

Xiong Ding

PH.D. STUDENT · PHYSICS RESEARCHER

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Education

Georgia Institute of Technology

Atlanta, GA, USA

Ph.D. in Physics

Aug. 2012 – Jun 2017

- adviser: Prof. Predrag Cvitanović
- Research area : cycle expansion theory in nonlinear dynamics

Georgia Institute of Technology

Atlanta, GA, USA

M.S. in Computer Science & Engineering

Jan.2016 – Jun. 2016

- Interested area : High Performance Computing
- GPA: 3.86

Skills

Programming : C/C++, Python, Matlab, Java, Fortran

Tools : Bash, Perl, Awk

Libraries : Boost.Python, Eigen, LAPACK, FFTW, HDF5

Web : Django with Python, CSS, HTML

Employment & Teaching Experience

Center for Nonlinear Science, School of Physics, Georgia Institute of Technology

Atlanta, GA, USA

Research Assistant

2013 – Present

- Apply cycle expansion theory into high dimensional nonlinear dispative dynamical systems.
- Numerical algorithm to calculate Floquet vectors with high accuracy.
- Soliton explosion in cubic quintic Ginzburg-Landau equation.

Center for Nonlinear Science, School of Physics, Georgia Institute of Technology

Atlanta, GA, USA

Teaching Assistant

2012 – 2013

- Guide undergraduate students in physical experiments.

Online course : Geometry of chaos

<http://www.chaosbook.org/course1/about.html>

Teaching Assistant

2015 Spring

- Design Homework for 16 weeks.
- Design and implement online autograder.
- Answer questions on Piazza forum.

Projects

PHYSICS RELATED

Center for Nonlinear Science, School of Physics, Georgia Tach

Atlanta, GA, USA

Project : Computation of Floquet vectors in Kuramoto-Sivashinsky system

2013-2014

- **Adviser :** Prof. Predrag Cvitanović
- **Main result:** paper [2] below

Center for Nonlinear Science, School of Physics, Georgia Tach

Atlanta, GA, USA

Project : Investigation of the local dimension of inertial manifolds in chaotic systems

2014-2015

- **Adviser :** Prof. Predrag Cvitanović
- **Main result:** paper [1] below

Center for Nonlinear Science, School of Physics, Georgia Tech

Atlanta, GA, USA

Project : Symbolic dynamics in symmetry reduced 1-d Kuramoto-Sivashinsky system

2015-PRESENT

- **Adviser :** Prof. Predrag Cvitanović
- **Status:** In progress

MATHEMATICS RELATED

School of Mathematics, Georgia Tech

Atlanta, GA, USA

Project : Integration of soliton explosion with local error control in cubic quintic Ginzburg-Landau system

Sprint 2016

- **Adviser :** Prof. Sung Ha Kang
- **Main result:** paper [3] below

COMPUTER SCIENCE RELATED

online course : Geometry of Chaos

Atlanta, GA, USA

Project : Online autograder

Sprint 2015

- **main goal :** Auto grade students' online submissions and email back their grades.
- **Framework :** Django in Python, deployed in Heroku
- **Repository :** <https://github.com/dingxiong/phys7224>

Course project: Gatech CSE 6730 Simulation and Modeling

Atlanta, GA, USA

Project : Simulating Pedestrian Movement Outside Football Stadium

Sprint 2016

- **main goal :** Simulate the pedestrian movement after football match according to real geometric configuration.
- **Language :** Python

Research code: Nonlinear dynamics

Atlanta, GA, USA

Systems : Kuramoto-Sivashinsky equation and complex cubic quintic Ginzburg-Landau equation

2013 – PRESENT

- **Languages :** C++, Python, Matlab
- **Tools :** Boost.Python, Boost.Numpy, HDF5, Arpack
- **Repository :** <https://github.com/dingxiong/research>

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

SIAM Student Chapter Seminar

Atlanta, GA, USA

Talk : Periodic Eigendecomposition and its application in nonlinear dynamics

Sep. 2014

- 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, *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)