio, 1981.
20. Two mixed finite element methods for the simply supported plate problem (with J.H. Bramble), *R.A.I.R.O.*, 17(4) (1983), 337-384.
21. Numerical identification of a variable coefficient, in *Methoden und Verfahren der Mathematischen Physik*, band 25 (1983), 31-42.
22. Approximation of an optimal control problem, in *Methoden und Verfahren der Mathematischen Physik*, band 25 (1983), 17-30.
23. A mixed-Lagrange multiplier finite element method for the polyharmonic equation (with J.H. Bramble), *R.A.I.R.O.*, 19 (1985), 519-557.
24. A numerical method for the Cauchy problem for Poisson's equation (with P. Monk), in *Advances in Computer Methods for Partial Differential Equations V*, R. Vichnevetsky and R.S. Stepleman (eds.), *Publ. IMACS* (1984), 350-352.
25. Logarithmic convexity for discrete harmonic functions and the approximation of the Cauchy problem for Poisson's equation (with P. Monk), *Math. of Comp.*, 47 (1986), 135-149.
26. An analysis of a finite element for hyperbolic equations (with G. Richter), in *Advances in Computer Methods for Partial Differential Equations V*, R. Vichnevetsky and R.S. Stepleman (eds.), *Publ. IMACS* (1984), 297-300.
27. Analysis of a continuous finite element scheme for hyperbolic equations (with G.R. Richter), *SIAM J. on Num. Anal.*, 24 (1987), 257-278.
28. Remarks on a continuous finite element scheme for hyperbolic equations (with G.R. Richter), *Numerical Analysis Proceedings*, Guanajuato, Mexico, J.P. Hennart (ed.), *Lecture Notes in Mathematics*, Springer-Verlag, 1230, 63-72.
29. Continuous dependence on the elastic coefficients for a class of anisotropic materials (with D.N. Arnold), *IMA Preprint series #165*, Univ. of Minnesota, July, 1985.
30. Well-posedness of the fundamental boundary value problems for constrained anisotropic elastic materials (with D.N. Arnold), *Archive for Rational Mechanics and Analysis*, 98 (1987), 143-165.

31. A new mixed formulation for elasticity (with D.N. Arnold), *Numer. Math.*, 53 (1988), 13-30.
32. Inverse and ill-posed problems in reservoir simulation (with R. Ewing and T. Lin), *Notes and Reports on Mathematics in Science and Engineering*, Academic Press, 4, Inverse and Ill-posed Problems, Engl and Groetsch (eds), Academic Press (1987), 483-497.
33. A uniformly accurate finite element method for the Reissner- Mindlin plate (with D.N. Arnold), *SIAM J. on Numer. Anal.*, 26 (1989), 1276-1290.
34. Nonconforming finite elements for the Stokes problem (with M. Crouzeix), *Math. of Comp.*, 52 (1989), 437-456.
35. Stability of a higher order Hood-Taylor method (with F. Brezzi), *SIAM J. on Numerical Analysis*, 28 (1991), 581-590.
36. The boundary layer for the Reissner-Mindlin plate model, (with D. N. Arnold), *SIAM J. on Math. Anal.* 21 (1990), 281-312.
37. Equivalence of finite element methods for problems in elasticity, (with M. Morley), *SIAM J. on Numer. Anal.*, 27 (1990), 1486-1505.
38. Nonconforming finite element methods for the equations of linear elasticity, *Math. of Comp.*, 57 (1991), 529-550.
39. Approximation of Inverse Problems, in *Inverse Problems in Partial Differential Equations*, D. Colton, R. Ewing, W. Rundell (eds.), SIAM, 1990, 7-16.
40. Edge effects in the Reissner-Mindlin plate theory, (with D. N. Arnold), in *Analytical and Computational Models for Shells*, (A. K. Noor, T. Belytschko, J. Simo, eds.), American Society of Mechanical Engineers, New York, 1989, 71-90.
41. Local error estimates for a finite element method for hyperbolic and convection-diffusion equations (with G. Richter), *SIAM J. on Numer. Anal.*, 29 (1992), 730-754.
42. The approximation of hyperbolic and convection-diffusion equations by explicit finite element methods (with G. Richter) in "Computational Methods for Boundary and Interior Layers in Several Dimensions," J. J. H. Miller (editor), Boole Press, Dublin, 1991, 27-50.
43. Reduced continuity finite element methods for first order scalar hyperbolic equations, (with D-M. Cai) *RAIRO Modél. Math. Anal. Numér*, 28 (1994), 667-698.
44. Comments on mixed finite element methods for problems with rough coefficients, (with J. Osborn), in "Advances in Computer Methods for Partial Differential Equations – VII," Proceedings of the 7th IMACS International Conference on Computer Methods for Partial Differential Equations, IMACS, June 23, 1992, 237-243.
45. A finite element method for a minimum energy plate model, (with S. Alessandrini), in "Advances in Computer Methods for Partial Differential Equations – VII," Proceedings of the 7th IMACS International Conference on Computer Methods for Partial Differential Equations, IMACS, June 23, 1992, 15-21.
46. A finite element method for the approximation of the incompressible, linearized Euler equations, (with G. Richter), in "Advances in Computer Methods for Partial Differential Equations – VII," Proceedings of the 7th IMACS International Conference on Computer Methods for Partial Differential Equations, IMACS, June 23, 1992, 244-250.

47. Remarks on mixed finite element methods for problems with rough coefficients, (with J. Osborn) *Math. of Comp.*, 62 (1994), 1-19.
48. Convergence of a second-order scheme for the nonlinear dynamical equations of elastic rods, (with J-M. Xu) *SIAM J. Numer. Anal.*, 32 (1995), 1185-1209.
49. Asymptotic analysis of the boundary layer for the Reissner-Mindlin plate model, (with D. N. Arnold), *SIAM J. Math. Anal.*, vol. 27 (1996), 486-514.
50. Space-time finite element methods for surface diffusion with applications to the theory of stability of cylinders, (with B. D. Coleman and M. Moakher), *SIAM J. Scientific Computing*, vol. 17 (1996), 1434-1448.
51. Stability of cylindrical bodies in the theory of surface diffusion, (with B. D. Coleman and M. Moakher), *Physica D*, vol. 89 (1995), 123-135.
52. Diffusion in Axially Symmetric Surfaces, (with B. D. Coleman and M. Moakher), in *Trends in Applications of Mathematics to Mechanics*, edited by M. M. Marques & J. F. Rodrigues, Longman Scientific & J. Wiley, New York and London (1995), 99-111.
53. Analysis of a linear-linear finite element for the Reissner-Mindlin plate model, (with D. N. Arnold), *Math. Models and Methods in Appl. Sci.*, volume 7, number 2, (1997), 217-238.
54. Preconditioning in $H(\text{div})$ and Applications, (with D. N. Arnold and R. Winther), *Mathematics of Computation*, vol. 66 (1997), 957-984. Summary in *Ninth International Conference on Domain Decomposition Methods* (Bergen, 1996), P. Bjørstad, M. Espedal, D. Keyes (eds.), 12-19.
55. Preconditioning discrete approximations of the Reissner-Mindlin plate model, (with D. N. Arnold and R. Winther), *Math. Modelling Numer. Anal.*, vol. 31 (1997), 517-557. Summary in *Ninth International Conference on Domain Decomposition Methods* (Bergen, 1996), P. Bjørstad, M. Espedal, D. Keyes (eds.), 215-221.
56. Derivation and Justification of plate models by variational methods, (with S. M. Alessandrini, D. N. Arnold, and A. L. Madureira), in *Plates and Shells* (Québec, 1996) (M. Fortin, ed.) CRM Proc. Lecture Notes, vol. 21, Amer. Math. Soc., Providence, RI, 1999, 1-20.
57. Multigrid preconditioning in $H(\text{div})$ on non-convex polygons, (with D. N. Arnold and R. Winther), *Computational and Applied Mathematics*, vol 17 (1998), 307-319.
58. Explicit finite element methods for symmetric hyperbolic equations, (with G. Richter), *SIAM J. Numer. Anal.*, vol. 36 (1999), 935-952.
59. Similarity solutions in the theory of curvature driven diffusion along planar curves: I: Symmetric curves expanding in time, (with S. Asvadurov, B. Coleman, and M. Moakher), *Physica D*, volume 121 (1998), 263-274.
60. Analysis of a One-dimensional Variational Model of the Equilibrium Shape of a Deformable Crystal, (with E. Bonnetier and M. Grinfeld), *M2AN Math. Model. Numer. Anal.*, volume 33 (1999), 573-591.
61. Multigrid in $H(\text{div})$ and $H(\text{curl})$, (with D. N. Arnold and R. Winther), *Numer. Math.*, vol. 85 (2000), 197-218.
62. Locking-free finite elements for the Reissner-Mindlin plate, (with Tong Tu), *Math. Comp.*, vol. 69 (2000), 911-928.
63. Analysis of finite element methods for linear hyperbolic problems, in *Discontinuous*

- Galerkin Methods: Theory, Computation and Applications, B. Cockburn, G. Karniadakis, C.-W. Shu (Eds.), Springer-Verlag, Lecture Notes in Computational Science and Engineering, vol. 11 (2000), 103-112.
64. Explicit finite element methods for linear hyperbolic systems, (with G. Richter), in Discontinuous Galerkin Methods: Theory, Computation and Applications, B. Cockburn, G. Karniadakis, C.-W. Shu (Eds.), Springer-Verlag, Lecture Notes in Computational Science and Engineering, vol. 11 (2000), 209-220.
 65. Approximation by quadrilateral finite elements, (with D.N. Arnold and D. Boffi), *Math. Comp.*, vol 71 (2002), 909-922.
 66. Finite element approximation on quadrilateral meshes, (with D.N. Arnold, D. Boffi, and L. Gastaldi), *Communications in Numerical Methods in Engineering*, vol. 17 (2001), pp. 805-812.
 67. Remarks on quadrilateral Reissner-Mindlin plate elements (with D.N. Arnold and D. Boffi), *Proceedings of the Fifth World Congress on Computational Mechanics (WCCM V)*, (H. A. Mang, F. G. Rammerstorfer, and J. Eberhardsteiner, eds.), Vienna University of Technology, Austria, 2002, On-line publication: <http://wccm.tuwien.ac.at/>, Paper-ID: 81482.
 68. Quadrilateral H(div) finite elements, (with D.N. Arnold and D. Boffi), *SIAM J. Numer. Anal.* 42 (2005), pp. 2429-2451.
 69. Differential complexes and stability of finite element methods. I. The de Rham complex (with D.N. Arnold and R. Winther), in *Compatible Spatial Discretizations*, D. Arnold, P. Bochev, R. Lehoucq, R. Nicolaides, and M. Shashkov, eds., *IMA Volumes in Mathematics and its Applications* 142, Springer Verlag 2005, pp. 23-46.
 70. Differential complexes and stability of finite element methods. II. The elasticity complex (with D.N. Arnold and R. Winther), in *Compatible Spatial Discretizations*, D. Arnold, P. Bochev, R. Lehoucq, R. Nicolaides, and M. Shashkov, eds., *IMA Volumes in Mathematics and its Applications* 142, Springer Verlag 2005, pp. 47-67.
 71. Mixed finite element methods for linear elasticity with weakly imposed symmetry, (with D. N. Arnold and R. Winther), *Mathematics of Computation*, 76 (2007), pp. 1699-1723.
 72. Locking-free Reissner-Mindlin elements without reduced integration, (with D. N. Arnold, F. Brezzi, and D. Marini), *Comput. Methods Appl. Mech. Engrg*, 196 (2007), pp. 3660-3671.
 73. Finite element exterior calculus, homological techniques, and applications, (with D. N. Arnold and R. Winther), *Acta Numerica* 15 (2006), pp. 1-155.
 74. Finite element methods for linear elasticity, in *Mixed Finite Elements, Compatibility Conditions, and Applications*, Lectures given at the C.I.M.E. Summer School held in Cetraro, Italy, June 26-July 1, 2006, *Lecture Notes in Mathematics*, Springer-Verlag, 1939 (2008), pp. 160-194.
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