Ruobing Zhao

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https://ruobingzhao.github.io/

Overview

- Ph.D. graduate of University of California, San Diego. Dissertation on Optimal Control Theory
- Strong background in Mathematics (Advanced Probability Theory, Partial Differential Equations, Stochastic Calculus, Numerical Methods, Mathematical Physics)
- Excellent communication skills

Skills

- **Programming:** C++, Python, MATLAB, Excel

Education

Ph.D. Mechanical Engineering (Control Theory) 2013/9 - 2019/9
University of California, San Diego
Dissertation Title: "Stationary-Action Stochastic Control Representation of the Schrödinger Initial Value Problem"

B.S. Chemical Engineering (major), Mathematics (minor) 2009/9 - 2013/6
University of California, Los Angeles
with Honors; major GPA: 3.74; minor GPA:4.00 (out of 4.00)

Work Experience

Research Assistant 2013/9 - 2019/8
University of California, San Diego
Conducted research on the connection between stochastic control problems and second-order Hamilton-Jacobi-Bellman partial differential equations (HJB PDEs) that arise in classical and quantum mechanics. Developed a high performance control-theoretic numerical method for these HJB PDEs. Developed a numerical method utilizing controlled diffusion process representation to solve Schrödinger initial value problems (IVPs). Studied the conditions for existence of strong solutions for a class of degenerate stochastic differential equations (SDEs).

Teaching Assistant 2014/9 - 2019/6
University of California, San Diego
- Tutored masters students and first-year Ph.D. students in advanced material from control theory and mathematics. Topics covered include: optimal control, dynamic programming, measure theory and functional analysis, probability theory
- Gave lectures (one lecture per week) to undergraduate engineering students on numerical methods for computation
- Tutored undergraduate engineering students in programming in Matlab
- Graded assignments and exams
- Maintained student grade and enrollment record
- Received overwhelmingly good reviews from students. Teaching evaluations are available on website.

Teaching History:
Graduate courses: Optimal Control*, Real Analysis for Application
Undergraduate courses: Numerical Methods*, Introduction to Programming with Matlab
* Recommended in 100% of student evaluations in recent assignments

Honors

- Dean's Honor List multiple times during undergraduate studies at UCLA
- 2013-2016 Charles Lee Powell Foundation Graduate Fellowship
- 2018 UCSD Departmental Dissertation Writing Fellowship

Publications - Journals

3. "Staticization and Iterated Staticization", with W. McEneaney, *SIAM Journal on Control and Optimization, Vol 60, Issue 3, 2022*
2. "Solution Existence and Uniqueness for Degenerate SDEs with Application to Schrödinger-Equation Representations", with W. McEneaney, P. Dower, H. Kaise, T. Wang, *Communications in Information and Systems, Vol 21, Number 2, 2021*
1. "Diffusion Process Representations for a Scalar-Field Schrödinger Equation Solution in Rotating Coordinates", with W. McEneaney, *Numerical Methods for Optimal Control Problems, Springer INDAM Series, Vol. 29*

Publications - Conferences

4. "Strong Solution Existence for a Class of Degenerate Stochastic Differential Equations", with W. McEneaney, P. Dower, H. Kaise, *International Federation of Automatic Control (IFAC) World Congress 2020.*
3. "Iterated Staticization and Efficient Solution of Conservative and Quantum Systems", with W. McEneaney, *Proceedings of SIAM Conference on Control and Its Applications 2019.*
2. "Employing the Staticization Operator in Conservative Dynamical Systems and the Schrödinger Equation", with W. McEneaney, *Proceedings of Asian Control Conference 2019.*
1. "A Diffusion-Based Solution Technique for Certain Schrödinger Equation Dynamical Systems", with W. McEneaney, *Proceedings of European Control Conference 2018*.

Contributed Presentations

5. SIAM Conference on Control & Its Applications 2019, Chengdu, China
   "Iterated Staticization and Efficient Solution of Conservative and Quantum Systems" (with W. McEneaney)
4. Asian Control Conference 2019, Kitakyushu, Japan
   "Employing the Staticization Operator in Conservative Dynamical Systems and the Schrödinger Equation" (with W. McEneaney)
3. SIAM Conference on Control & Its Applications 2017, Pittsburgh, PA
   "Hamilton-Jacobi Equations for Two-Point Boundary-Value Problems in Conservative Systems and Dequantized Schrödinger Equations" (with W. McEneaney, P. Dower)
2. SIAM Conference on Control & Its Applications 2017, Pittsburgh, PA
   "A Complex-valued Controlled-diffusion Representation for the Schrödinger Equation in a Rotating Frame" (with W. McEneaney)
1. Southern California Control Workshop 2017, Caltech
   "Diffusion Process Approximation for a Solution of the Schrödinger Equation" (with W. McEneaney)