

Curriculum Vitae, February 2006

WALTER B. RICHARDSON, JR.

Professor of Mathematics
University of Texas San Antonio

ACADEMIC TRAINING

1970-1973: Southwest Texas State University; B.S.-Math., 1973; Summa Cum Laude.
1976-1977: University of Houston; M.S.-Math., 1977; Advisor: J. S. MacNerney
1980-1984: University of North Texas; Ph.D.-Math., 1984; Advisor: J. W. Neuberger.

PROFESSIONAL EXPERIENCE

1973-1976: Officer, Air Weather Service, United States Air Force
1977-1978: Teaching Fellow, The University of Houston
1978-1980: Geophysical Applications Programmer, Atlantic Richfield Company
1980-1984: Teaching Fellow, The University of North Texas
1985-1988: Researcher, Microelectronics and Computer Technology Corp.
1988-1989: Post-Doctoral Fellow, Aerospace Engineering Department, UT Austin
1989-1993: Assistant Professor of Mathematics, UT San Antonio
1993-1998: Associate Professor of Mathematics, UT San Antonio
1999-Present: Professor of Mathematics, UT San Antonio

BIBLIOGRAPHY

Books

1. Graham F. Carey, Walter B. Richardson, Coke S. Reed, and Brian J. Mulvaney, *Circuit, Device, and Process Simulation: Mathematical and Numerical Aspects*, John Wiley & Sons, New York, 1996, ISBN 0-471-960195, 425 pp.

Chapters in Books

1. W. B. Richardson, "A Reaction-Diffusion System Modeling Phosphorus Diffusion," *Semiconductors, Part I - The IMA Volumes in Mathematics and its Applications Volume 58*, A. Friedman and W. Willard, Series Eds., W. M. Coughran, Jr., Julian Cole, Peter Lloyd, and Jacob K. White, Eds., Springer-Verlag, New York 1994, pp. 67-77.
2. Walter B. Richardson, Jr., Chapter 20: "Wavelets Applied to Mammograms" in *Time Frequency and Wavelets in Biomedical Signal Processing*, Metin Akay, Ed., IEEE Press, New York, 1997, pp. 499-516.

Articles

1. Walter Richardson, "Steepest Descent and the Least C for Sobolev's Inequality," *Bulletin of the London Mathematical Society* 18, 1986, pp. 478-484.
2. B. J. Mulvaney and W. B. Richardson, "A Model for Defect-Impurity Pair Diffusion in Silicon," *Applied Physics Letters* 51(18), 1987, pp. 1439-1441.
3. W. B. Richardson and B. J. Mulvaney, "Plateau and kink in P profiles diffused into Si - A Result of Strong Bimolecular Recombination?," *Applied Physics Letters* 53(20), 1988, pp. 1917-1919.
4. Walter Richardson, "Comments on 'Sufficient Conditions for Existence and Diffeomorphism of a Nonlinear Vector Function'," *Proceedings of the IEEE* 77(3), 1989, pp. 496-497.
5. W. B. Richardson and B. J. Mulvaney, "Nonequilibrium behavior of charged point defects during phosphorus diffusion in silicon," *Journal of Applied Physics* 8(4), 1989, pp. 2243-2247.
6. Brian J. Mulvaney, W. B. Richardson, and Timothy L. Crandle, "PEPPER - A Process Simulator for VLSI," *IEEE Transactions on Computer-Aided Design* 8(4), 1989, pp. 336-349.
7. B. J. Mulvaney and W. B. Richardson, "The Effect of Concentration Dependent Defect Recombination Reactions on Phosphorus Diffusion in Silicon," *Journal of Applied Physics* 67(6), 1990, pp. 3197-3199.
8. Walter B. Richardson, Graham F. Carey, and Brian J. Mulvaney, "Modeling Phosphorus Diffusion in Three Dimensions," *IEEE Transactions on Computer-Aided Design* 11(4), 1992, pp. 487-496.
9. Walter B. Richardson, Jr. "Sobolev Gradient Preconditioning for PDE Applications", *Iterative Methods in Scientific Computation IV, IMACS Series in Computational and Applied Mathematics Volume 5*, 1999, pp. 223-234.
10. Walter Richardson, Jr., "Mathematical Aspects of Semiconductor Modeling," *Nonlinear Studies*, 6(2), 1999, pp. 231-240.
11. Walter B. Richardson, Jr., "Sobolev Preconditioning for the Poisson-Boltzmann Equation," *Computer Methods in Applied Mechanics and Engineering*, 181, 2000, pp. 425-436.
12. Walter B. Richardson, Jr., "Steepest Descent using Smooth Gradients," *Journal of Applied Mathematics and Computation*, 112, 2000, pp. 241-254.
13. A. Ardelea, G. F. Carey, A. Pardhanani, and W. B. Richardson, "Simulation of Macroscopic Superconductivity for Microelectronics", *Physica C: Superconductivity*, Vols. 341-348, Part 4, 2000, pp. 2649-2650.
14. Walter B. Richardson, Anand L. Pardhanani, Graham F. Carey, and Alexandre Ardelea, "Numerical effects in the simulation of Ginzburg-Landau models for superconductivity," *Int. J. Numer. Meth. Engng*, 59, 2004, pp. 1251-1272.
15. W. B. Richardson, Jr., "High-Order Sobolev Preconditioning", *Nonlinear Analysis*, 63(2005) pp. e1779-e1787.

16. Graham F. Carey and Walter B. Richardson, Jr., "A note on least-squares methods," *Comm. Num. Methods Eng.*, **22**, 2006, pp. 83-92.

Refereed Conference Proceedings

1. T.L. Crandle, W.B. Richardson, and B. J. Mulvaney, "A kinetic model for anomalous diffusion during post-implant annealing", *Inter. Electron Devices Meeting Technical Digest*, December 1988, pp 636-639.
2. Walter B. Richardson, Jr., "Krylov Subspace Methods for 3-D Process Simulation," *Proceedings of the Seventh International Conference on the Numerical Analysis of Semiconductor Devices and Integrated Circuits (NASECODE)*, Copper Mountain, April 1991, pp. 18-19.
3. Brian J. Mulvaney and Walter B. Richardson, "Physical Models for Impurity Diffusion in Silicon," *Proceedings of NASECODE VII*, Copper Mountain, April 1991, pp. 15-17.
4. W. B. Richardson, H. Longbotham, and D. Gokhman, "Multiscale Wavelet Analysis of Mammograms," *Progress in Wavelet Analysis and Applications: Proceedings of the International Conference Wavelets and Applications, Toulouse, France, June 1992*, Yves Meyer and Sylvie Roques, Eds., Editions Frontieres, 1993, pp. 599-608.
5. H. Longbotham, W. B. Richardson, and D. Gokhman, "Design of Optimal Linear Operators for the Haar Basis," *Progress in Wavelet Analysis and Applications: Proceedings of the International Conference Wavelets and Applications, Toulouse, France, June 1992*, Yves Meyer and Sylvie Roques, Eds., Editions Frontieres, 1993, pp. 593-597.
6. Walter B. Richardson, Jr., "Nonlinear Filtering and Multiscale Texture Discrimination for Mammograms," *Proceedings of the SPIE Conference on Mathematical Methods in Medical Imaging (SPIE Vol. 1768)*, San Diego, July 1992, pp. 293-305.
7. Walter B. Richardson, Jr., "Wavelet Packets Applied to Mammograms," *Proceedings of the SPIE Conference on Biomedical Image Processing and Biomedical Visualization (SPIE Vol. 1905)*, San Jose, February 1993, pp. 504-508.

PRESENTATIONS

- 1988: NUPADS Semiconductor Modeling Conference, San Diego.
- 1990: Texas Partial Differential Equations Conference, Arlington.
- 1991: Texas PDE Conference, San Marcos.
- 1991: NASECODE VII Conference (Semiconductor Modeling), Copper Mountain.
- 1992: Wavelets and Applications Conference, Toulouse, France.
- 1992: SIAM 40th Anniversary Meeting, Los Angeles.
- 1992: SPIE Conference on Mathematical Methods in Medical Imaging, San Diego.
- 1992: World Congress of Nonlinear Analysts, Tampa.
- 1993: SPIE Special Session on Digital Image Processing in Mammography, San Jose.
- 1994: Invited Talk on PDE Filters and Wavelets, NASA Lewis.
- 1994: Interface '94 Applications of Wavelets, Research Triangle.

1994: Least Squares Finite Element Conference, NASA Lewis.
 1996: Texas Institute for Computational and Applied Mathematics, UT Austin.
 1998: IMACS Conference, Austin.
 1999: SIAM Conference on the Geosciences, San Antonio.
 1999: Joint AMS-SMM Meeting, Denton, Texas.
 1999: AMS Sectional Meeting, Austin.
 2000: 6th International Conference on Materials and Mechanisms of Superconductivity and High Temperature Superconductors (M2S-HTSC-VI), Houston.
 2003: SIAM Conference on the Geosciences, Austin
 2004: Legacy of R. L. Moore Conference, Austin
 2004: World Congress of Nonlinear Analysts, Orlando
 2005: 8th US National Congress of Computational Mechanics, Austin

PROFESSIONAL SERVICE

Featured speaker and co-organizer of a 2-day engineering short course *Topics in Semiconductor Process, Device, and Circuit Simulation* held in Austin, July 18-19, 1990. This was administered by Continuing Engineering Studies, College of Engineering, University of Texas at Austin and included participants from Texas Instruments, Advanced Micro Devices, Sony, and Technology Modeling Associates. Similar courses were offered through UT Austin on the dates June 19-21, 1995 and November 11-13, 1996. In addition, during my stay at Motorola in the Spring of 1994, I was asked to give a series of lectures on the theory of wavelets and their applications to signal processing.

SPECIAL RECOGNITION

1991: Visiting Researcher, University of Paris IX - Dauphine.
 1991: Visiting Researcher, Institute for Mathematics and its Applications,
 University of Minnesota.
 1994: Visiting Researcher, Motorola.
 1994: Visiting Scientist, NASA Lewis Research Center.
 1996: Visiting Professor, University of Texas at Austin
 1999: Visiting Researcher, TICAM, UT Austin
 2002: Visiting Professor, Aerospace Engineering Dept., UT Austin
 2004: Visiting Researcher, ICES, UT Austin
 2005: Researcher, Institute for Mathematics and its Applications,
 University of Minnesota, Special Year on Imaging.

FUNDED RESEARCH GRANTS AND CONTRACTS

1. National Science Foundation Research Opportunity Award ECS-870-8082, *Computational Grid Optimization in Engineering*, (\$14,403), 6/1/90-7/31/90.
2. National Science Foundation, Division of Applied Mathematics, DMS-9024712, *Mathematics of Point-Defect Diffusion Models for Semiconductors*, (\$50,000), 6/1/91-6/1/93 (Principal Investigator).

3. National Science Foundation, DMS-9300473, *Research Experiences for Undergraduates in the Mathematical Sciences: Wavelets and their Applications* (\$30,000), 4/1/93-9/30/94 (Principal Investigator).
4. NASA Lewis Research Center, Contract C-71902-C, *PDE Filters in Image Processing and Multiscale Wavelet Analysis of Random Processes*, 5/9/94-8/31/94 .
5. DOD PET Program, Project ET-K4-006, *Mesh Improvement Algorithms and Software Technology*, 6/1/04-5/31/05.

THESIS SUPERVISION

Master's Thesis: Karen R. Baker, *Semiconductor Process Simulation with Matrix Preconditioning*.

UNDERGRADUATE HONOR'S THESES

1. Amy Moch, *Fractal Signature for Texture Discrimination in Mammography* (Poster presented at 1992 Nonlinear Dynamics Days, Austin).
2. Susan Martinez, *Upwinding Strategies for the Shallow Water Equations*, Dec. 2003.