

# PER DANZL

## Curriculum Vitae

### Home Address

1078 Miramonte Drive  
Apartment 3  
Santa Barbara, CA 93109  
pdanzl@engineering.ucsb.edu

### Dept. Address

Department of Mechanical Engineering  
University of California Santa Barbara  
Engineering II Building  
Santa Barbara, CA 93106-5070  
Dept Phone: 805-893-2430  
Dept Fax: 805-893-8651

### Research Experience

**Research Assistant** 04/2006–Present  
Department of Mechanical Engineering, UCSB.  
Performing original research in population-level dynamics of stimulated neuron systems under the direction of Prof. J. Moehlis. Also researching closed-loop control methods for coupled neuron systems with application to electrical deep brain stimulation therapy for Parkinson’s Disease.

### Industry Experience

**Engineer** 01/2003–06/2005  
Honeywell Engine Systems and Accessories.  
Dynamical systems modeling, analysis, and design for electrohydraulic actuation and fuel control for military and commercial aircraft platforms.

### Teaching Experience

**Teaching Assistant** 09/2005–03/2006  
Department of Mechanical Engineering, UCSB.  
Sensors and Actuators Laboratory Fall 2005  
Senior Design II Winter 2006  
**Graduate Mentor** 02/2005  
W.E.B. DuBois Writing Program, UCSB.

### Education

**University of California Santa Barbara** Santa Barbara, CA  
September 2005-Present. Dynamical systems and control with applications to neural systems. Recent coursework includes cooperative control over networks, probability theory, system identification, non-cooperative game theory, nonlinear control systems, chaos, measure theory, and numerical methods. Current overall GPA 3.9.  
**University of Minnesota** Minneapolis, MN  
B.S. in Mechanical Engineering, December 2002. Overall GPA 3.55. Departmental GPA 3.9.

### Refereed Journal Articles

“Partial phase synchronization of neural populations due to random Poisson inputs” with R. Hansen, G. Bonnet, and J. Moehlis. To appear in the *Journal of Computational Neuroscience*.

## Refereed Conference Proceedings

“Event-Based Feedback Control of Nonlinear Oscillators Using Phase Response Curves” with J. Moehlis. To appear in *Proceedings of the 46th IEEE Conference on Decision and Control* New Orleans, LA 2007.

“Spike Timing Control of Oscillatory Neuron Models Using Impulsive and Quasi-Impulsive Charge-Balanced Inputs” with J. Moehlis. Submitted to the *American Control Conference*, 2008.

## Research Interests

I am currently studying how large populations of neurons respond to various types of stimulus depending on their internal dynamics and network coupling parameters. I am interested in novel approaches for electrical deep brain stimulation for patients with Parkinson’s Disease or other neuromotor disorders.

Nonlinear control systems using feedback electrodes offer promising opportunities to mitigate collateral tissue damage by optimizing the stimulus for minimum power and net charge balance. Under investigation is a novel control scheme using phase response information to schedule controller gain and stimulus timing.

## Talks

*Event-Based Feedback Control of Nonlinear Oscillators Using Phase Response Curves*, 46th IEEE Conf. on Decision and Control, New Orleans LA, December 14 2007.

*Feedback Control of Neural Spike Synchrony Using Phase Response Curves*, IGERT Student Research Symposium, Carnegie-Mellon University, June 24, 2007.

*Phase Reduction Methods and Application to Feedback-Controlled Deep Brain Stimulation*, The Mathematics of Parkinson’s Disease Mini-Symposium, SIAM Conference on Applications of Dynamical Systems, Snowbird UT, May 28, 2007.

*Desynchronize This! Event-Based Feedback Control of Nonlinear Oscillators*, IGERT Systems Biology Seminar, UC Santa Barbara, April 9, 2007.

*Partial Phase Synchronization of Uncoupled Populations: An Application of Phase Reduction Methods*, Theoretical Ecology Seminar, UC Santa Barbara, November 29, 2006.

## Poster Sessions

*Partial Phase Synchronization of Uncoupled Populations: An Application of Phase Reduction Methods*, Selected for Poster Spotlight Presentation. Grand Challenges in Neural Computation: Measurement, Analysis, and Modeling of Cellular and Network Dynamics, Santa Fe NM, February 19-21, 2007.

## Workshops Attended

**Mathematical Sciences Research Institute** Berkeley, CA  
Introductory Workshop on Dynamical Systems with Emphasis on Extended Systems, January 22–26, 2007.

**Mathematical Biosciences Institute** Ohio State University  
Introduction to Mathematical Neuroscience, September 11–15, 2006.

**iSight** South Bend, IN  
Model Integration and Optimization Seminar, August 2004.

**Integrated Engineering Software** Cincinnati, OH  
Boundary Element Electromagnetics Modeling Workshop, May 2004.

**ANSOFT** Detroit, MI  
Electromagnetics Modeling Workshop, October 2003.

**Awards and Honors**

**National Science Foundation IGERT Fellowship** Winter 2007  
Department of Mechanical Engineering, University of California Santa Barbara.

**Walter and Margaret Pierce Scholarship** Spring 2000  
Department of Mechanical Engineering, University of Minnesota.

**Institute of Technology Deans List** Fall/1999–Winter/2002  
Department of Mechanical Engineering, University of Minnesota.

**Memberships** Institute for Electrical and Electronics Engineers - Student Member, Control Systems Society  
Society for Industrial and Applied Mathematics - Student Member, Dynamical Systems Activity Group