Ruobing Zhao

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LinkedIn

OVERVIEW

- Ph.D. graduate from University of California, San Diego (Class of 2019)
- Specialization in Stochastic Optimal Control Theory
- Strong background in Control Theory, Advanced Probability Theory, Convex Optimization
- Publication at top venues including Society for Industrial and Applied Mathematics (SIAM)
- Excellent communication skills

SKILLS

- **Programming:** MATLAB, C++, Python, Haskell
- **Mathematics:** Real Analysis, Probability Theory, Functional Analysis, Convex Optimization, Stochastic Differential Equations, Stochastic Calculus, Statistics, Numerical Methods for Computation, Mathematical Finance
- **Control Theory:** Optimal Control, Linear Systems and Control, Nonlinear Systems, Nonlinear Control, Hybrid Systems Control
- **Other Skills:** HTML, CSS, LaTeX

RESEARCH INTERESTS

Stochastic control; optimal control; dynamical systems; stochastic differential equations; calculus of variations

EDUCATION

Ph.D. Mechanical Engineering (Control Theory) 2013/9 - 2019/8
University of California, San Diego
"Stationary-Action Stochastic Control Representation of the Schrödinger Initial Value Problem"
Dissertation Committee:
William M. McEneaney (Chair), Ruth J. Williams (Co-chair),
Robert R. Bitmead, Jorge Cortés, Patrick J. Fitzsimmons

M.S. Mechanical Engineering (Control Theory) 2013/9 - 2015/5
University of California, San Diego

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

EXPERIENCE

Research Assistant 2013/9 - 2019/8

University of California, San Diego

- Worked on research projects in optimal control and advanced mathematics:
  Studied 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).
- Wrote papers for publication at top conferences and academic journals
- Gave presentations at multiple academic conferences and workshops

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
- Tutored undergraduate engineering students in programming in Matlab
- Gave lectures to undergraduate engineering students on numerical methods for computation
- Graded assignments and exams
- Maintained student grade and enrollment record
- Received overwhelmingly good reviews from students

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

Referee 2017/9 - 2017/12

European Control Conference (2018)

- Wrote review reports of research papers on control theory submitted to the conference
- Recommended acceptance or rejection decisions to the program committee

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

6. "Strong Solutions for a Class of Degenerate SDEs", with W. McEneaney, P. Dower, H. Kaise, *In preparation.*
5. "Staticization and Iterated Staticization", with W. McEneaney, *Submitted to SIAM Journal on Control and Optimization.*
4. "Iterated Staticization and Efficient Solution of Conservative and Quantum Systems", with W. McEneaney, *Proceedings of SIAM Conference on Control and Its Applications 2019.*
3. "Employing the Staticization Operator in Conservative Dynamical Systems and the Schrödinger Equation", with W. McEneaney, *Proceedings of Asian Control Conference 2019.*

2. “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*

1. “A Diffusion-Based Solution Technique for Certain Schrödinger Equation Dynamical Systems”, with W. McEneaney, *Proceedings of European Control Conference 2018*.

CONTRIBUTED LECTURES AND 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)

REFERENCE

Professor William McEneaney (Ph.D. advisor), wmceneaney@eng.ucsd.edu