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 Tech *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 Tech *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. 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)