

GENETHA ANNE GRAY

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EDUCATION

Rice University, Houston, Texas

Aug 1997 - May 2002

Ph.D., Computational and Applied Mathematics (CAAM), May 2002.

- *thesis*: “A Variational Study of the Electrical Impedance Tomography Problem”
- *advisors*: Dr. Liliana Borcea and Dr. Yin Zhang

M.A., Computational and Applied Mathematics, May 2001.

California State University, Sacramento

Aug 1995 - May 1997

M.A., Mathematics, May 1997.

University of California, Davis

Sept 1989 - June 1993

B.S., Mathematics, June 1993.

WORK EXPERIENCE

Sandia National Laboratories, Livermore, California

Aug 2002 - present

Post Doc (Aug 2002-Jan 2004) and *Research Staff Member* (Jan 2004-present) in the Computational Sciences and Mathematical Research Department. Involved in the following projects:

- Development of an integrated computational/experimental model to address questions of transmembrane protein structure.
- Parameter identification in a computer simulation of a semiconductor bridge.
- Maintenance and revision of a C++ parallel optimization software code, Asynchronous Parallel Pattern Search (APPS).

Sandia National Laboratories, Livermore, California

summer 1998

Intern in the Scientific Computing Division. Worked with C code for solving large unconstrained minimization problems found in computational chemistry.

Bayer Laboratories, Berkeley, California

1995

Biotechnician in the Recombinant Factor VIII Division. Responsible for carrying out FDA protocol designed to purify products used in the production of blood clotting drugs.

Calgene, Davis, California

1991-1994

Research associate and *Intern* in the Tomato Research and Development Group. Carried out various bench top biology processes (westerns, southern, PCR, and cloning) as well as sterile tissue culture and seed germination assays. Also participated in field trial studies and data collection and analysis.

PAPERS AND TECHNICAL REPORTS

G.A. Gray, T.G. Kolda, K.L. Sale, M.M. Young, “Optimizing an empirical scoring function for transmembrane protein structure determination,” to appear, *INFORMS Journal on Computing*, Special Issue on Computational Biology Issue, vol. 16, no. 4, fall 2004. (also available as Sandia Technical Report SAND2003-8516, August 2003).

- L. Borcea, G.A. Gray, Y. Zhang, "Variationally Constrained Numerical Solution of Electrical Impedance Tomography," *Inverse Problems*, vol. 19, pp. 1159 - 1184, 2003.
- K.L. Sale, J-L. Faulon, G.A. Gray, J. Schoeniger, M.M. Young, "Optimal bundling of the transmembrane helices of integral membrane proteins using sparse distance constraints," to appear, *Protein Science*, 2004.
- K.R. Kavanaugh, J.P. Reese, C.E. Kees, C.T. Kelley, C.T. Miller, A.J. Booker, J.E. Dennis, Jr, D.E. Finkel, M.W. Farthing, G. Couture, G.A. Gray, T.G. Kolda, "A comparison of Optimization Methods for Problems Involving Flow and Transport Phenomena in Saturated Subsurface Systems," in preparation for submission to *Advances in Water Resources*.
- G.A. Gray, "A Variational Study of the Electrical Impedance Tomography Problem," doctoral thesis, Rice University, CAAM Department Technical Report, TR02-02, May 2002.

TEACHING AND MENTORING EXPERIENCE

- Rice University**, Houston, Texas *1997-2000*
Teaching Assistant and Grader: taught recitation, held office hours, prepared homework solutions, and assisted with exam preparation and grading for undergraduate and graduate courses.
- Alliance for Graduate Education and the Professoriate** *summers 2000 and 2001*
Mentor for undergraduate and high school students in science, engineering, and math in the AGEP program held at Rice University.
- California State University, Sacramento** *1995-1997*
Instructor and Tutor: Responsible for preparing and delivering lectures and assigning and grading all homework and exams for undergraduate courses; Member of the staff at the drop in tutoring center provided for students taking undergraduate math courses.

PRESENTATIONS

- July 2004** SIAM Annual Meeting, AWM Workshop, Portland, OR, presentation: "An Empirical Scoring Function for the Optimal Bundling of Transmembrane Helices."
- April 2004** UCLA, Bioengineering Department, seminar: "An Integrated Computational Experimental Approach to the Transmembrane Protein Structure Determination Problem"
- April 2004** IPAM, UCLA, seminar: "Optimal Bundling of Transmembrane Helices Using Sparse Distance Constraints"
- February 2004** SIAM Conference on Parallel Processing for Scientific Computing, San Francisco, CA, poster presentation: "A Parallelized Method of Parameter Identification for Electrical Simulation Software"
- February 2004** Biophysical Society Annual Meeting, Baltimore, MD, poster presentation: "Optimal Bundling of the Transmembrane Helices of Integral Membrane Proteins"
- January 2004** The 5th Biennial Structural Biology Symposium, Membranes: A Challenge for Protein Magnetic Resonance, Florida State University, Tallahassee, FL, poster presentation: "Optimal Bundling of the Transmembrane Helices of Integral Membrane Proteins"
- May 2003** Program for Women in Mathematics: Summer Session on Bio Math, Institute for Advanced Studies, Princeton, NJ, lecture: "Two Examples of Simulation Based Optimization"

- May 2003** Tenth Anniversary Reunion of the Program for Women in Mathematics, Institute for Advanced Studies, Princeton, NJ, poster presentation: “Derivative-Free Optimization for Transmembrane Protein Structure Determination”
- May 2003** California State University, Hayward, seminar: “Two Examples of Simulation Based Optimization”
- April 2003** Simulation and Optimization Workshop, Statistics & Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, NC, poster presentation: “Derivative-Free Optimization for Transmembrane Protein Structure Determination”
- March 2003** Fourth Bay Area Numerical Analysis Day, Stanford University, Palo Alto, CA, presentation: “Derivative-Free Optimization for Transmembrane Protein Structure Determination”
- February 2003** SIAM Conference on Computational Science & Engineering, San Diego, CA, contributed talk: “Transmembrane Protein Structure Determination”
- July 2002** SIAM Annual Meeting, Philadelphia, PA, minisymposium presentation: “A Variational Study of the Electrical Impedance Tomography Problem”
- July 2002** AWM Workshop, SIAM Annual Meeting, Philadelphia, PA, poster presentation: “A Variational Study of the Electrical Impedance Tomography Problem”
- June 2002** Free University, Brussels, Belgium, seminar: “A Variational Study of the Electrical Impedance Tomography Problem”
- September 2001** Keck Center Annual Research Conference, Galveston, TX, poster presentation: “The Use of Variational Methods in Medical Imaging”
- July 2001** SIAM Annual Meeting, San Diego, CA, poster presentation: “Variational Constraints for the Electrical Impedance Tomography Problem”
- May 2001** University of Texas Medical Branch (UTMB) Symposium, Galveston, TX, poster presentation: “Using Variational Principles to Regularize the Electrical Impedance Tomography Problem”
- April 2001** SIAM Southwestern Regional Mathematics in Industry Research, Houston, TX, panelist: “Industrial Internships”
- October 2000** Keck Anniversary Symposium, Houston, TX, poster presentation: “A Study of Variational Methods for Solving the Problem of Electrical Impedance Tomography”
- October 1999** Keck Center Annual Research Conference, Galveston, TX, poster presentation: “Electrical Impedance Tomography for Noninvasive Measurements of the Lung Resistivity”

RESEARCH INTERESTS AND SKILLS

- *Research interests:* Computational Biology, Optimization, and Inverse Problems.
- *Platforms used:* Unix, Linux, Windows, and Macintosh environments.
- *Programming skills:* Fortran 90, C, C++, MPI, Matlab, LaTeX and html.

HONORS AND FUNDING AWARDED

AWM Workshop for recent Ph.D.s, funded participant

July 2004

Proteomics: Sequence, Structure, Function, Institute for Pure and Applied Math (IPAM), UCLA, funded participant

spring 2004

Computational Biophysics Summer School, Beckman Institute, UIUC, Urbana-Champaign, IL *June 2003*
 Institute for Advanced Studies Women's Program in Mathematics, Bio Math Summer Session, funded participant *May 2003*
 AWM Workshop for graduate students, funded participant *July 2002*
 W.M. Keck Center for Computational Biology, predoctoral fellow *1999-2002*
 George R. Brown Computational Engineering, fellow *2000-2001*
 SIAM student participant at the Annual Meeting, funding awardee *July 2001*

PROFESSIONAL LEADERSHIP AND VOLUNTEER WORK

Science Buddies Advisor *2002-2004*
 Sandia Math & Science Awards Banquet hostess and mentor *2003, 2004*
 SIAM committee on the annual meeting. *2001-2003*
 Rice University CAAM department graduate recruitment committee. *1999-2000*
 Judge for the Texas State Science Fair *1999, 2000, & 2002*

PROFESSIONAL MEMBERSHIPS

Society for Industrial and Applied Mathematics (SIAM)
 American Mathematical Society (AMS)
 Association for Women in Mathematics (AWM)
 Association for Computing Machinery (ACM)
 Institution for Operations Research and the Management Sciences (INFORMS)