Guangyuan Liao, PhD

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I have been a teaching and research assistant for the past five years. For teaching, I was the recitation leader of 1-2 courses for each semester and a computational lab instructor. For research, I completed a project and my dissertation. I developed a deep understanding of dynamical systems, mathematical biology and circadian rhythms. I also developed many skills including programming, mathematical modeling, data analysis and scientific article writing.

EDUCATION

PhD   New Jersey Institute of Technology, Applied Mathematics   2020
GPA: 3.844/4
Advisor: Dr. Amitabha Bose
Dissertation: Mathematical models and tools to understand coupled circadian oscillations and limit cycling systems.

MS   Sichuan University, Computational Mathematics   2014
Advisor: Dr. Bing Hu

BS   Sichuan University, Mathematics   2011

RESEARCH INTERESTS

Dynamical System: limit cycling systems, invariant manifold computation, poincare maps.

Mathematical biology: neural networks, circadian rhythms, modeling, model reduction techniques.

Data sciences: parameter estimation, machine learning.

PUBLICATIONS AND CONFERENCE PRESENTATIONS

Guangyuan Liao, Casey Diekman, Amitabha Bose (2020). Entrainment dynamics of forced hierarchical circadian systems revealed by 2-dimensional maps. SIADS, in press, arXiv.

Guangyuan Liao, Casey Diekman, Amitabha Bose. Mathematical Models and Tools for understanding the Entrainment of Hierarchical Circadian System. SIAM Conference on Appl. Dyn. Syst., 2019. Poster.

Guangyuan Liao, Casey Diekman, Amitabha Bose. Entrainment dynamics of forced hierarchical circadian systems. Dynamics Days, 2020. Poster.

Guangyuan Liao, Amitabha Bose. Maps for coupled hierarchical kuramoto oscillators with discontinuous forcing. In preparation.

RESEARCH EXPERIENCE

Research assistant   2016 - 2020
Advisor: Dr. Amitabha Bose
Dissertation
- Two mathematical models of hierarchically coupled circadian systems.
- First order phase-amplitude approximation of limit cycling systems.
- Isochron visualization of two dimensional limit cycling systems.
- Low dimensional mapping tools for high dimensional systems.

Project: Develop models and novel tools to understand circadian systems.
- Developed two mathematical models to study the entrainment of circadian oscillators.
- Developed a method, entrainment map, to predict the entrainment time and direction of entrainment.

TEACHING EXPERIENCE

New Jersey Institute of Technology, Newark, NJ   August 2015 - May 2020
Teaching assistant, Department of Mathematical Sciences
- Taught Calculus I,II, an undergraduate course averaging 40 students per semester, covering the following topics: differentiation, integration, limits, elementary functions.
- Graded quizzes, exams, and homework.

Lab instructor, Department of Mathematical Sciences   Fall 2019

- Taught two lab sections of two courses (Mathematical modeling, Teaching in mathematics).
- Taught students basic programming skills to solve scientific computing problems.
- Developed homework and final projects, see course materials.

Sichuan University, Chengdu, China   September 2012 - July 2014
Teaching assistant, Department of Mathematical Sciences
- Assisted the instructors of two graduate courses (Linear Algebra, Analysis).
- Graded homework and exams.

COMPUTER SKILLS

Programming: MATLAB, LaTeX, Julia, Mathematica, Python, C++, HTML.

Platforms: Windows, Linux, MAC.