HOMER F. WALKER

Curriculum Vitae

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Education

B.A., Mathematics, Rice University, 1966.

M.S., Mathematics, Courant Institute of Mathematical Sciences, New York University, 1968.

Ph.D., Mathematics, Courant Institute of Mathematical Sciences, New York University, 1970.

Academic Appointments

Professor, Mathematical Sciences Department, WPI, 7/97–12/18; Emeritus, 1/19 – present.

Professor of Mathematics, Utah State University, 1/86–6/97.

Professor of Mathematics, University of Houston, 9/80–12/85.

Associate Professor of Mathematics, University of Houston, 9/75–8/80.

Associate Professor of Mathematics, Texas Tech University, 9/73–8/74.

Assistant Professor of Mathematics, Texas Tech University, 9/70–8/73.

Visiting

Visiting Professor of Applied Mathematics, Brown University, 7/13 – present.

Visiting Scholar, Center for Research on Parallel Computation, Rice University, 10/93–5/94.

Visiting Professor of Computer Science, Yale University, 9/89–12/89.

Visiting Professor of Mathematics, University of New Mexico, 9/81–8/82.

Visiting Associate Professor of Computer Science, Cornell University, 9/78–12/78.

Visiting Associate Professor of Mathematics, University of Houston, 9/74–8/75.

Visiting Associate Professor of Mathematics, University of Denver, 9/73–8/74.

Administrative and Nonacademic Appointments

Deputy Director (7/13–12/17), Associate Consulting Director for Special Projects (1/18 – present), Institute for Computational and Experimental Research in Mathematics.

Sabbatical Visitor, Center for Applied Scientific Computing, Lawrence Livermore National Laboratory, 9/10–6/11.

Applied Mathematics Program Manager, Office of Advanced Scientific Computing Research, U.S. Department of Energy Office of Science, 9/07 – 8/08.

Administrative and Nonacademic Appointments (cont.)

Sabbatical Visitor, Computer Science Research Institute, Sandia National Laboratories (Albuquerque), 9/03–6/04.

Department Head, Mathematical Sciences Department, WPI, 7/97–12/02.

Mathematical Consultant, Lawrence Livermore National Laboratory, 10/79–5/06.

Visiting Mathematician, Sandia National Laboratories (Livermore), 6/90–7/90.

Visiting Mathematician, Lawrence Livermore National Laboratory, 6/79–8/79.

Scientist Principal, Lockheed Electronics Company, NASA–Johnson Space Center, 6/78–8/78.

Mathematical Consultant, NASA–Johnson Space Center, 6/73–8/73 and 6/74–12/77.

Associate Scientist, Lockheed Electronics Company, NASA–Manned Spacecraft Center, 6/66–8/66 and 6/67–8/67.

Professional Recognition

SIAM Fellow, Class of 2018.

Board of Trustees Award for Outstanding Research and Creative Scholarship, WPI, 2005.

ISI Highly Cited Researcher in Mathematics, 2003.

College of Science Researcher of the Year, Utah State University, 1994.

First Governor's Medal for Science and Technology, State of Utah, 1987.

Professional Memberships

American Mathematical Society

Society for Industrial and Applied Mathematics

Research Interests

Numerical analysis, applied mathematics.

Publications

Dissertation

Elliptic Systems of Partial Differential Equations in $\mathbf{R}^n$, advised by P. D. Lax.

Edited Proceedings

Nonlinear Diffusion, co-edited with W. E. Fitzgibbon, Pitman Publishing, London, 1977.

Papers

On the null-spaces of first-order elliptic operators in $\mathbf{R}^n$, Proc. Amer. Math. Soc., 30 (1971), 278–286.

A Fredholm theory for a class of first-order elliptic operators in $\mathbf{R}^n$, Trans. Amer. Math. Soc., 165 (1972), 75–86.

On the null-spaces of elliptic partial differential operators in $\mathbf{R}^n$, Trans. Amer. Math. Soc., 173 (1972), 263–275.

Local energy decay of solutions of evolution equations, in Texas Tech University Math. Ser. 10, V. Komkov, ed., 83–106, 1972.

A Fredholm theory for elliptic partial differential operators in $\mathbf{R}^n$, Proc. Symp. Pure Math., 23 (1973), 225–230.

The null-spaces of elliptic partial differential operators in $\mathbf{R}^n$, with L. Nirenberg, J. Math. Anal. Appl., 42 (1973), 271–301.

On the estimation of the L_2*-norm of a function over a bounded subset of* $\mathbf{R}^n$, Proc. Amer. Math. Soc., 38 (1973), 103–110.

On minimizing the probability of misclassification for linear feature selection, with L. F. Guseman, Jr., in *The Search for Oil: Some Statistical Methods and Techniques*, D. B. Owen, ed., Marcel Dekker, Inc., New York, 1975, 61–81.

On minimizing the probability of misclassification for linear feature selection, with L. F. Guseman, Jr., and B. C. Peters, Jr., Annals of Statistics, 3 (1975), 661–668.

Well-posedness of certain elliptic problems in unbounded domains, in *Improperly Posed Boundary Value Problems*, A. Carasso and A. P. Stone, eds., Pitman Publishing, London, 1975, 1–8.

On the null-spaces of partially elliptic operators of a certain type, with J. A. LaVita, J. Math. Anal. Appl., 66 (1976), 375–379.

Some remarks on the local energy decay of solutions of the initial-boundary value problem for the wave equation in unbounded domains, J. Differential Equations, 23 (1977), 459–471.

Some remarks on local energy decay for solutions of the wave equation, in *Proceedings of the Seventh Annual University of Southwestern Louisiana Mathematics Conference*, 1977, 50–61.

Strong ellipticity and Van Hove's lemma in inhomogeneous media, Quarterly of Appl. Math., 35 (1977), 287–292.

An iterative procedure for obtaining maximum-likelihood estimates of the parameters for a mixture of normal distributions, with B. C. Peters, Jr., SIAM J. Appl. Math., 35 (1978), 362–378.

The numerical evaluation of the maximum-likelihood estimate of a subset of mixture proportions, with B. C. Peters, Jr., SIAM J. Appl. Math., 35 (1978), 447–552.

Least-change secant update methods, in *Proceedings of the Tenth Annual University of Southwestern Louisiana Mathematics Conference*, 1979, 75–93.

Estimating the proportions of two populations in a mixture using linear maps, Commun. Statist.–Theor. Meth. A9, 8 (1980), 837–849.

Convergence theorems for least-change secant update methods, with J. E. Dennis, Jr., SIAM J. Numer. Anal., 18 (1981), 949–987.

Mixture densities, maximum likelihood, and the EM algorithm, with R. A. Redner, SIAM Review, 26 (1984), 195–239.

Inaccuracy in quasi-Newton methods: local improvement theorems, with J. E. Dennis, Jr., in *Mathematical Programming at Oberwohlfach II*, B. Korte and K. Ritter, eds., Mathematical Programming Studies, 22 (1984), 70–85.

Experiments with quasi-Newton methods for solving stiff ODE systems, with P. N. Brown and A. C. Hindmarsh, SIAM J. Sci. Stat. Comput., 6 (1985), 297–313.

Publications (cont.)

Least-change sparse secant update methods with inaccurate secant conditions, with J. E. Dennis, Jr., SIAM J. Numer. Anal., 22 (1985), 760–778.

Implementation of the GMRES method using Householder transformations, SIAM J. Sci. Stat. Comput., 9 (1988), 152–163.

Asymptotics of solute dispersion in periodic porous media, with R. Bhattacharya and V. K. Gupta, SIAM J. Appl. Math., 49 (1989), 86–98.

Implementations of the GMRES method, in *Proceedings of the Minnesota Supercomputer Institute Workshop on Practical Iterative Methods for Large Scale Computations*, D. L. Boley, D. G. Truhlar, Y. Saad, R. E. Wyatt, and L. E. Collins, eds., published in Computer Physics Communications, 53 (1989), 311–320.

Newton-like methods for underdetermined systems, in *Computational Solution of Nonlinear Systems of Equations*, E. L. Allgower and K. Georg, eds., Lectures in Applied Mathematics Vol. 26, American Mathematical Society, Providence, RI, 1990, 679–699.

Least-change secant update methods for underdetermined systems, with L. T. Watson, SIAM J. Numer. Anal., 27 (1990), 1227–1262.

Least-change secant updates of nonsquare matrices, with S. K. Bourji, SIAM J. Numer. Anal., 27 (1990), 1263–1294.

Quasi-Newton methods for maximum-likelihood estimation, with J. D. Gonglewski, in *Advances in Numerical Partial Differential Equations and Optimization: Proceedings of the Fifth México–United States Workshop*, S. Gómez, J.-P. Hennart, and R. A. Tapia, eds., SIAM Proceedings in Applied Mathematics, Vol. 47, Society for Industrial and Applied Mathematics, Philadelphia, PA, 1991, 332–345.

Experiments with conjugate gradient algorithms for homotopy curve tracking, with K. M. Irani, M. P. Kamat, C. J. Ribbens, and L. T. Watson, SIAM J. Optimization, 1 (1991), 222–251.

Preconditioned iterative methods for homotopy curve tracking, with C. Desa, K. M. Irani, C. J. Ribbens, and L. T. Watson, Special Issue on Iterative Methods in Numerical Linear Algebra, SIAM J. Sci. Stat. Comput., 13 (1992), 30–46.

Efficient high accuracy solutions with GMRES(m), with K. Turner, SIAM J. Sci. Stat. Comput., 13 (1992), 815–825.

Residual smoothing techniques for iterative methods, with L. Zhou, Special Section on Iterative Methods in Numerical Linear Algebra, SIAM J. Sci. Comput., 15 (1994), 297–312.

Globally convergent inexact Newton methods, with S. C. Eisenstat, SIAM J. Optimization, 4 (1994), 393–422.

A simpler GMRES, with L. Zhou, Special Issue on Iterative Methods and Preconditioners for Nonsymmetric Linear Systems, Numer. Linear Algebra Appl., 1 (1994), 571–581.

Residual smoothing and peak/plateau behavior in Krylov subspace methods, Special Issue on Iterative Methods for Linear Equations, Applied Numerical Mathematics, 19 (1995), 279–286.

Choosing the forcing terms in an inexact Newton method, with S. C. Eisenstat, Special Issue on Iterative Methods in Numerical Linear Algebra, SIAM J. Sci. Comput., 17 (1996), 16–32.

GMRES on (nearly) singular systems, with P. N. Brown, SIAM J. Matrix Anal. Appl., 18 (1997), 37–51.

Publications (cont.)

An approach to continuation using Krylov subspace methods, in *Computational Science for the 21st Century*, J. Periaux, ed., John Wiley and Sons, Ltd., 1997, 72–81.

An inexact Newton method for fully-coupled solution of the Navier–Stokes equations with heat and mass transport, with J. N. Shadid and R. S. Tuminaro, J. Comput. Physics, 137 (1997), 155–185.

Algorithm 777: HOMPACK90: a suite of FORTRAN 90 codes for globally convergent homotopy algorithms, with L. T. Watson, M. Sosonkina, R. C. Melville, and A. P. Morgan, ACM Trans. Math. Software, 23 (1997), 514–549.

NITSOL: a Newton iterative solver for nonlinear systems, with M. Pernice, Special Issue on Iterative Methods, SIAM J. Sci. Comput., 19 (1998), 302–318.

A new adaptive GMRES algorithm for achieving high accuracy, with M. Sosonkina, L. T. Watson, and R. K. Kapania, Numer. Linear Algebra Appl., 5 (1998), 275–297.

An adaptation of Krylov subspace methods to path following problems, SIAM J. Sci. Comput., 21 (2000), 1191–1198.

A 3-D model with fluid-structure interactions for unsteady blood flow in stenotic arteries with cyclic wall collapse, with D. Tang, C. Yang, S. Kobayashi, and D. N. Ku, in *Computational Fluid and Solid Mechanics*, K. J. Bathe, ed., Elsevier Science Ltd., New York, 2001, 1388–1392.

Simulating cyclic artery compression using a 3-D unsteady model with fluid-structure interactions, with D. Tang, C. Yang, S. Kobayashi, and D. N. Ku, Computers and Structures, 80 (2002), 1651–1665.

On backtracking failure in Newton–GMRES methods with a demonstration for the Navier–Stokes equations, with R. S. Tuminaro and J. N. Shadid, J. Comp. Physics, 180 (2002), 549–558.

2D and 3D multi-physics models for flow and nonlinear stress/strain analysis of stenotic arteries with lipid cores, with D. Tang, C. Yang, S. Kobayashi, J. Zheng, and D. N. Ku, in *Computational Fluid and Solid Mechanics 2003*, Vol. 2, K. J. Bathe, ed., Elsevier Science Ltd., New York, 2003, 1829-1832.

An iterative method for symmetric indefinite linear systems, with S. Yi, Commun. Korean Math. Soc., 19 (2004), 375–388.

Globalization techniques for Newton–Krylov methods and applications to the fully-coupled solution of the Navier–Stokes equations, with R. P. Pawlowski, J. N. Shadid, and J. P. Simonis, SIAM Review, 48 (2006), 700–721.

On using approximate finite-differences in matrix-free Newton–Krylov methods, with P. N. Brown, R. Wasyk, and C. S. Woodward, SIAM J. Numer. Anal., 46 (2008), 1892–1911.

Inexact Newton dogleg methods, with R. P. Pawlowski, J. P. Simonis, and J. N. Shadid, SIAM J. Numer. Anal., 46 (2008), 2112–2132.

An accelerated fixed-point iteration for solution of variably saturated flow, with C. S. Woodward and U. M. Yang, Proceedings of the XVIII International Conference on Water Resources, CMWR 2010, J. Carrera, ed., CIMNE, Barcelona, 2010 (available online at `http://congress.cimne.com/CMWR2010/Proceedings/Start.html`).

Anderson acceleration for fixed-point iterations, with P. Ni, SIAM J. Numer. Anal., 49 (2011), 1715-1735.

Publications (cont.)

An accelerated Picard method for nonlinear systems related to variably saturated flow, with P. A. Lott, C. S. Woodward, and U. M. Yang, Advances in Water Resources, 38 (2012), 92-101.

Anderson acceleration and application to the three-temperature energy equations, with H. An and X. Jia, J. Comp. Physics, 347 (2017), 1-19.

Accelerating the Uzawa algorithm, with N. Ho and S. D. Olson, SIAM J. Sci. Comput., 39 (2017), S461-S476.

Articles

Solution methods for large-scale nonlinear problems: an evolving research area, with C. S. Woodward, SIAM News, 34 (April, 2001), pp. 15-16.

Workshop on solution methods for large-scale nonlinear problems, with C. S. Woodward, SIAM News, 37 (March, 2004), pp. 16,9.

Unpublished Reports

An approach to the numerical solution of two-point boundary value problems, Lockheed Electronics Co. Tech. Report for NASA Manned Spacecraft Center, 8/66.

The differentiability of the probability of misclassification as a function of a linear feature selection matrix, with L. F. Guseman, Jr., University of Houston Math. Dept. Tech. Report No. 28, Contract NAS-9-12777, 8/73.

Some qualitative remarks on the variation of the probability of error, University of Houston Math. Dept. Tech. Report No. 34, Contract NAS-9-12777, 1974.

Maximum-likelihood signature estimation, University of Houston Math. Dept. Tech. Report No. 42, Contract NAS-9-12777, 4/75.

An iterative procedure for obtaining maximum-likelihood estimates of the parameters for a mixture of normal distributions, with B. C. Peters, Jr., University of Houston Math. Dept. Tech. Report No. 43, Contract NAS-9-12777, 7/75.

On the numerical evaluation of the maximum-likelihood estimate of mixture means, University of Houston Math. Dept. Tech. Report No. 44, Contract NAS-9-12777, 7/75.

Addendum to 'An iterative procedure for obtaining maximum-likelihood estimates of the parameters for a mixture of normal distributions', with B. C. Peters, Jr., University of Houston Math. Dept. Tech. Report No. 47, Contract NAS-9-12777, 9/75.

The numerical evaluation of maximum-likelihood estimates of the parameters for a mixture of normal distributions from partially identified samples, University of Houston Math. Dept. Tech. Report No. 54, Contract NAS-9-12777, 6/76.

Quasi-Newton methods, University of Houston Math. Dept. Tech. Report No. 67, Contract NAS-9-12777, 1978.

The mean-square error optimal linear discriminant function and its application to incomplete data vectors, Lockheed Electronics Company Tech. Report, 8/78.

Sample-moment estimates of the mean vector and the covariance matrix for a sample of incomplete data vectors, Lockheed Electronics Company Tech. Report, 8/78.

Unpublished Reports (cont.)

Estimation of proportions using linear maps, Lockheed Electronics Company Tech. Report, 8/78.

Local convergence theorems for quasi-Newton methods, with J. E. Dennis, Jr., Cornell University Comp. Sci. Dept. Tech. Report TR79-383 and Rice Univ. Math. Sci. Rep. TR476-(141-171-163)-1.

LLL-UHMLE: maximum-likelihood estimates for the general normal mixture, preliminary user's guide, with F. N. Fritsch, Lawrence Livermore Laboratory Report UCID-18276, 9/79.

Lectures on numerical solutions of nonlinear problems, Lawrence Livermore Laboratory Report UCID-18285, 9/79.

Quasi-Newton methods for stiff ordinary differential equations, Lawrence Livermore Lab. Math.-Stat. Sec. Tech. Memo. No. 80-1, 2/80.

Implementation of the GMRES and Arnoldi methods using Householder transformations, Lawrence Livermore Nat. Lab. Report UCRL-93589, 10/85.

On integrals associated with a certain partial differential equation, Utah State University Math. Dept. Res. Report, July 1986/36.

A note on a Householder transformation implementation of the GMRES method, with A. C. Hindmarsh, Lawrence Livermore Nat. Lab. Report UCID-20899, 10/86.

Experiments with the stable Householder implementation of the GMRES method in stiff ODE solving, Lawrence Livermore Nat. Lab. Report UCID-21343, 3/88.

Fisher information from convergence rates of the EM algorithm, with M. P. Windham, Utah State University Math. Stat. Dept. Res. Report April/1989/43.

Cluster Validity from Information Ratios, with H. H. Bock and M. P. Windham, Utah State University Math. Stat. Dept. Res. Report July/1989/46.

Polymeric mechanical response based on molecular structure: obtaining individual chain force laws, with R. G. Carter and I. L. Davis, Thiokol Corporation Report, 10/89.

Report on the International Meeting on Linear/Nonlinear Iterative Methods and Verification of Solution, Matsuyama, Japan, July 6-9, 1993, prepared for ONR/Far East, available by anonymous ftp to cs.arizona.edu, 10/93.

A GMRES-backtracking Newton iterative method, Utah State University Math. Stat. Dept. Res. Report 3/94/74, 3/94.

Parallel solution of nonlinear partial differential equations using a globalized inexact Newton–Krylov–Schwarz method, with M. Pernice and L. Zhou, Utah Supercomputing Institute Report No. 48 (revised) and Utah State University Math. Stat. Dept. Res. Report 7/95/82, 7/95.

The Workshop on Iterative Methods for Large Scale Nonlinear Problems, with M. Pernice, Utah State University Math. Stat. Dept. Res. Report 12/95/84, 12/95.

Numerical Methods for Nonlinear Equations, WPI Math. Sciences Dept. Report MS-03-02-18, 3/02.

Globalization techniques for Newton–Krylov methods and applications to the fully-coupled solution of the Navier–Stokes equations, with R. P. Pawlowski, J. N. Shadid, and J. P. Simonis, Report SAND2004-1777, Sandia National Laboratories, 5/04.

Unpublished Reports (cont.)

A linearly constrained least-squares problem in electronic structure computations, with P. Ni, WPI Math. Sci. Dept. Report MS-1-13-46, 1/10.

Anderson acceleration: algorithms and implementations, WPI Math. Sciences Dept. Report MS 6-15-50, 6/11.

Recent Invited Talks and Presentations

Preconditioned Newton–Krylov methods for large-scale continuation, Minisymposium on Preconditioning Linear and Nonlinear Iterations, 7th IMACS International Symposium on Iterative Methods in Scientific Computing, Toronto, Ontario, 5/05.

Inexact Newton dogleg methods, Minisymposium on Effective Numerical Algorithms for Large-Scale Nonlinear Systems, SIAM 2005 Annual Meeting, New Orleans, Louisiana, 7/05.

Globalization techniques for Newton–Krylov methods, IX Workshop on Partial Differential Equations, Instituto Nacional de Matemática Pura e Aplicada, Rio de Janeiro, Brazil, 7/05.

Globalization techniques for Newton–Krylov methods, Argonne National Laboratory, 9/05.

Globalization techniques for Newton–Krylov methods, Numerical Analysis Seminar, University of Maryland, 10/05.

Approximate finite differences in matrix-free Newton–Krylov methods, Copper Mountain Conference on Iterative Methods, Copper Mountain, Colorado, 4/06.

Numerical Methods for Ordinary Differential Equations, four-hour short course, University of Utah, 12/06.

Newton–Krylov methods for nonlinear PDEs, Conference on Variational and Topological Methods, Northern Arizona University, 5/07.

Applied mathematics research in DOE's Office of Advanced Scientific Computing Research, SIAM Science Policy Committee, 11/07.

DIIS acceleration of fixed-point iteration, Gene Golub Memorial Conference, University of Massachusetts at Dartmouth, 2-3/08.

Applied mathematics research in DOE's Office of Advanced Scientific Computing Research, AMS Science Policy Committee, 3/08.

Inexact Newton methods for large-scale underdetermined systems, Minisymposium on Recent Advances in Nonlinear Solvers, SIAM 2008 Annual Meeting, San Diego, California, 7/08.

Inexact Newton methods, Newton-Krylov methods, and extensions for large-scale underdetermined systems, Oak Ridge National Laboratory, 8/08.

Anderson acceleration for fixed-point iteration, University of Maryland – Baltimore County, 5/09.

Mixture densities, the EM algorithm, and Anderson acceleration, Minisymposium on Statistically Motivated Iterative Techniques and Regularization, SIAM Conference on Applied Linear Algebra, Monterey, California, 10/09.

Anderson acceleration for fixed-point iteration, Lawrence Livermore National Laboratory, 10/09.

Anderson acceleration for fixed-point iterations, Copper Mountain Conference on Iterative Methods, 4/10.

Recent Invited Talks and Presentations (cont.)

Anderson acceleration for fixed-point iterations, New England Numerical Analysis Day 2011, Dartmouth, Massachusetts, 4/11.

Anderson acceleration for fixed-point iterations, Sandia National Laboratories, 6/11.

Anderson acceleration for fixed-point iterations, Householder Symposium XVIII, Tahoe City, California, 6/11.

Anderson acceleration for fixed-point iterations, Schlumberger–Tufts University Seminar, 9/11.

Anderson acceleration: theory and applications, Department of Energy Applied Mathematics Program Meeting, 10/11.

Anderson acceleration for fixed-point iterations, AMS-SIAM Special Session on the Mathematics of Computation: Differential Equations, Linear Algebra, and Applications, Boston, Massachusetts, 1/12.

Anderson acceleration for fixed-point iterations, University of Houston, 4/12.

Anderson acceleration: algorithms and implementations, Session on Advances in Nonlinear and Linear Solvers for Water Resources Applications, Computational Methods in Water Resources XIX International Conference, Urbana–Champagne, Illinois, 6/12.

Anderson acceleration for fixed-point iterations, MIT, 10/12.

Accelerating the EM algorithm for mixture density estimation, Minisymposium on Anderson Acceleration and Applications, SIAM Conference on Computational Science and Engineering, Salt Lake City, Utah, 3/15.

Accelerating the EM algorithm for mixture density estimation, ICERM Topical Workshop on Numerical Methods for Large-Scale Nonlinear Problems and Their Applications, Providence, Rhode Island, 9/15.

Graduate Students

Master's Theses and Reports Supervised at Texas Tech University

Dennis Moreno	December, 1971	*Differential Inequalities*
Alan Lair	August, 1972	*The Sobolev Spaces $H_s(\mathbf{R}^n)$*
Beverly Miller	August, 1972	*Brownian Motion and the Dirichlet Problem*
George Miller	December, 1972	*Decay of Solutions of the Wave Equation Exterior to a Star-Shaped Obstacle*

Ph.D. Dissertations Supervised at the University of Houston

Richard A. Redner	December, 1977	*Characterization of Linear Sufficient Statistics*
Phuong A. Vu	June, 1983	*Noisy Secant Conditions for Problems with Symmetric Jacobians*
James Sparra	June, 1984	*Stochastic Approximation of Fixed Points*
John D. Gonglewski	August, 1986	*On Quasi-Newton Methods for Maximum-Likelihood Estimation with Applications to the Mixture Density Problem*

Master's Theses and Reports Supervised at Utah State University

Yi Qian	September, 1990	*Inexact Newton and Newton Iterative Methods*
Lorna Payne	January, 1994	*Unstable Output Behavior of a Radio-Emission Plasma*

Graduate Students (cont.)

Ph.D. Dissertations Supervised at Utah State University

Samih K. Bourji	August, 1987	*Least-Change Secant Updates of Nonsquare Matrices*
Lu Zhou	June, 1994	*Krylov Subspace Methods for Linear and Nonlinear Systems*
Sucheol Yi	June, 1996	*Krylov Subspace Methods for Linear Symmetric Indefinite Systems*

Master's Theses and Reports Supervised at WPI

Joseph P. Simonis	May, 2003	*A Numerical Study of Globalizations of Newton-GMRES Methods*
Bijayalaxmi Padhy	May, 2006	*NITSOL: A Newton Iterative Solver for Nonlinear Systems, A FORTRAN-to-MATLAB Implementation*
David LeRay	May, 2007	*Efficient Pricing of an Asian Put Option Using Stiff ODE Methods*
Brian M. Skjerven	October, 2007	*A Parallel Implementation of an Agent-Based Brain Tumor Model*
Chukwunomso Agunwamba	February, 2010	*A Band-Pass Method for Discovering Relevant Scales in Surface Roughness Measurement*
Jonathan E. Moore	May, 2011	*EM Algorithm for GPU Using CUDA*
Joshua H. Plasse	May, 2013	*The EM Algorithm in Multivariate Gaussian Mixture Models using Anderson Acceleration*

Ph.D. Dissertations Supervised at WPI

Joseph P. Simonis	May, 2006	*Inexact Newton Methods Applied to Under-Determined Systems*
Peng Ni	February, 2010	*Anderson Acceleration of Fixed-point Iteration with Applications to Electronic Structure Computations*

Sponsored Postdoctoral Associates

Lu Zhou, Utah State University, September–December, 1994.

Michael D. Tocci, WPI, January, 1998–May, 2000.

Jung-Han Kimn, WPI, May, 2001–September, 2002.

Professional Service

Committee Service

SIAM Committee on Science Policy, 1/14–12/16.

SIAM Committee on Membership, 1/15–12/17.

Editing

Associate editor for the Copper Mountain Special Issues and Special Sections on Iterative Methods, SIAM J. Sci. Comput.: Vol. 15 (1994), Nos. 2–3; Vol. 17 (1996), No. 1; Vol. 19 (1998), No. 1.; Vol. 21 (2000), No. 5; Vol. 23 (2002), No. 2; Vol. 25 (2004), No. 2; Vol. 29 (2007), No. 5; Vol. 32 (2010), No. 1; Vol. 33 (2011), No. 5; Vol. 35 (2013), No. 5; Vol. 37 (2015), No. 5; Vol. 39 (2017), No. 5.

Editorial board member, SIAM J. Numer. Anal., 2002-2013.

Professional Service (cont.)

Conference Work

Organization committee member, NSF–CBMS Regional Conference on Partial Differential Equations, Texas Tech University, 5/72.

Co-organizer (with W. E. Fitzgibbon), NSF-CBMS Regional Conference on Non-Linear Diffusion, University of Houston, 6/76–7/76.

Contributed papers chair and session chair, SIAM Fall 1980 Meeting, Houston, Texas, 11/80.

Program organizer, Computer Science and Statistics: 15^{th} Symposium on the Interface, Houston, Texas, 3/83.

Invited papers chair and contributed papers chair, SIAM Conference on Mathematical and Computational Methods in Seismic Exploration and Reservoir Modeling, Houston, Texas, 1/85.

Session chair, SIAM Conference on Optimization, Houston, Texas, 5/87.

Co-organizer (with C. Duffy and U. Hornung), Workshop on Mathematical Modeling for Preferential Flow in Groundwater Flow and Contaminant Transport, Utah State University, 3/89.

Organizer, Miniconference on Newton-Like Methods for Large Scale Nonlinear Systems, Utah State University, 8/89.

Organization committee member, Conference on Numerical Optimization for Differential Equations and Control, North Carolina State University, 7/91.

Program committee member and session chair, Conference on Iterative Methods, Copper Mountain, Colorado, 4/92.

Organizer (by invitation), Minisymposium on Iterative Methods for Large Scale Nonlinear Systems, SIAM 1992 Annual Meeting, Los Angeles, California, 7/92.

Session chair, DOE/OSC Applied Mathematics Workshop, Albuquerque, New Mexico, 2/93.

Session chair, Special Session on Numerical Optimization, AMS 879th Meeting, Knoxville, Tennessee, 3/93.

Organizer (by invitation), Minisymposium on Lanczos-based Methods for Nonsymmetric Linear Systems, Householder Symposium XII on Numerical Linear Algebra, Lake Arrowhead, California, 6/93.

Session chair, International Meeting on Linear/Nonlinear Iterative Methods and Verification of Solution, Matsuyama, Japan, 7/93.

Program committee member, session chair, and referee for student the paper contest, Colorado Conference on Iterative Methods, Breckenridge, Colorado, 4/94.

Session chair, DOE/OSC Applied Mathematics Workshop, Albuquerque, New Mexico, 2/95.

Organizer, Workshop on Iterative Methods for Large Scale Nonlinear Problems, Utah State University, 9/95.

Program committee member, session chair, and referee for the student paper contest, Conference on Iterative Methods, Copper Mountain, Colorado, 4/96.

Program committee member and session chair, Conference on Iterative Methods, Copper Mountain, Colorado, 4/98.

Professional Service (cont.)

Organizer (by invitation), Minisymposium on Nonlinear Equations, Sixth SIAM Conference on Optimization, Atlanta, Georgia, 5/99.

Program committee member and session chair, Conference on Iterative Methods, Copper Mountain, Colorado, 4/00.

Program committee member and session chair, Conference on Iterative Methods, Copper Mountain, Colorado, 3/02.

Invited participant, Breakout Session on Multi-physics Solution Techniques, DOE Office of Science Workshop on the Science Case for Large-Scale Simulation, 6/03.

Session co-chair, Minisymposium on Krylov Subspace Methods on Singular and Nearly Singular Systems, ICIAM 2003: Fifth International Congress on Industrial and Applied Mathematics, Sydney, Australia, 7/03.

Organizing committee member, Workshop on Solution Methods for Large-Scale Nonlinear Problems, Livermore, California, 8/03.

Program committee member and session chair, Conference on Iterative Methods, Copper Mountain, Colorado, 3/04-4/04.

Organizer (by invitation), Minisymposium on Effective Numerical Algorithms for Large-Scale Nonlinear Systems, SIAM 2005 Annual Meeting, New Orleans, Louisiana, 7/05.

Program committee member and session chair, Conference on Iterative Methods, Copper Mountain, Colorado, 4/06.

Program committee member, Conference on Iterative Methods, Copper Mountain, Colorado, 4/08.

Program committee member, student paper contest committee chair, special session organizer, Conference on Iterative Methods, Copper Mountain, Colorado, 4/10.

Invited participant, NSF Workshop on Cyberscience: Grand Challenges and Implications for Cyberinfrastructure, 4/10.

Organizer, New England Numerical Analysis Day 2010, Worcester, Massachusetts, 5/10.

Invited participant, DOE Workshop on Computational Materials Science and Chemistry for Innovation, 7/10.

Invited participant, DOE ASCR Exascale Research Meetings: Annapolis, Maryland, 10/11; Arlington, Virginia, 10/12.

Invited participant, DOE ASCR Workshop on Extreme-Scale Solvers, Washington, D.C., 3/12.

Program committee member, Conference on Iterative Methods, Copper Mountain, Colorado, 3/12.

Program committee member, student paper contest committee member, Conference on Iterative Methods, Copper Mountain, Colorado, 4/14.

Co-Organizer (with C. T. Kelley and C. S. Woodward), ICERM Topical Workshop on Numerical Methods for Large-Scale Nonlinear Problems and Their Applications, Providence, Rhode Island, 8-9/15.

Program committee member, student paper contest committee member, Conference on Iterative Methods, Copper Mountain, Colorado, 3/16.

Professional Service (cont.)

Steering committee and local co-organizer, New England Numerical Analysis Day 2019, Worcester, Massachusetts, 4/19.

Review Work

Site visit team member, NSF-CISE Institutional Infrastructure program, 7/91.

Proposal review panel member, Louisiana Education Quality Support Fund, Subprogram A, Mathematics Area, 1991, 1992, 1995, 1996, 1999, 2000, 2003, 2004, 2007, 2008, 2011, and 2012.

Panel reviewer, DOE Accelerated Strategic Computing Initiative Academic Strategic Alliance Program Level 1 center proposals, 1/97.

Panel reviewer, DOE Accelerated Strategic Computing Initiative Academic Strategic Alliance Program Level 2 projects, 5/00.

External reviewer, Scalable Solvers section, DOE Accelerated Strategic Computing Initiative Technology Prospectus, 11/00.

External evaluator, Mathematics Department, University of Massachusetts – Dartmouth, 3/02.

Panel member, 2002 External Technical Review, Computation, Computers, Information and Mathematics (CCIM) Center 9200, Sandia National Laboratories, 8/02.

Proposal review panel member, NSF ITR program, panel IT4-MS-QM, 5/04.

Proposal review panel member, DOE SciDAC program, 4/06.

Proposal review panel member, Special Research Program (SFB), Austrian Science Fund (FWF), 9/06.

SIAM representative, AMS-IMS-SIAM Evaluation Panel for NSF Mathematical Sciences Postdoctoral Research Fellowships, 7/06–6/09.

External evaluator, Mathematics Department, University of Massachusetts – Dartmouth, 5/09.

Mid-term review panel member, DOE SciDAC program, 5/09.

Proposal review panel member, DOE SBIR Phase 2 program, 5/09.

Proposal review panel member, DOE Mathematics for Analysis of Petascale Data program, 6/09.

Site visit team member, NSF-DMS Mathematical Sciences Research Institutes program, 10/09.

Proposal review panel member, NSF-DMS CAREER program, 10/09.

Proposal review panel member, DOE Office of Science SCGF program, 3/10.

Proposal review panel member, DOE Office of Science PECASE program, 9/10.

Interim evaluation panel member, Special Research Program (SFB) 32, "Mathematical Optimization and Applications in Biomedical Sciences," Austrian Science Fund (FWF), 1/11.

Proposal review panel member, NSF-DMS Numerical Linear Algebra and Optimization program, 3/11.

Panel reviewer, DOE Science Graduate Fellowship Program, 4/12.

Proposal review panel member, DOE Mathematical Multifaceted Integrated Capability Centers program, 6/12.

Professional Service (cont.)

Reviewer, Evaluation of Research Quality 2004-2010, Italian National Agency for the Evaluation of Universities and Research Institutes, 2012.

Site visit team member, NSF-DMS Mathematical Sciences Research Institutes program, 3/13.

Panel reviewer, DOE Extreme-Scale UQ Methodologies program, 6/13.

Member, Committee of Visitors, DOE ASCR Applied Mathematics program, 7/13.

Review team member, DOE ASCR Mathematical Multifaceted Integrated Capability Center (MMICC) review, 2/14.

Panel reviewer, DOE Office of Science Early Career Research Program, 2/14.

Interim evaluation panel member, Special Research Program (SFB) 32, "Mathematical Optimization and Applications in Biomedical Sciences," Austrian Science Fund (FWF), 10/14.

External reviewer, Academic Program Review, Department of Mathematical and Statistical Sciences, University of Colorado Denver, 11/15.

Advancement Committee Review team member, Computational and Applied Mathematics Department, Rice University, 4/17.

Refereeing and Mail Reviewing

Air Force Office of Scientific Research

Applied Mathematics Letters

Applied Numerical Mathematics

Army Research Office

Austrian Science Fund

BIT

Communications in Statistics

Computational and Applied Mathematics

Computational Geosciences

Computer Physics Communications

Computers and Mathematics with Applications

Department of Energy

East–West Journal of Numerical Analysis

Electronic Transactions on Numerical Analysis

Houston Journal of Mathematics

IMA Journal of Numerical Analysis

Journal of the American Statistical Association – Theory and Methods

Journal of Computational and Applied Mathematics

Journal of Computational Physics

Journal of Numerical Linear Algebra with Applications

Journal of Optimization Theory and Applications

Linear Algebra and Applications

Mathematical Programming / Mathematical Programming Studies

Professional Service (cont.)

Mathematics of Computation
National Science Foundation
Netherlands Research Council
Numerical Algorithms
Numerical Methods for Partial Differential Equations
Numerische Mathematik
Optimization Methods and Software
ORSA Journal on Computing
Parallel Computing
Pi Mu Epsilon Journal
SIAM Journal on Control and Optimization
SIAM Journal on Matrix Analysis and Applications
SIAM Journal on Numerical Analysis
SIAM Journal on Optimization
SIAM Journal on Scientific (and Statistical) Computing
SIAM Review
Transactions on Mathematical Software
Transport Theory and Statistical Physics

Book Reviewing

Addison–Wesley
McGraw–Hill
SIAM Press
Springer Verlag

Grants and Contracts

Associate Investigator, *Applied Mathematics in Classification*, NASA Grant NAS-9-12777 to the University of Houston, 5/73–7/76, $401,910.

Co-Principal Investigator (with W. E. Fitzgibbon), *NSF-CBMS Regional Conference on Non-Linear Diffusion*, NSF Grant MCS76-09519 to the University of Houston, 6/76–7/76, $11,300.

Co-Principal Investigator (with J. E. Dennis, Jr., and R. A. Tapia), *Extension of Quasi-Newton Methods to Constrained Optimization and to General Systems of Nonlinear Equations and Inequalities*, DOE Grant DEAS-05-76ER05046 to Rice University and the University of Houston, 2/80–7/85, $111,827 to the University of Houston.

Co-Principal Investigator (with J. G. Etgen and J. T Hardy), *Scientific Computing Research Equipment for Mathematical Sciences*, NSF SCREMS Grant to the University of Houston, 6/83–5/84, $9,749.

Co-Principal Investigator (with J. G. Etgen), *Scientific Computing Research Equipment for Mathematical Sciences*, NSF SCREMS Grant DMS-8404102 to the University of Houston, 6/84–5/85, $20,000.

Principal Investigator, *Quasi-Newton Methods in the Numerical Solution of Stiff Ordinary Differential Equations*, University of Houston Energy Laboratory Grant, 1/85–8/85, $7,005.

Principal Investigator, *Quasi-Newton Methods in the Numerical Solution of Stiff Ordinary Differential Equations*, Utah State University Grant, 7/86–6/87, $8,536.

Principal Investigator, *Numerical Solution of Nonlinear Algebraic Equations in Stiff ODE Solving*, DOE Grant DE-FG02-86ER25018 to Utah State University, 7/86–12/89, $171,208.

Principal Investigator, *Polymer Network Modeling*, Morton Thiokol, Inc./Wasatch Operations Contract 882045 with Utah State University, December, 1987–6/88, $8,652.

Co-Principal Investigator (with L. D. Loveland), *Scientific Computing Research Equipment for Mathematical Sciences*, NSF SCREMS Grant DMS-8805157 to Utah State University, 6/88–5/89, $35,000.

Co-Principal Investigator (with M. P. Windham), *Fast Algorithms for Estimating Mixture Parameters*, ARO Grant DAAL03-88-K-0051 to Utah State University, 7/88–6/89, $55,000.

Co-Principal Investigator (with M. P. Windham), *Fast Algorithms for Estimating Mixture Parameters*, NSF Grant DMS-8800995 to Utah State University, 7/88–12/90, $95,008.

Principal Investigator, *Quasi-Newton Updating for Large Scale Nonlinear Systems*, renewal of DOE Grant DE-FG02-86ER25018 to Utah State University, 1/90–12/90, $49,436.

Principal Investigator, *Quasi-Newton Updating for Large Scale Nonlinear Systems*, AFOSR Grant AFOSR-91-0294 to Utah State University, 7/91–6/94, $87,713.

Principal Investigator, *Newton Iterative Methods for Large Scale Nonlinear Systems*, DOE Grant DE-FG02-92ER25136 to Utah State University, 8/92–7/94, $41,500.

Travel grant from ONR/Far East to fund U.S.–Japan travel to the International Meeting on Linear/Nonlinear Iterative Methods and Verification of Solution, Matsuyama, Japan, 7/93, $1,150.

Participant (with L. D. Loveland, K. Hestir, J. V. Koebbe, and J. Powell), *Mathematical Sciences Research Equipment Enhancement*, NSF SCREMS Grant DMS-9305519 to Utah State University, 7/93–12/94, $26,507.

Principal Investigator, *Iterative Methods for Large Scale Nonlinear and Linear Systems*, DOE Grant DE-FG03-94ER25221 to Utah State University, 8/94–7/96, $77,600.

Principal Investigator, *Iterative Methods for Large Scale Nonlinear and Linear Systems*, NSF Grant DMS-9400217 to Utah State University, 7/94–6/97, $34,300.

Principal Investigator, *A Conference on Iterative Methods for Large Scale Nonlinear Problems*, DOE Grant DE-FG03-95ER25255 to Utah State University, 6/95–5/96, $5,000.

Principal Investigator, *Algorithms and Software for Large Scale Nonlinear Systems*, LLNL Subcontract No. B337025 with Utah State University, 3/97–9/97, $23,583.

Principal Investigator, *Iterative Methods for Large Scale Nonlinear and Linear Systems*, NSF Grant DMS-9727128 to WPI, 8/97–7/00, $75,000.

Principal Investigator (with M.-H. Chen, M. Humi, R. Lipton, and D. Tang), *Acquisition of a High-Performance Computer for Mathematical Sciences Applications*, NSF MRI Grant DMS-9870971 to WPI, 9/98–8/01, $145,051.

Principal Investigator, IBM Corporation Shared University Research Grant, 9/99, hardware and software valued at $1,085,832.

Principal Investigator, *Educational Innovation in Simulation Education*, WPI subcontract of University of Utah NSF CISE Educational Innovation Grant 9979838, 10/99–9/03, $81,756.

Principal Investigator, *Summer Undergraduate Research Fellowship (SURF)*, NIST Grant 70NANB3H1045 to WPI (summer support for B. Cordes), 5/03–8/03, $6,576.

Principal Investigator, *Collaboration on Nonlinear Solution Algorithms*, Sandia National Laboratories Contract 198313 (sabbatical visit support), 9/03–7/04, $95,740.

Principal Investigator, *Summer Undergraduate Research Fellowship (SURF)*, NIST Grant 70NANB4H1051 to WPI (summer support for B. Cordes), 5/04–8/04, $6,670.

Co-Principal Investigator (PI D. Tang), *Experiment-Based 3-D Computational Studies of Blood Flow in Stenotic Carotid Arteries with Dynamic Wall Properties*, NSF Grant DMS-0072873 to WPI, 9/01–8/05, $163,000.

Principal Investigator, *Summer Undergraduate Research Fellowship (SURF)*, NIST Grant 70NANB5H1046 to WPI (summer support for B. Cordes and M. Desrosiers), 5/05–8/05, $14,019.

Co-Principal Investigator (PI M. Humi), *Scientific Computing Research Environments for the Mathematical Sciences*, NSF SCREMS Grant DMS-0320590 to WPI, 8/03–7/06, $125,328.

Principal Investigator, *Nonlinear Solvers Research and Short Course*, Sandia National Laboratories Contract 16099 with WPI, 2/01–9/06, $402,152.

Principal Investigator, *Algorithms and Software for C-SAFE*, WPI subcontract of University of Utah DOE-ASCI Center for Simulation of Accidental Fires and Explosions, 10/97–1/07, $873,409.

Co-Principal Investigator (PI D. Tang), *Multi-Physics Modeling and Meshless Methods for Atherosclerotic Plaque Progression*, NSF DMS/Bio/NIGMS Grant DMS-0540684 to WPI, 3/06–2/12, $1,847,537.

Principal Investigator, *Anderson Acceleration for Fixed-Point Iteration*, NSF DMS Grant DMS-0915183 to WPI, 9/09–8/12, $210,000.

Principal Investigator, *Anderson Acceleration for Fixed-Point Iterations*, DOE Office of Science Grant DE-SC0004880 to WPI, 9/10–8/14, $536,292.

Principal Investigator (with S. D. Olson, M. Sarkis, D. Tang, B. S. Tilley, and Z. Wu), *MRI: Acquisition of a High-Performance Computing System for Research, Education, and Training*, NSF MRI Grant DMS-1337943 to WPI, 9/13–8/17, $363,579.