

JOHN C. STRIKWERDA**Personal Data**

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 US citizen, Married

Education

Ph.D., Mathematics, Stanford University 1976
 M.A., Mathematics, University of Michigan 1970
 A.B., Major: Mathematics, Minor: Physics, Calvin College 1969

Professional Employment

University of Wisconsin-Madison, Computer Sciences Department and Mathematics Department
 Associate Chair of the Computer Sciences Dept. 1999–
 Professor 1993–
 Associate Professor 1984–93
 Assistant Professor 1980–84
 National Science Foundation, Division of Mathematical Sciences 1997–99
 Program Officer in Applied Mathematics and Computational Mathematics
 ICASE, NASA Langley Research Center, Staff Scientist 1976–80

Activity in Professional Societies

Society for Industrial and Applied Mathematics

Awards

1996 Benjamin Smith Reynolds Award for Excellence in Teaching Engineers, awarded by the College of Engineering, UW-Madison.
 1994–1995 Excellent Educator Award from the Computer Sciences Dept.
 1981–1982 Sperry Univac Computer Science Professor of the Year, awarded by the Computer Sciences Department, Sept. 1982
 Co-author of outstanding paper of 1980 within the Aeronautics Directorate of NASA Langley Research Center, awarded Sept. 1982 for publication 4 in the list of publications below.

Ph.D. Theses Supervised

1. Yih-yih Lin (Comp. Sci.) Numerical Methods for Free-Boundary Problems, 1982 (co-supervisor)
2. Gerardo A. Ache (Math.) Incompressible Viscous Steady Flow in Channels and Pipes, 1985
3. N. S. Asaithambi (Comp. Sci.) A Numerical Method for Free-Surface Flows, 1985
4. Bruce A. Wade (Math.) Stability and Sharp Convergence Estimates for Symmetrizable Difference Operators, 1987
5. Carl D. Scarbnick (Comp. Sci.) Far-Field Boundary Conditions for Incompressible Viscous Flow, 1990
6. Dongho Shin (Math.) Fast Solvers for Incompressible Viscous Flow, 1992
7. Paul A. Martin (Math.) Uniqueness of Finite Difference Approximations to Elliptic Systems of Partial Differential Equations, 1994
8. Hsing-hsia Chen (Math.) Preconditioning for Regular Elliptic Systems, 1996
9. Young S. Lee (Math.) Analysis of Finite Difference Schemes for the Navier-Stokes Equations, 1998

Recent Research Funding

1. Theory and Application of Domain Decomposition Methods for Incompressible Fluid Flow. NSF, 2/1/93-1/31/96, \$135,000.
2. Analysis of Parallel Solution Methods for Scientific Computation. NSF, 8/1/96-7/31/00, \$126,000.

Publications

1. Initial Boundary Value Problems for Incompletely Parabolic Systems, Ph.D. Dissertation, Stanford University, August, 1976.
2. Initial Boundary Value Problems for Incompletely Parabolic Systems, *Communications on Pure and Applied Mathematics*, 30, (1977) pp. 797–822.
3. Initial Boundary Value Problems for the Method of Lines, *Journal of Computational Physics*, 34, (1980) pp. 94–107.
4. A Non-reflecting Outflow Boundary Condition for Subsonic Navier-Stokes Calculations, (with D. Rudy) *Journal of Computational Physics*, 36, (1980) pp. 55–70.
5. Iterative Methods for the Numerical Solution of Second Order Elliptic Equations with Large First Order Terms, *SIAM Journal on Scientific and Statistical Computing*, 1, (1980) pp. 119–130.
6. Vertical Slender Jets, (with J. Geer) *Journal of Fluid Mechanics*, 101, (1980) pp. 53–63.
7. A Numerical Method for Computing the Shape of a Vertical Slender Jet, (with J. Geer) *SIAM Journal on Scientific and Statistical Computing*, 1, (1980) pp. 449–466.
8. Boundary Conditions for Subsonic Compressible Navier-Stokes Calculations, *Computers and Fluids*, (with D. Rudy) 9, (1981) pp. 327–338.
9. A Time-Split Difference Scheme for the Compressible Navier-Stokes Equations; Applied to Flow in a Slotted Nozzle, in *Parallel Computations, Computational Techniques*, Vol. 1, (1982) pp. 251–267, G. Rodrigue ed. Academic Press, Inc., New York.
10. Upwind Differencing, False Scaling, and Non-Physical Solutions to the Driven Cavity Problem, *Journal of Computational Physics*, 47, (1982) pp. 303–307.
11. Interior Regularity Estimates for Elliptic Systems of Difference Equations, (with K. Bube) *SIAM Journal on Numerical Analysis*, 20, (1983) pp. 653–670.
12. Vertical Slender Jets with Surface Tension, (with J. Geer) *Journal of Fluid Mechanics*, 135, (1983) pp. 155–169.
13. Finite Difference Methods for the Stokes and Navier-Stokes Equations, *SIAM Journal on Scientific and Statistical Computing*, 5, (1984) pp. 56–68.
14. Thermoelastic Response to a Short Laser Pulse, (with A. Scott) *Journal of Thermal Stresses*, 7, (1984) pp. 1–17.
15. An Iterative Method for Solving Finite Difference Approximations to the Stokes Equations, *SIAM Journal on Numerical Analysis*, 21, (1984) pp. 447–458.
16. A Numerical Method for the Incompressible Navier-Stokes Equations in Three-dimensional Cylindrical Geometry, (with Y. Nagel) *J. Comp. Phys.*, 78, (1988) pp. 64–78.
17. An Extension of the Kreiss Matrix Theorem, (with B.A. Wade) *SIAM J. Numerical Analysis*, 25, (1988) pp. 1272–1278.
18. Numerical Solution of Forced Convection Heat Transfer in He II, (with A. Kashani and S.W. Van Sciver) *Numerical Heat Transfer, Part A*, 16, (1989) pp. 213–228.
19. Evaluation of Retransmission Strategies in a Local Area Network Environment, (with A. Mukherjee and L.H. Landweber) *SIGMETRICS Performance Evaluation Review*, 17, (1989) pp. 98–107. *Proceedings of ACM SIGMETRICS and PERFORMANCE '89, International Conference on Measurement and Modeling of Computer Systems*, Berkeley, CA. (1989)
20. Regularity Estimates up to the Boundary for Elliptic Systems of Difference Equations, (with B.A. Wade and K.P. Bube) *SIAM J. Numerical Analysis*, 27, (1990) pp. 292–322.

21. Simultaneous Analysis of Flow and Error Control Strategies with Congestion-Dependent Errors, (with A. Mukherjee and L.H. Landweber) Proceedings of ACM SIGMETRICS Conference, 1990, Boulder, Colorado.
22. Cesàro Means and the Kreiss Matrix Theorem, (with B.A. Wade) *J. Lin. Alg. and Appl.*, 145, (1991) pp. 89–106.
23. Analysis of Dynamic Congestion Control Protocols – A Fokker-Planck Approximation (with A. Mukherjee) Conference Proceedings of SIGCOMM '91, Zurich, Switzerland.
24. A Domain Decomposition Method for Incompressible Viscous Flow, (with C. Scarnick) *SIAM J. on Scientific and Statistical Comput.* 14, (1993) pp. 49–67.
25. An Analysis of the Burst Test Geometry, A New Approach, (with J.M. Considine) Proceedings of the 1991 International Paper Physics Conference, (1991) pp. 579-584.
26. Notes on Wave Attenuation on Beaches (with R.E. Meyer and J.-M. Vanden-Broeck) *Wave Motion*, 17 (1993) pp. 11–31.
27. Fast Solvers for Finite Difference Approximations for the Stokes and Navier-Stokes Equations (with D. Shin) *Australian Mathematical Society, Series B*, 38 (1996) pp. 274-290.
28. Cardinal Series Interpolation to Nonuniform Grids, *J. Approx. Theory*, 76 (1994) pp. 149-165.
29. Analysis of Dynamic Congestion Control Protocols – A Fokker-Planck Approximation (with A. Mukherjee) *Journal of High Speed Networks*, 3 (1994) pp. 31-56.
30. Inf-sup Conditions for Finite Difference Approximations of the Stokes Equations (with D. Shin) *Australian Mathematical Society, Series B*, 39 (1997) pp.121-134.
31. High-Order Accurate Schemes for Incompressible Viscous Flow, *International Journal for Numerical Methods in Fluids*, 24 (1997) pp. 715-734.
32. A Survey of the Kreiss Matrix Theorem for Power Bounded Families of Matrices and its Extensions, (with B.A. Wade) in: *Linear Operators, Banach Center Publ.* 38, Inst. Math., Polish Acad. Sci., Warsaw (1997) pp. 339-360.
33. A Convergence Theorem for Chaotic Asynchronous Relaxation, *Lin. Alg. and Appl.*, 253 (1997) pp.15-24.
34. Estimating Completion Time Ratios of a Fork-Join Barrier Synchronization, (with E. Bach and R. Mansharamani) *Performance Evaluation*, 26 (1996) pp. 145-154.
35. The Accuracy of the Fractional Step Method, (with Y.S. Lee) *SIAM Journal on Numerical Analysis*, 31 (1999) pp. 37-47.
36. Preconditioning for Regular Elliptic Systems, (with H.-h. Chen) *SIAM Journal on Numerical Analysis*, 31 (1999) pp. 131-151.
37. A Probabilistic Analysis of Asynchronous Iteration, *Linear Algebra and its Applications*, 349 (2002) pp. 125-154.
38. Reversing the Lecture/Homework Paradigm Using eTEACH Web-based Streaming Video Software, (with G. Moses, J. Foertsch, M. Litzkow) *Journal of Engineering Education*, 91, (July 2002) pp. 276-274.
39. eTEACH - A Proven Learning Technology for Education Reform (with G. Moses, M. Litzkow, and J. Foertsch) to be presented at the Frontiers in Education Conference, Boston, Mass. Nov. 2002.
40. The Stability of Finite Difference Schemes for the Stokes Equations, (with Y.S. Lee) submitted to *SIAM Journal on Numerical Analysis*.
41. **Textbook**
Finite Difference Schemes and Partial Differential Equations, published by Wadsworth & Brooks/Cole Press, 1989. Second Edition to appear in 2003, published by SIAM.

Current Projects

Since the Fall 2000 semester, Prof. G. Moses and I have been teaching the course Problem Solving with Computers (CS310) in a significantly new way. We combine the power of Internet presentations with a collaborative learning environment. The pre-recorded lecture presentations combine graphical displays of the material with the audio of a lecture format. The students are able to view the lecture material at anytime using high speed Internet connections. The collaborative learning takes place in regularly scheduled 'team labs.' Students work in groups of three on problems that illustrate the concepts discussed in the lecture material. This approach is discussed in publication 38.

I am preparing a new edition of my textbook (item 41 in the list of publications) for publication by SIAM Press.

In my research I am working on extensions to publication #37 on asynchronous iteration. I am also collaborating on a project with Prof. John Norman on efficiently and accurately computing the rain run-off from agricultural fields.

Courses Taught Recently

CS 310 Problem Solving using Computers (each semester since Fall 1999)

CS 354 Machine Organization and Basic Systems (Fall 1998)

CS 412 Introduction to Numerical Methods (last taught Fall 1993 and Fall 2002)

CS 513 Numerical Analysis (last taught Fall 1987)

CS 712 Finite Difference Methods (Spring 1999, Spring 2002)