

HUGH ROBERT MACMILLAN

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EDUCATION

University of Colorado, Boulder, CO 8/94-6/01

PhD, Applied Mathematics

“First-Order System Least Squares and Electrical Impedance Tomography,”
co-advised by Profs. Tom Manteuffel and Steve McCormick

Princeton University, Princeton, NJ 8/90-6/94

AB, Pure Mathematics

“Stability of a Pair of Vortex Filaments,” advised by Prof. Andrew Majda

RESEARCH EXPERIENCE

Postdoctoral Research Associate, Florida State University 8/03-present

Prof. Max Gunzburger, School of Computational Science

Adaptive meshfree first-order system least squares using centroidal Voronoi generators to define a partition of unity discretization.

Quantifying uncertainty in modeling the molecular basis of cell cycle and cell fate control during cortical neurogenesis.

Alfred P. Sloan Foundation/Dept. of Energy Postdoctoral Fellow, University of California at San Diego 9/01-8/03

Prof. J. Andrew McCammon, Dept. of Chemistry and Biochemistry

Prof. Michael Holst, Dept. of Mathematics

“Multiscale Modeling of Synaptic Transmission at a Neuromuscular Junction”
Transition to biological problems began with finite element modeling of chemical diffusion and reaction in a pseudo-realistic neuromuscular junction.

NSF VIGRE Research Assistant 9/98-6/01

Prof. T. Manteuffel and Prof. S. McCormick, Dept. of Applied Mathematics

Developed and implemented a first-order system least squares formulation for the inverse problem of electrical impedance tomography (EIT) that unifies existing approaches and provides insight on how to pose the inverse problem well.

Research Assistant 6/96-8/98

Prof. J. Dunn, Dept. of Electrical and Computer Engineering

Treating the curl-free and divergence-free subspaces separately, a preconditioning, or regularization, of the mixed potential integral equation was implemented for modeling microwave integrated circuits.

TEACHING EXPERIENCE

- Instructor, Undergraduate Numerical Analysis II** 1/04-5/04
FSU Department of Mathematics, Tallahassee, FL
- MWF lectures to a small class of senior math majors. Topics included introductions to direct and iterative methods, nonlinear systems, finite differences, and finite elements, particularly as motivated by ordinary and partial differential equations
- Volunteer Tutor, Mrs. Sandra Carrillo's 7th grade ESL math class** 9/01-8/03
Memorial Academy, Barrio Logan, San Diego, CA.
- Weekly in-class visits to facilitate individual attention, promoting algebra and pre-algebra literacy, while also learning Spanish.
- Academic Excellence Workshop Facilitator** 8/96-5/97
Minority Engineering Program, Univ. of Colorado, Boulder, CO
- Conducted weekly two-hour tutoring/homework sessions in Calculus and Differential Equations, as well as private tutoring through MEP.
- Teaching Assistant** 8/94-5/96
Department of Applied Mathematics, Univ. of Colorado, Boulder, CO
- Fall 1994 and Spring 1995, led three weekly recitations in Calculus II, conducted review sessions and graded all assignments. Continued in the same capacity for an Ordinary Differential Equations course the following academic year.

PUBLICATIONS

Biomathematics

- H. R. MacMillan, M. J. McConnell, "Modeling of DNA Damage Response as an Intrinsic Developmental Timer During Cortical Neurogenesis," in preparation.
- H. R. MacMillan, "Toward Quantifying the Influence of DNA Damage and Repair During Cortical Neurogenesis," submitted to Bulletin of Mathematical Biology, October, 2004.
- K. Tai, S. D. Bond, H. R. MacMillan, N. A. Baker, M. J. Holst, and J. A. McCammon, "Finite Element Simulations of Acetylcholine Diffusion in Neuromuscular Junctions," Biophysical Journal, **84**:2234-2241, 2003.
- H. R. MacMillan, M. J. McConnell, K. Tai, "Biological System of Analysis of Systems Math," International Journal of Computer Research, to appear as conference proceedings.

Numerical Analysis

- H. R. MacMillan, M. D. Gunzburger, J. Burkardt, "Adaptive Meshfree First-Order System Least-Squares Using Centroidal Voronoi Generators," in preparation.
- H. R. MacMillan, M. D. Gunzburger, J. Burkardt, "A Meshfree First-Order System Least-Squares Method," in preparation.
- H. R. MacMillan, T. A. Manteuffel, and S. F. McCormick, "First-Order System Least Squares and Electrical Impedance Tomography: Numerical Results," in preparation.
- H. R. MacMillan, T. A. Manteuffel, and S. F. McCormick, "First-Order System Least Squares and Electrical Impedance Tomography," SIAM Journal of Numerical Analysis, **42**(2): 461-483, 2004.

TALKS GIVEN

“Meshfree First-Order System Least Squares”

4th Annual Algebraic Multigrid/First-Order System Least Squares Summit,
Lake City, CO, September, 2004

“Quantifying Uncertainty in Modeling the Balance Between DNA Damage and Repair”

Seminar, Florida State University Medical School, Tallahassee, FL, November, 2004

Minisymposium co-organizer, SIAM Life Sciences, Portland, OR, July, 2004

Minisymposium, World Congress of Nonlinear Analysts, Orlando, FL, July, 2004

Biomathematics Seminar, Dept. of Mathematics, Florida State University,
Tallahassee, FL, October, 2003.

General session, ICIAM, Sydney, Australia, July, 2003.

“Biological System of Analysis of Systems Math”

Invited Seminar, Bauer Center for Genome Research, Harvard University,
Cambridge, MA, April, 2003.

“Toward Computational Subcellular Physiology: Convection, Diffusion, and Reaction
of Acetylcholine at a Neuromuscular Junction”

Colloquium, Dept. of Computational Science, San Diego State University,
San Diego, CA, February, 2002.

Seminar, Center for Nonlinear Studies, Theoretical Division, Los Alamos
National Laboratory, Los Alamos, NM, January, 2002.

“First-Order System Least Squares and Electrical Impedance Tomography”

FOSLS Workshop, Mathematisches Forschungsinstitut, Oberwolfach,
Germany, June, 2002.

Scientific Computation Group Seminar, Dept. of Mathematics, UCSD,
La Jolla, CA, January, 2002.

10th Copper Mountain Conference on Multigrid Methods, Copper
Mountain, CO, April, 2001.

GAMM Workshop on Computational Electromagnetics, Kiel, Germany,
January, 2001.

6th Copper Mountain Conference on Iterative Methods, Copper
Mountain, CO, April, 2000.

“Scalable Solution Methodology for Elliptic PDEs”

Seminar, Gilson Laboratory, NIST/Univ. of Maryland Center for
Advanced Research in Biotechnology, Rockville, MD, September, 2000.

“A Practical Method for Increasing the Speed and Stability of the Matrix Solve in
Moment Method Simulations within a Frequency Band”

Applied Computational Electromagnetics Society Conference,
Monterey, CA, March, 1999.

ADDITIONAL EXPOSURE

Workshop on Control of Cell Growth, Division and Death,
Mathematical Biosciences Institute, Columbus, OH, October, 2003.

Workshop on Modelling Cellular Function, Waiheke Island,
Auckland, New Zealand, July, 2003.

PROFESSIONAL REFERENCES

Applied Mathematics

Prof. Thomas A. Manteuffel, Dept. of Applied Mathematics,
Univ. of Colorado, Boulder, *tmanteuf@colorado.edu*

Prof. Steve F. McCormick, Dept. of Applied Mathematics,
Univ. of Colorado, Boulder, *stevem@colorado.edu*

Prof. Max Gunzburger, School of Computational Science,
Florida State University, Tallahassee, *gunzburg@csit.fsu.edu*

Dr. John Burkardt, School of Computational Science,
Florida State University, Tallahassee, *burkardt@csit.fsu.edu*

Prof. Michael J. Holst, Dept. of Mathematics,
Univ. of California, San Diego, *mholst@ucsd.edu*

Biomathematics

Dr. Mandri Obeyesekere, Dept. of Biomathematics, M. D. Anderson
Cancer Center, Houston, TX. *mandri@biomath.mdacc.tmc.edu*

Prof. Baltazar Aguda, School of Medicine, Boston University,
Boston, MA, *bdaguda@bu.edu*

Prof. J. Andrew McCammon, Dept. of Chemistry and Biochemistry,
Univ. of California, San Diego, *jmccammo@ucsd.edu*