School of Mathematical and Statistical Sciences
Arizona State University

M E M O R A N D U M

DATE: 05/01/2024

TO: Faculty and Students

FROM: Professor(s) Dan Cheng and John Fricks
Chair/Co-Chairs of Henrique Cheng
Defense for the PhD in Statistics
Committee Members
Ming-Hung Kao
Sebastien Motsch
Shiwei Lan

DEFENSE ANNOUNCEMENT

Candidate: Henrique Cheng

Defense Date: Wednesday, May 15, 2024

Defense Time: 10:00 AM

Virtual Meeting Link: https://asu.zoom.us/j/4124316003 Room: WXLR A206

Title: Effects of Stochastic Phase Variation on Parameter Estimation in Dynamical Systems

Please share this information with colleagues and other students, especially those studying in similar fields. Faculty and students are encouraged to attend. The defending candidate will give a 40-minute talk, after which the committee members will ask questions. There may be time for questions from those in attendance. But, guests are primarily invited to attend as observers and will be excused when the committee begins its deliberations or if the committee wishes to question the candidate privately.

ABSTRACT
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ABSTRACT

Accurate parameter estimation in systems of ODEs can be critical to a scientific analysis due to the often physical interpretation of parameters. Historically, researchers have mainly built models incorporating the effects of amplitude variation — the differing magnitude of responses at any given point in time that is typically modeled as additive iid Gaussian error — on parameter estimates. What does not appear to be implemented yet is a model incorporating the effects of phase variation — the differing points in time where features of a process occur — as well. I present a Bayesian hierarchical model to address this objective in which a key focus is the improved performance of using Hamiltonian Monte Carlo (HMC) to estimate the posterior distribution. Both simulated and experimentally gathered data are used to demonstrate the performance of the model and consequences of ignoring phase variation. Lastly, I conduct studies on the asymptotic performance of a parameter estimator within a frequency framework.