

Stephanie R. Taylor

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Education

Ph D. 2008 (expected) Computer Science, University of California, Santa Barbara
Emphasis: Computational Science and Engineering
Advisors: Linda R. Petzold, Department of Computer Science
Francis J. Doyle III, Department of Chemical Engineering

B.S. 1998 Mathematics and Computer Science (double major)
Gordon College, Wenham, Massachusetts. *Summa Cum Laude*

Honors and Awards

2008 – 2016 Clare Boothe Luce Program of the Henry Luce Foundation, Colby College
2003 – 2008 Integrative Graduate Education and Research Traineeship Fellowship, UCSB
2006 Institute for Collaborative Biotechnologies Army-Industry Collaboration
Conference Second Place Poster
1998 Inducted into Phi Alpha Chi (Gordon College's honor society)
1997 – 1998 Wood Memorial Scholarship in the Natural Sciences, Gordon College
1994 – 1998 Dean's Scholarship, Gordon College

Research Experience

2004 – 2008 Research Assistant, University of California Santa Barbara

- Implemented BioSens, a general purpose sensitivity analysis toolkit for mathematical models of biological systems
- Developed sensitivity analysis methods for oscillatory systems, with application to circadian clocks
- Developed model reduction techniques to preserve phase response behavior in models of oscillatory systems, with application to circadian clocks
- Collaborated with experimental biologists at The Scripps Research Institute (La Jolla, CA) and Washington University (St. Louis, MO)

Teaching Experience

2005 – 2006 Adjunct Instructor, Westmont College, Santa Barbara, California

- Taught *Fundamentals of Computer Science* and *Modern Programming Languages*
- Responsibilities: Lectured, wrote syllabi, held office hours, assigned and graded coursework, assigned final grades

Professional Experience

1998 – 2003 Software Engineer, JEOL, USA
Contributed to DELTA, the software package accompanying JEOL's nuclear magnetic resonance spectrometer, by developing data processing and visualization features

1996 – 1998 Paid Intern, JEOL, USA

Developed a web-based bug-tracking database program

Development of Mathematical Software

DASPKAdjoint : Sensitivity analysis solver for differential algebraic equation (DAE) systems using the adjoint method

- Authors : Shengtai Li and Linda R. Petzold
- General-purpose production-level software package
- Responsibilities : provided user access to adjoint variable, added support for building on Cygwin, added example programs

BioSens : A General Purpose Sensitivity Analysis Toolkit

- Authors : Stephanie R. Taylor, Rudyanto Gunawan, Kapil Gadkar, Francis J. Doyle III
- Part of DARPA's Bio-SPICE software project
- Matlab graphical user interface with DASPK as the sensitivity analysis computational engine
- Responsibilities : chief architect and developer

Peer-Reviewed Journal Articles

SR Taylor, FJ Doyle III, LR Petzold, Oscillator Model Reduction Preserving the Phase Response: Application to the Circadian Clock, *Biophys. J.*, in press

N Bagheri*, **SR Taylor***, K Meeker, LR Petzold, FJ Doyle III. Synchrony and Entrainment Properties of Robust Circadian Oscillators, *J. R. Soc. Interface*, in press
(*Equal contribution)

SR Taylor, R Gunawan, LR Petzold, and FJ Doyle III. Sensitivity Measures for Oscillating Systems: Application to Mammalian Circadian Gene Network, *IEEE Trans. Automat. Contr.*, 153:177-188, 2008

H Mirsky, R Gunawan, **SR Taylor**, J Stelling, FJ Doyle III. Noise Propagation and Sensitivity in Mammalian Circadian Clocks, *PLoS Comput. Biol.*, submitted

MN Zeilinger*, EM Farre*, **SR Taylor**, SA Kay, and FJ Doyle III. A novel computational model of the circadian clock in *Arabidopsis* that incorporates PRR7 and PRR9. *Mol. Syst. Biol.* 2:58, 2006 (* Equal contribution)

Peer-Reviewed Conference Proceedings

SR Taylor*, N Bagheri*, K Meeker, LR Petzold, FJ Doyle III. Robust Timekeeping in Circadian Networks: From Genes to Cells. FOSBE 2007 (Foundations of Systems Biology in Engineering), Stuttgart, Germany, Sep 2007
(*Equal contribution)

N Bagheri, **SR Taylor**, FJ Doyle III, and J Stelling. A Finite Differences Approach to Phase-Based Sensitivity Analysis of Biological Oscillators, FOSBE 2005 (Foundations of Systems Biology in Engineering), U.C. Santa Barbara, Santa Barbara, CA, Aug 2005

Presentations

- September 29, 2007 Invited Speaker, 2007 Biomedical Engineering Society (BMES) Fall Meeting, Hollywood, CA
Title: Analyzing Circadian Networks with Parametric Impulse Phase Response Curves
- February 19, 2007 SIAM Conference on Computational Science and Engineering 2007, Costa Mesa, CA
Title: BioSens: A Sensitivity Analysis Toolkit for Systems Biology
- November 3, 2006 Invited Speaker, Natural and Behavioral Sciences Seminar Westmont College, Santa Barbara, CA
Title: Plants, Clocks, Math, and Computers
- October 13, 2006 The First Annual Graduate Student Conference Department of Computer Science, UCSB, Santa Barbara, CA
Title: Analyzing the Phase Behavior of the Circadian Clock in *Arabidopsis thaliana*
- March 1, 2006 Invited Speaker, Mathematics and Computer Science Graduate Seminar California State University, Channel Islands.
Title: Numerical Analysis in Systems Biology

Book Chapters

JE Shoemaker., PS Chang, EC Kwei, **SR Taylor**, and FJ Doyle III. *Robustness and Sensitivity Analysis in Cellular Networks* in Control-Theoretic Approaches in Systems Biology, eds. B Ingalls and P Iglesias, MIT Press, in press

SP Hildebrandt, N Bagheri, R Gunawan, HP Mirsky, J Shoemaker, **SR Taylor**, LR Petzold, and FJ Doyle III. *Systems Analysis of Biological Networks* in Systems Biology, eds. ET Liu, GP Nolan, DA Lauffenburger, to be published by Academic Press

Posters and Abstracts

SR Taylor, FJ Doyle III, and LR Petzold. Phase Response-Based Model Reduction Improves Analysis of Clock Models, Society for Research on Biological Rhythms 11th Biennial Meeting, Sandestin, FL, May 2008

PS Chang, **SR Taylor**, S An, ED Herzog, LR Petzold, and FJ Doyle III, Phase Dependent Gating of the Vasoactive Intestinal Polypeptide Signaling Pathway in the Suprachiasmatic Nucleus, ICSB 2007 (The Eighth International Conference on Systems Biology), Long Beach, CA, Oct 2007

SR Taylor, R Gunawan, F J Doyle III, and LR Petzold. Analyzing Phase Dynamics of Limit Cycle Systems with Application to the Circadian Clock, Meeting of the National Centers of Integrative and Systems Biology 2007, Boston/Cambridge, MA, Jun 2007

SR Taylor, R Gunawan, FJ Doyle III, and LR Petzold. Analyzing Phase Dynamics of Limit Cycle Systems with Application to the Circadian Clock, Stanford 50: State of the Art and Future Directions of Computational Mathematics and Numerical Computing, Palo Alto, CA, Mar 2007

HP Mirsky, R Gunawan, **SR Taylor**, and FJ Doyle III, Sensitivity Analysis of Mammalian Circadian Clocks, AIChE Annual Meeting, San Francisco, CA, Nov 2006

SR Taylor, FJ Doyle III, and LR Petzold, Sensitivity Analysis in Systems Biology, 2006 IGERT Project Meeting, Arlington, VA, May 2006

SR Taylor, N Bagheri, R Gunawan, and F J Doyle III, Capturing Phase Dynamics of Circadian Clocks, 2006 ICB Army-Industry Collaboration Conference, U.C. Santa Barbara, Santa Barbara, CA, May 2006

R Gunawan, **SR Taylor**, and FJ Doyle III, Sensitivity Analysis in Biological Modeling: an Application in the Model Development of Staphylococcal Enterotoxin B Pre-Apoptotic Pathways, AIChE Annual Meeting, Cincinnati, OH, Nov 2005

SR Taylor, R Gunawan, and FJ Doyle III, BioSens : Sensitivity Analysis Toolkit for Bio-SPIICE, 2005 ICB Army-Industry Collaboration Conference, U.C. Santa Barbara, Santa Barbara, CA, Apr 2005

Workshops and Conferences Attended

May 17-21, 2008. Society for Research on Biological Rhythms 11th Biennial Meeting, Sandestin, FL

Sep 26-29, 2007. 2007 Biomedical Engineering Society (BMES) Fall Meeting, Hollywood, CA

Jul 2 - Aug 10, 2007. Biological Switches and Clocks Program, Kavli Institute for Theoretical Physics, U C Santa Barbara, Santa Barbara, CA

Jun 12-14, 2007. Meeting of the National Centers of Integrative and Systems Biology 2007, Boston/Cambridge, MA

Mar 29-31, 2007. Stanford 50: State of the Art and Future Directions of Computational Mathematics and Numerical Computing, Palo Alto, CA

Feb 19-23, 2007. SIAM Conference on Computational Science and Engineering 2007, Costa Mesa, CA

Oct 4-7, 2006. Feedback and Dynamics in Nature Workshop, and the Grace Hopper Celebration of Women in Computing Conference 2006, San Diego, CA

May 10-11, 2006. 2006 ICB Army-Industry Collaboration Conference, U.C. Santa Barbara, Santa Barbara, CA

Aug 7-10, 2005. Foundations of Systems Biology and Engineering (FOSBE) 2005, U.C. Santa Barbara, Santa Barbara, CA

May 9-10, 2005. The Third SBML Hackathon, National Museum of Emerging Science and Innovation, Tokyo, Japan

Jan 24-25, 2005. Bio-SPICE Engineering Product Development Task Force Hackathon, SRI, Menlo Park, CA

Professional Memberships

Society of Industrial and Applied Mathematics

Graduate Coursework and Seminars

Courses

- Computational Geometry
- Implementations of Modern Programming Languages
- Automata-based Complexity
- Preconditioning Iterative Methods in Computational Science
- Applied Parallel Computing
- Matrix Analysis and Computation
- Sparse Matrix Algorithms
- Numerical Simulation (of Ordinary Differential Equations)
- Numerical Solution of Partial Differential Equations - Finite Difference Methods
- Applied Dynamical Systems I and II

Seminars

- Systems Biology Seminar (joint with Caltech)
- Theoretical Ecology Seminar

Outreach

- Participated in recruitment activities
 - IGERT recruitment lunch at the Grace Hopper Celebration (Oct 2006)
 - UCSB CS department recruitment lunch at Cal Poly San Luis Obispo
- Coordinated frequent research meetings for a collaboration across 3 campuses
- Developed, with R. Gunawan, an introduction to software for systems biology, presented in UCSB's ChE 154 in the springs of 2005, 2006, and 2007