

Kenneth Caluya

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EDUCATION **University of California, Riverside**
B.S. Applied Mathematics, June 2013 - June 2017

University of California, Santa Cruz
PhD Applied Mathematics, September 2017 - Current

RESEARCH EXPERIENCE **Interests**
- Probability, Differential Equations and Dynamical Systems, Optimization

Proximal Algorithm for Uncertainty Propagation in Stochastic Nonlinear Systems with Professor Abhishek Halder

- We developed a new method to solve the Fokker-Planck equation and similar PDE's.
- Our methodology breaks away from the traditional approach of spatial discretization for this second-order PDE's which suffers from "curse-of-dimensionality".
- This approach enables meshless computation leading to remarkably fast computation that is straightforward to implement and numerically stable, even in high dimensions.

Undergraduate Research in Mathematical Oncology

- Used ODE's to model the growth of cancer cells and analyze their asymptotic behavior.
- Found estimates on the variance and expected death times of the cell when external factors such as treatment and medicine are introduced.

Measure theoretic probability research with Professor David Weisbart

- We studied the convergence of the spectra of Hamiltonian operators associated with certain finite dimensional quantum systems.
- We investigated the convergence of continuous time random walks on grids to brownian motion.

PUBLICATIONS AND PREPRINTS **Journal Papers**

- **K.F. Caluya**, and A. Halder. Gradient Flow Algorithms for Density Propagation in Stochastic Systems. to appear IEEE Transactions on Automatic Control

Conference Papers

- **K.F. Caluya**, and A. Halder. Proximal Recursion for Solving the Fokker-Planck Equation. American Control Conference, Philadelphia, 2019.

Preprints

- **K.F. Caluya**, and A. Halder. Finite Horizon Density Control for Static State Feedback Linearizable System arXiv:1904.02272
- A. Halder, **K.F. Caluya**, B. Travacca, and S.J. Moura Hopfield Neural Network Flow: A Geometric Viewpoint arXiv:1908.0127

- **K.F. Caluya**, and A. Halder. Finite Horizon Density Steering for Multi-input State Feedback Linearizable Systems arXiv:1909.12511

TEACHING
EXPERIENCE

Teaching

- Teaching Assistant for AMS 10 (Linear Algebra) (Fall 2017)
 - Held two hour lab sections per week, graded quizzes and exams, provide office hours and general academic support.
- Teaching Assistant for MATH 149A/B (Mathematical Probability and Statistics) at the University of California, Riverside (Summer 2018)
 - Mentored 19 undergraduate students in a double credit 7-week summer course in probability theory.
 - Held office hours every week, provide solutions to quizzes and worksheets.
 - Prepared students for undergraduate research topics in probability. The projects will be continued after the course.

PRESENTATIONS

- *Mathematical Oncology*, Undergraduate Research Presentations at UC Riverside, Spring 2016. (<https://sites.google.com/site/ucrundergradmathresearch>)
- *Proximal Algorithms for Uncertainty Propagation in Stochastic Nonlinear Systems*, Poster Session at CITRIS/CPAR Control Theory and Automation Symposium, UCSC, April 2018.
- Gradient Flow Algorithms for Density Propagation in Stochastic Systems, Slide Presentation at CITRIS/CPAR Control Theory and Automation Symposium, UC Berkeley, April 2019.
- Gradient Flow Algorithms for Density Propagation in Stochastic Systems, Slide Presentation at *ACC 2019* Philadelphia, July 2019.

RELEVANT SKILLS Programming: MATLAB, Fortran, C++