Xiong Ding

PHYSICS PH.D. · SOFTWARE ENGINEER

(+1) 678-882-9228 | dingxiong203@gmail.com | www.cns.gatech.edu/~xiong/ | github.com/dingxiong | www.linkedin.com/in/xiong-ding

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*

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: The Floquet multipliers of Periodic orbits in high dimensional systems usually spans a large orders of magnitudes. The periodic eigendecomposition is the right tool to obtain Floquet spectrum and vectors to high accuracy, by which We find the smallest eigenvalue of Floquet matrix to be order of 10^{-3000} with relative accuracy 10^{-14}. See paper[2] for more detail.
  - 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: By studying the shadowing cases of periodic orbits in one-dimensional Kuramoto-Sivashinsky system, we show strong evidence that its inertial manifold at domain size 22 has dimension 8. see paper [1] for more details.
  - 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, which substantially slows down the integration of the soliton explosion part. See paper[3] for more detail.
  - 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)

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