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Vita

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Education: Ph. D. Computational & Applied Mathematics, Rice University, 1995
(under direction of Roland Glowinski and Richard Tapia)
M. A. Computational & Applied Mathematics, Rice University, 1994
B. A. Major: Mathematics,
University of Maryland at Baltimore County, 1990
magna cum laude

Employment: Mathematician, National Institute of Standards and Technology (NIST)
(formerly the National Bureau of Standards) 1996 - present
Assistant Professor, Carnegie Mellon University 1998 - 2002
Assistant Professor, University of Massachusetts, September, 1995-1997
Graduate Assistant, Rice University, August, 1990-1995
Student Mathematician, NIST, 1988-1993
Visiting Scientist, Centre European de Recherche et de Formation
Avancee en Calcul Scientifique (CERFACS), February - July 1994
Research Assistant, University of Maryland, December, 1989 - August, 1990
Teaching Assistant, University of Maryland, May, 1988 - August, 1990

Honors: Arthur S. Flemming Award for Science 2001

Presidential Early Career Award for Scientists and Engineers (PECASE) 1998

Rice Computational Science and Engineering Fellowship 1994-1995

Patricia R. Harris Fellowship, Rice University, 1990-1994

Pi Mu Epsilon, University of Maryland, 1989

Outstanding Mathematics Student, University of Maryland, 1989, 1990

Dean's List, University of Maryland, 1989, 1990

Outstanding College Student of America, 1990

Selected Refereed Publications:

1. A model of steady state Couette flow with viscous heating, *International Journal of Engineering Science.*, Vol **32** , No. 1. (1994). pp. 179-186.

2. On the simulation and control of some friction constrained motions, (WITH R. GLOWINSKI), *SIAM Journal on Optimization*, Vol **5**, No. 3. (1995). pp. 681–694.

3. Numerical simulation and optimal shape for viscous flow by a fictitious domain method, (WITH R. GLOWINSKI, T. W. PAN AND J. PERIAUX), *The International Journal of Numerical Methods in Fluids*, Vol **20**, No. (8-9). (1995). pp. 695–711.

4. On the solution of the isotonic regression problem on parallel computers, (WITH R. A. TAPIA AND M. TROSSET), In *Applied Mathematics and Parallel Computing; Festschrift für Professor Dr. Klaus Ritter*, H. Fischer, B. Riedmuller, S. Schaffler eds., Physica-Verlag, Heidelberg. pages 141–147. (1996)

5. An infeasible point method for minimizing the Lennard-Jones potential, (WITH M. S. GOCKENBACH AND W. W. SYMES), *Computational Optimization and Applications*, Vol **8**, No. 3. (1997). pp. 273–286.

6. Estimating growth and mortality in stage-structured populations, (WITH B. J. ROTHSCHILD, A. SHAROV AND A. S. BONDARENKO) *Journal of Plankton Research*, Vol **19**, No. 12. (1997). pp. 1913–1928.

7. The Solution of the Metric STRESS and SSTRESS Problems in Multidimensional Scaling Using Newton's Method, (WITH R. A. TAPIA AND M. TROSSET), *Computational Statistics*, Vol **13**, Issue 3. (1998). pp. 369–396.

8. A practical algorithm for general large scale nonlinear optimization problems, (WITH P. T. BOGGS AND J. W. TOLLE), *SIAM Journal on Optimization*, Vol. **9**, No. 3. (1999). pp. 755–778.

9. Optimal signal sets for non-Gaussian detectors, (WITH M. S. GOCKENBACH), *SIAM Journal on Optimization*, Vol **9**, No. 2. (1999). pp. 316–326.

10. A global convergence analysis of an algorithm for large scale nonlinearly constrained optimization problems (WITH P. T. BOGGS AND J. W. TOLLE) *SIAM Journal on Optimization*, Vol. **9** No. 4. (1999). pp. 833–862.

11. Definition of a suitable basic reference state for the use in anomaly coupled ocean-atmosphere climate models, (WITH J. MACÍAS AND D. STEPHENSON) *Applied Mathematics Letters*, Vol **12**, No. 1. (1999). pp. 21–24.

12. Primary Phase Field of the Pb-Doped 2223 Hi-T_c Superconductor in the $(Bi, Pb) - Sr - Ca - Cu - O$ System, (WITH W. WONG-NG, L.P. COOK, AND W. GREENWOOD) *Journal of Research of the National Institute of Standards and Technology*, Vol **104**, No. 3. (1999). pp. 277–290.

13. Effect of Ag on the primary phase field of high Td_c (Bi,Pb)-2223 superconductor, (WITH W. WONG-NG, L.P. COOK, AND W. GREENWOOD) *Journal of Material Science*, Vol **15**, No. 2. (2000). pp. 296–305.

14. Roles of melting equilibria in the processing of high T_c superconductors in the BSCCO system, (WITH W. WONG-NG AND A. ROOSEN) *Phycica C*, Vol **335**, (2000). pp. 120–123.

15. Global and local optimization algorithms for optimal signal set design, *Journal of Research of the National Institute of Standards and Technology*, Vol **106**, No. 2. (2001). pp. 441–454.

16. Optimization approach to multiphase flow. (WITH L. C. COWSAR, R. GLOWINSKI, M. F. WHEELER AND I. YOTOV) *Journal of Optimization Theory and Applications*, Vol. **111**, No. 3. (2001). pp. 473–488.

17. Existence of weak solutions to a class of nonstrictly hyperbolic conservation laws with noninteracting waves (WITH A. REIFF) *Pacific Journal of Mathematics*, Vol. **205** No. 1. (2002). pp. 153–170.

18. An Optimization approach to multiple sequence alignment (WITH F. HUNT AND H. WAN) *Applied Mathematics Letters* Vol. **16** (2003). pp. 785–790.

19. Simulation of an Austenite-twinned-Martensite Interface, (WITH L. MELARA) *Journal of Research of the National Institute of Standards and Technology* Vol. **108** No. 6. (2003). pp. 413–427.

20. Hierarchical Control of a Linear Diffusion Equation, (WITH P. T. BOGGS AND J. W. TOLLE), In *Large-Scale PDE-Constrained Optimization*, L. T. Biegler, O. Ghattas M. Heinkenschloss and B. van Bloemen Waanders eds., Springer-Verlag Lecture Notes in Computational Science and Engineering, Heidelberg (**30**) pages 236 – 249. (2003)

21. An Operator-Independent Approach to Mass Spectral Peak Identification and Integration (WITH W. WALLACE AND C. GUTTMAN) *Analytical Chemistry*, Vol. **76** No. 9. (2004) pp. 2446 – 2452.

22. MassSpectator: Fully automated peak picking and integration - A Web-based tool for locating mass spectral peaks and calculating their areas without user input (WITH W. WALLACE AND C. GUTTMAN) *Analytical Chemistry*, Vol. **76** No. 9. (2004) pp. 183A–184A.

23. Constructing sequence alignments from a Markov decision model with estimated parameter values (WITH F. HUNT AND A. O'GALLAGER) *Applied Bioinformatics*, Vol. **3(2-3)**. (2004) pp. 159–165.

24. A Numerical Method for Mass Spectral Data Analysis (WITH W. WALLACE AND C. GUTTMAN) *Applied Mathematics Letters*, Vol. **18** No. 12. (2005) pp. 1319–1426.

25. A Matrix-free algorithm for the large-scale constrained trust-region subproblem, *Optimization Methods and Software*, Vol. **21** No. 2. (2006) pp. 233– 245.

26. Numerical experiments with total variation denoising problems, (WITH L. MELARA AND R. A. TAPIA) to appear *Journal of Optimization Theory and Applications*

27. Optimization algorithms for optimal signal set design, to appear in *Optimization Methods and Software*

28. Isotonic Regression using projections onto ordered Simplicies to appear *Journal of Research of the National Institute of Standards and Technology*

29. An Infeasible point method for solving 0/1 integer programming problems, submitted to *Operations Research Letters*

30. Flow Control Through the Use of Topography, (WITH D. COTRELL) submitted to *Optimization and Engineering*

31. Bayesian Tomography for Projections with an Arbitrary Transmission Function with an Application to Electron Tomography (WITH Z. LEVINE AND J. HAGEDORN) submitted to *IEEE Transactions on Image Processing*

Selected Conference Proceedings:

1. A truncated SQP algorithm for large scale nonlinear programming problems, (WITH P. T. BOGGS AND J. W. TOLLE), (1992) (in *Proceedings 6th United States-Mexico Workshop on Numerical Analysis.*) Susana Gomez and Jean-Pierre Hennart eds., Kluwer Academic Publishers, Boston. pages 69-78.

2. On the convergence of a trust region SQP algorithm for nonlinearly constrained optimization problems(1996) (WITH P. T. BOGGS AND J. W. TOLLE) (in *Proceedings of the 17th IFIP TC7 Conference on System Modeling and Optimization.*), J. Dolezal, ed., Chapman, London. pages 1–14.

3. Fictitious domain methods for viscous flow simulation, (WITH R. GLOWINSKI, T. W. PAN AND J. PERIAUX), In *Computational Fluid Dynamics Review*, M. M. Hafez and K. Oshima eds., Wiley, Chichester. pages 357–382. (1996)

4. Remarks on optimal shape design problems (WITH H. Q. CHEN, J. W. HE, R. GLOWINSKI, J. PERIAUX AND O. PIRONNEAU) In *Frontiers of CFD '94*, D. A. Caughey and M. M. Hafez eds., Wiley, Chichester. pages 67–80. (1995)

5. Tuning Parallel and Networked Programs with S-Check, (WITH M. COURSON, M. INDOVINA AND R. SNELICK), In *Parallel and Distributed Processing Techniques and Applications (PDPTA'97)*, Las Vegas, Nevada, Volume I. pages 21–30. (1997)

6. Phase equilibria of the (Bi,Pb)-Sr-Ca-Cu-O system pertaining to the 2212 and 2223 phases (WITH W. WONG-NG, L.P. COOK, AND W. GREENWOOD) In *Proceeding of the International workshop of high temperatures superconductors and novel inorganic materials engineering* Moscow State University, Moscow, Russia, pages 46–59. (1998)

7. Phase equilibria of high Tc superconductors in the (Bi,Pb)-Sr-Ca-Cu-O system (WITH W. WONG-NG, L.P. COOK, AND W. GREENWOOD) In *Proceeding of the 8th US-Japan Workshop on High Temperature Superconductors*, National High Magnetic Field Laboratory, Florida State University, Tallahassee, Florida, pages 64–71. (1998)

8. Role of Melting Equilibria in the Processing of High Tc Superconductors in the BSCCO System (WITH A. ROOSEN W. WONG-NG AND L.P. COOK) In *Proceeding of the 9th US-Japan Workshop on High Temperature Superconductors*, National High Magnetic Field Laboratory, Florida State University, Tallahassee, Florida, pages 4–13. (1999)

9. Using Linux PC clusters for scientific computing (WITH R. POZO, B. MITCHELL, B. MURRAY, K. REMINGTON, Workshop on Novel Computational Techniques, National Institute of Standards and Technology, Gaithersburg, Maryland, pages 1–8. (1998)

10. Advanced Numerical Methods for Polymer Mass Spectral Data Analysis (WITH W. WALLACE, C. GUTTMAN AND J. BERNAL) Proceedings of the 50th ASMS Conference, (2002).

11. An Optimization Approach to Multiple Sequence Alignment: A Preliminary Report (WITH F. HUNT AND H. WAN) In *Proceedings of the Atlantic*

Symposium on Computational Biology and Genome Information Systems & Technology, Durham, North Carolina, pages 164–170. (2001)

12. Automatad Peak Picking and Integration Algorithm for Mass Spectral Data (WITH W. WALLACE, C. GUTTMAN AND J. BERNAL) Proceedings of the 51th ASMS Conference, (2003).

13. An Optimization Approach to Multiple Sequence Alignment: A Preliminary Report (WITH F. HUNT AND A. O'GALLAGER) In *Proceedings of the Sixth Conference for African American Researchers in Mathematical Sciences* Princeton, NJ. (2002).

14. Constructing Sequence Alignments from a Markov Decision Model with Estimated Parameter Values (WITH F. HUNT AND A. O'GALLAGER) In *Proceedings of the Biological Language and Applied Bioinformatics Conference* Carnegie Mellon University, Pittsburgh, PA. (2003).

Selected Articles & Technical Reports:

1. A merit function for inequality constrained nonlinear programming problems, (WITH P. T. BOGGS AND J. W. TOLLE), NIST-TR 4702, National Institutes of Standards and Technology, Gaithersburg, MD., (1991)

2. Optimality Conditions for Hierarchical Control, (WITH P. T. BOGGS AND J. W. TOLLE), NIST-TR 6898, National Institutes of Standards and Technology, Gaithersburg, MD., (2002)

3. The Use of Optimization Techniques in the Solution of Partial Differential Equations from Science and Engineering, PhD Thesis and Technical Report, Rice University, Houston TX (1995).

4. Fictitious Domain Methods and Shape Optimization, *SIAM News*, Vol **28**, No. 8. (1994)

5. Book Review: Review of Primal-Dual Interior-Point Methods (Stephen J. Wright), *SIAM Review*, Vol **40**, No. 2. (1998)

Professional Affiliations:

American Academy of Mechanics (AAM),
American Mathematics Society (AMS)
Association of Computational Machinery (ACM),
Society of Industrial and Applied Mathematics (SIAM),
Society for the Advancement of Chicanos and Native Americans in Science
(SACNAS).

Professional Committee and Consulting Work:

Review Panel, National Science Foundation. 1998, 1999, 2001. Jemison Institute
Committee, Dartmouth College. 2000, Computer Science Research Institute
Committee, Department of Energy. 1999-2002, Department of Justice 2003-2005,
Department of Homeland Security 2005.