

Xiong Ding

PHYSICS PH.D. · SOFTWARE ENGINEER

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— looking for an entry-level full-time *quantitative researcher* position —

Current Experience

Airbnb Software Engineer San Francisco, CA, USA May. 2017 – Present

Infrastructure team

- **Main responsibility:** Build and maintain Ebert (the review service) for *airbnb.com*.
- **Details:**
 - Increase the performance of this service: P95 latency from 85ms to 45ms.
 - Setup **review Elasticsearch** cluster for full-text search on reviews on listing pages.
 - Cooperate with core-storage team to build **review pipeline** to serve review aggregated data, i.e, review count, review overall rating.
- **Core metrics&features:**
 - QPS: Average: 10K. Peak: 12K. Traffic comes from room description page, user profile page, checkout page and so on.
 - Latency: Overall, P95: ~45ms; ~P99: ~80ms; P999: ~250ms. Different endpoints have different latency.
 - Features: • Mcrouter cache enabled • Horizontal scalable • Accompanied by mutation publisher
- **Framework & tools:** Dropwizard, Chef, Airflow, Elasticsearch, Mcrouter Cache, Powergrid(multithreading)

Skills

Programming: Proficient: Java; Familiar: C++
Domain knowledge: Numerical PDE, Matrix analysis, Nonlinear dynamics
Libraries: Boost.Python, Eigen, ARPACK, OpenMP, OpenMPI, FFTW

Education

Ph.D. in Physics		Georgia Institute of Technology	Atlanta, GA, USA	Aug. 2012 – May. 2017
• adviser: Prof. Predrag Cvitanović	• Research area :	nonlinear dynamics, cycle expansion theory, complex Ginzburg-Landau equation		
M.S. in Computer Science & Engineering	GPA: 3.86/4.0	Georgia Institute of Technology	Atlanta, GA, USA	Jan. 2016 – Jun. 2016
B.S. in Physics	GPA: 3.75/4.0	Wuhan University	Wuhan, China	Sep. 2008 – Jun. 2012

Graduate Courses

- **Math:** Real analysis, Numerical methods for ODEs, Numerical linear algebra
- **Physics:** Nonlinear dynamics, Statistical mechanics, Quantum field theory
- **Computer science:** High Perform Computing (HPC), Computational data analysis, Computability&Algorithms
- **Finance (self-study):** Stochastic Calculus for Finance I&II; Options, Futures, and Other Derivatives

Research Experience

Center for Nonlinear Science, School of Physics, Georgia Institute of Technology Atlanta, GA, USA Jun. 2013 – May. 2017

- **Research topic:** *Computation of Floquet vectors in Kuramoto-Sivashinsky system*
 - **main Result:** Find the smallest eigenvalue of Floquet matrix to be order of 10^{-3000} with relative accuracy 10^{-14} .
 - **tools/skills used:** C++, Boost.Python, Boost.Numpy, HDF5, Arpack, Matrix decomposition, Eigen
- **Research topic:** *Investigation of the local dimension of inertial manifolds in chaotic systems*
 - **main Result:** We show strong evidence that the inertial manifold of 1-d Kuramoto-Sivashinsky system has dimension 8.
 - **tools/skills used:** C++, Matlab, Exponential integrators
- **Research topic:** *Symbolic dynamics in symmetry reduced 1-d Kuramoto-Sivashinsky system*
 - **main Result:** In the symmetry reduced state space, we propose to obtain the symbolic dynamics of 1-d KS equation by constructing appropriate Poincaré sections.
 - **tools/skills used:** C++, Matlab, Eigen, Cycle expansion theory

School of Mathematics, Georgia Institute of Technology Atlanta, GA, USA Jan. 2016 – Jun. 2016

- **Research topic:** *Time-step adaptive exponential integrator for soliton explosions in 1d and 2d cubic quintic Ginzburg-Landau systems*
 - **main Result:** Formulize a new time-step adaptive exponential integrator for complex GL equation.
 - **tools/skills used:** Numerical PDE, C++, Boost, Numpy, Matplotlib

Conferences & Talks

SIAM Conference on Application of Dynamical Systems	Snowbird, Utah, USA	May 2015
Talk: Periodic Eigendecomposition and Its Application in Nonlinear Dynamics	Coauthor: Prof. P. Cvitanović	
Dynamics Days US	Atlanta, GA, USA	Jan. 2014
Poster: Lyapunov exponents, Floquet exponents and covariant vectors in Kuramoto-Sivashinsky equation	Coauthor: Prof. P. Cvitanović	

Publications

- [1] **X.Ding**, H. Chaté, P. Cvitanović, E. Siminos, and K. A. Takeuchi , *Estimating the dimension of an inertial manifold from unstable periodic orbits* , *Phys. Rev. Lett.* **117**, 024101 (2016)
- [2] **X. Ding** and P. Cvitanović , *Periodic Eigendecomposition and its application in Kuramoto-Sivashinsky system* , *SIAM J. Appl. Dyn. Syst.* **15**, 1434–1454 (2016)
- [3] **X. Ding** and S. H. Kang , *Adaptive time-stepping exponential integrators for cubic-quintic complex Ginzburg-Landau equations* , *arXiv:1703.09622* (2017)