Xiong Ding

PH.D. STUDENT · PHYSICS RESEARCHER

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Education

Ph.D. in Physics   *Georgia Institute of Technology*   Atlanta, GA, USA   *Aug. 2012 – Aug. 2017*
- adviser: Prof. Predrag Cvitanović
- Research area : nonlinear dynamics, cycle expansion theory, bifurcation theory, complex Ginzburg-Landau equation

M.S. in Computer Science & Engineering   *Georgia Institute of Technology*   Atlanta, GA, USA   *Jan.2016 – Jun. 2016*
- Interested area : High Performance Computing(**HPC**)
- GPA: 3.86/4.0

Skills

Programming : **Proficient :** C/C++, Python, Matlab; **Familiar :** Java, Fortran
Tools : Bash, Perl, Unix: Sed & Awk, Latex, Emacs
Libraries : CUDA, Cilk, Boost.Python, Eigen, LAPACK, ARPACK, OpenMP, OpenMPI, FFTW, HDF5, Ploty
Web : Django with Python, CSS, HTML

Professional Experience

Geometry of chaos   *www.chaosbook.org/course1*

Role : Web developer & Teaching Assistant   *2015 Spring*
- **Achievement :** Design and implement online autograder & Design Homework for 16 weeks.
- **Core features:** Auto grade students' online submissions & Email back grades automatically & Provide a straightforward interface for the customer (the course instructor) to view the grades online.
- **Framework :** Django in Python, deployed in Heroku   **Repository :** https://github.com/dingxiong/phys7224

Center for Nonlinear Science, Georgia Institute of Technology   *Atlanta, GA, USA*

Role : Research Assistant   Adviser : Prof. Predrag Cvitanović

Research topic : *Computation of Floquet vectors in Kuramoto-Sivashinsky system*   *2013 – 2014*
- **Main result:** The Floquet multipliers of Periodic orbits in high dimensional system usually spans a large orders of magnitudes. The periodic eigende-composition is the right tool to obtain Floquet spectrum and vectors to high accuracy. See paper[2] for more detail.

Research topic : *Investigation of the local dimension of inertial manifolds in chaotic systems*   *2014 – 2015*
- **Main result:** By studying the shadowing cases of periodic orbits in Kuramoto-Sivashinsky system, we show strong evidence that the inertial manifold has dimension 8. see paper [1] for more details.

Research topic : *Symbolic dynamics in symmetry reduced 1-d Kuramoto-Sivashinsky system*   *2015 – Present*
- In the symmetry reduced state space, the attractor of 1-d Kuramoto-Sivashinsky system is low dimensional. By constructing appropriate Poincaré section, we propose to obtain the symbolic dynamics.

School of Mathematics, Georgia Tech   *Atlanta, GA, USA*

Role : Cooperation with Prof. Sung Ha Kang from Math department

Research topic : *Integration of soliton explosion with local error control in cubic quintic Ginzburg-Landau system*   *Sprint 2016*
- **Main result:** Study the performance of exponential integrator in Ginzburg-Landau system, and add time step control into a few popular exponential integrators. See paper [3].

Conferences & Talks

SIAM Conference on Application of Dynamical Systems   *Snowbird, Utah, USA*

Talk : Periodic Eigendecomposition and Its Application in Nonlinear Dynamics   *May 2015*
- Coauthor: Prof. P. Cvitanović

Dynamics Days US   *Atlanta, GA, USA*

Poster : Lyapunov exponents, Floquet exponents and covariant vectors in Kuramoto-Sivashinsky equation   *Jan. 2014*
- Coauthor: Prof. P. Cvitanović

Publications

[1] **X.Ding**, H. Chaté, P. Cvitanovi´c, 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 , *Integration of a cubic-quintic complex Ginzburg–Landau exploding soliton* , In preparation (2016)

[4] **X. Ding** and P. Cvitanović , *Periodic orbit explosion and its symmetry reduced state space visualization* , In preparation (2016)

[5] **X. Ding** and P. Cvitanović , *Symbolic dynamics and analysis of Kuramoto-Sivashinsky attractor* , In preparation (2016)