# Xiong **Ding**

PHYSICS RESEARCHER · SOFTWARE ENGINEER

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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 Tach** *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 Tach** *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 studensts' 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)