

# Xiong Ding

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## Current Experience

Airbnb	Software Engineer	San Francisco, CA, USA	May. 2017 – Present
Infrastructure team			
<ul style="list-style-type: none"><li>• <b>Main responsibility:</b> Build and maintain <u>Ebert</u> (the review service) for <i>airbnb.com</i>.</li><li>• <b>Details:</b><ul style="list-style-type: none"><li>— I am the only person who works on this company-wide service.</li><li>— Implement <b>review sorting</b> logic for production page based on review language and user countries.</li><li>— Setup <b>review Elasticsearch</b> cluster for full-text search on reviews on listing pages.</li><li>— Cooperate with core-storage team to build <b>review pipeline</b> to serve review aggregated data, i.e, review count, review overall rating.</li></ul></li><li>• <b>Core metrics&amp;features:</b><ul style="list-style-type: none"><li>— <b>QPS:</b> Average: 10K. Peak: 12K. Traffic comes from room description page, user profile page, checkout page and so on.</li><li>— <b>Latency:</b> Overall, P95: ~50ms; ~P99: ~80ms; P999: ~250ms. Different endpoints have different latency.</li><li>— <b>Features:</b> • Mcrouter cache enabled • Horizontal scalable • Accompanied by mutation publisher</li></ul></li><li>• <b>Framework &amp; tools:</b> Dropwizard, Chef, Airflow, Elasticsearch, Mcrouter Cache, Powergrid(multithreading)</li></ul>			

## Skills

**Programming:** **Proficient:** Java, Matlab, C++, Python; **Familiar:** Ruby  
**Domain knowledge:** Numerical PDE, Matrix analysis, Nonlinear dynamics

## Education

Ph.D. in Physics		Georgia Institute of Technology	Atlanta, GA, USA	Aug. 2012 – May. 2017
<ul style="list-style-type: none"><li>• adviser: Prof. Predrag Cvitanović</li><li>• Research area: nonlinear dynamics, cycle expansion theory, complex Ginzburg-Landau equation</li></ul>				
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 by *Steven Shreve*

## Research Experience

Center for Nonlinear Science, School of Physics, Georgia Institute of Technology	Atlanta, GA, USA	Jun. 2013 – May. 2017
<ul style="list-style-type: none"><li>• <b>Research topic:</b> <i>Computation of Floquet vectors in Kuramoto-Sivashinsky system</i><ul style="list-style-type: none"><li>— <b>main Result:</b> Find the smallest eigenvalue of Floquet matrix to be order of <math>10^{-3000}</math> with relative accuracy <math>10^{-14}</math>.</li><li>— <b>tools/skills used:</b> C++, Boost.Python, Boost.Numpy, HDF5, Arpack, Matrix decomposition, Eigen</li></ul></li><li>• <b>Research topic:</b> <i>Investigation of the local dimension of inertial manifolds in chaotic systems</i><ul style="list-style-type: none"><li>— <b>main Result:</b> We show strong evidence that the inertial manifold of 1-d Kuramoto-Sivashinsky system has dimension 8.</li><li>— <b>tools/skills used:</b> C++, Matlab, Exponential integrators</li></ul></li><li>• <b>Research topic:</b> <i>Symbolic dynamics in symmetry reduced 1-d Kuramoto-Sivashinsky system</i><ul style="list-style-type: none"><li>— <b>main Result:</b> In the symmetry reduced state space, we propose to obtain the symbolic dynamics of 1-d KS equation by constructing appropriate Poincaré sections.</li><li>— <b>tools/skills used:</b> C++, Matlab, Eigen, Cycle expansion theory</li></ul></li></ul>		
School of Mathematics, Georgia Institute of Technology	Atlanta, GA, USA	Jan. 2016 – Jun. 2016
<ul style="list-style-type: none"><li>• <b>Research topic:</b> <i>Time-step adaptive exponential integrator for soliton explosions in 1d and 2d cubic quintic Ginzburg-Landau systems</i><ul style="list-style-type: none"><li>— <b>main Result:</b> Formulate a new time-step adaptive exponential integrator for complex GL equation.</li><li>— <b>tools/skills used:</b> Numerical PDE, C++, Boost, Numpy, Matplotlib</li></ul></li></ul>		

## 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)
- [4] **X. Ding** and P. Cvitanović , *Exploding relative periodic orbits in cubic-quintic complex Ginzburg-Landau equation* , *In preparation* (2018)