

Curriculum Vitae

XIANJIN CHEN

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EDUCATION

Texas A&M University (TAMU), College Station
Ph.D. in Mathematics 2008
Thesis Advisor: Professor Jianxin Zhou
Thesis Title: *Analysis and Computation of Multiple
Unstable Solutions to Nonlinear Elliptic Systems*

Huazhong University of Science and Technology (HUST), P.R. China
M.S. in Applied Mathematics 1999
B.S. in Mathematics 1997

RESEARCH INTERESTS

- Computational theory and methods for multiple (unstable) solution problems
- Numerical methods for nonlinear partial differential equations
- Nonlinear Schrödinger equations/systems, reaction-diffusion systems
- Optimization and simulation

PROFESSIONAL EXPERIENCE

- IMA Postdoctoral Associate 2008-present
- Teaching/Research Assistant; Instructor, TAMU 2002-2008
Taught one course (*Calculus I*) and several undergraduate/graduate recitation sessions (e.g., Numerical Analysis), graded papers, exams and homework, kept office hours
- Research Assistant, Institute of System Engineering, HUST 1999-2001
- Teaching/Research Assistant, Department of Mathematics, HUST 1997-1999

MEMBERSHIPS

- American Mathematical Society; Society for Industrial and Applied Mathematics

HONORS & AWARDS

- NSF travel supports for graduate students 05/2007, 11/2007
- AUF Fellowship, Texas A&M University, College Station 2003-2004, 2004-2005
- Guanghua Scholarship for excellent graduate students, HUST 1998, 1999
- University Award for excellent undergraduate students, HUST 1997
- *Excellent Research Award* for undergraduate students in Hubei Province 1996
- Dongfeng Scholarship for excellent undergraduate students, HUST 1995
- Guanghua Scholarship for excellent undergraduate students, HUST 1994

PROJECT EXPERIENCE

Developed numerical methods/algorithms, designed and implemented codes in Matlab/C/C++, prepared proposals, and composed reports/papers for the following projects:

- *Computational Theory and Methods for Finding Multiple Solutions to Differential Systems* (with Professor Jianxin Zhou), funded by US NSF, #DMS-0713872 2007-2008
- *Computational Theory and Methods for Solving Multiple Solution Problems* (with Professor Jianxin Zhou), funded by US NSF, #DMS-0311905 2003-2006
- *Modeling and 3-D Simulation of Oxygen Leak and Diffusion in a Sealed Chamber* (with Professor Huan Qi) 1999-2001
- *A Ship Scheduling Optimization Decision Support System and Computer Simulation on Running of Three Gorges Permanent Ship Lock* (with Professor Huan Qi) 1998-2000
- *Simulation and Optimal Design of Floating Raft Isolation Systems* (with Professor Huan Qi) 1998-1999

NUMERICAL DEMOS

- “A real-time demo on solving nonlinear PDEs for multiple solutions”, Variational and Topological Methods: Theory, Applications, Numerical Simulations, and Open Problems, Northern Arizona University, Flagstaff, AZ May 2007
- “A real-time demo on finding multiple solutions to the Henon equation”, Seminar in Applied Mathematics, Texas A&M University, TX March 2007
- “3-D numerical simulation on oxygen leak and dispersion in a sealed chamber”, Wuhan Ship Design Institute, Wuhan, P.R. China May 2001

PUBLICATIONS

- A local min-max-orthogonal method for multiple solutions of noncooperative elliptic systems (with J. Zhou), *Mathematics of Computation* (to appear)
- A local min-orthogonal method for multiple solutions of superlinear elliptic systems (with J. Zhou), *Discrete and Continuous Dynamical Systems Supplement* (to appear)
- Blowup and solitary wave solutions with ring profiles of two-component nonlinear Schrödinger systems (with T.-C. Lin and J. Wei), *Physica D* (Revision submitted)
- A numerical method for finding multiple co-existing solutions to nonlinear cooperative systems (with J. Zhou and X. Yao), *Appl. Num. Math.*, 58(2008), 1614-1627
- On homotopy continuation method for computing multiple solutions to the Henon equation (with J. Zhou), *Num. Meth. PDEs*, 24(2008), 728-748
- A numerical simulation on gas leak diffusion (with H. Qi, etc), *Computer Simulation*, Vol. 20, 2(2003), 24-27
- 3-D simulation of oxygen leak and diffusion in a sealed chamber (with H. Qi, etc), *Computer Simulation*, Vol. 19, 6(2002), 15-17 & 60
- Optimal design of a two-stage mounting isolation system by maximum entropy approach (with H. Qi, etc), *Journal of Sound and Vibration*, U.K., Vol. 243, 4(2001), 591-599
- Fuzzy random analysis of reliability of communication network (with S.H. Zhang, etc), *J. of Huazhong Univ. of Sci. & Tech.*, Vol. 28, 10(2000), 83-84 & 87
- System simulation on Three Gorges permanent shiplock's running (with F. Lu, etc), *Proceedings of Chinese Control and Decision Conference 2000*, P.R. China, 709-712
- A state-space approach for simulating a floating raft isolation system (with H. Qi, etc), *Noise and Vibration Control*, 1(1999), 15-17 & 29

WORK IN PROGRESS

- Instability analysis of multiple solutions to nonlinear cooperative systems via a local min-orthogonal method (with J. Zhou), *preprint*
- Convergence analysis of a local min-max-orthogonal method (with J. Zhou), *preprint*

- A generalized min-max-orthogonal method for saddle points of strongly indefinite functionals (with J. Zhou), *in preparation*

PROFESSIONAL ACTIVITIES

– Invited talks/presentations

- “*Two Variational Methods for Multiple Solutions of Semilinear Elliptic Systems*”, Fudan University, Shanghai, China June, 2009
- “*Two stable methods for multiple unstable solutions to semilinear variational elliptic systems*”, IMA Postdoc Seminar, University of Minnesota September 23, 2008
- “*Instability analysis on spatial vector solitons via a local min-orthogonal method*”, 7th AIMS International Conference on Dynamical Systems, Differential Equations and Applications, The University of Texas at Arlington, TX May 18-21, 2008
- “*A framework for computing multiple saddle points to strongly indefinite functionals*”, 31st Annual Texas PDEs Conference, Houston, TX April 5-6, 2008
- “*A numerical method and its demo on finding multiple unstable solutions to nonlinear variational systems*”, Seventh Mississippi State-UAB Conference on Differential Equations & Computational Simulations, Birmingham, AL November 1-3, 2007
- “*A local min-max-orthogonal method and its convergence*”, Variational and Topological Methods: Theory, Applications, Numerical Simulations, and Open Problems, Northern Arizona University, Flagstaff, Arizona May 23-26, 2007
- “*Saddle point characterization and computation for strongly indefinite functionals*”, American Mathematical Society (AMS) Session on Partial Differential Equations, Joint Mathematics Meetings, New Orleans, LA January 5-8, 2007
- “*On characterization of multiple solutions to two classes of nonlinear elliptic systems*”, Special Session on Nonlinear Elliptic and Parabolic Equations, AMS Sectional Meeting, University of Connecticut, Storrs, CT October 28-29, 2006
- “*A stable method for finding multiple solutions to noncooperative elliptic systems*”, Special Session on Nonlinear Differential Equations: Methods and Applications, AMS Sectional Meeting, University of Utah, Salt Lake City, UT Oct. 7-8, 2006
- “*A stable method to solve nonlinear elliptic PDE systems for multiple vector solitons*”, AMS-SIAM Special Session on Nonlinear Dynamical Systems, Joint Mathematics Meetings, San Antonio, TX January 12-15, 2006
- “*Finding multiple co-existing solutions to semilinear elliptic systems via a local min-orthogonal method*”, Applied Mathematics Seminar, Department of Mathematics, Texas A&M University, College Station, TX November, 2005

– Other conferences/workshops attended

- 2008 CNA Summer School, Center for Nonlinear Analysis, Carnegie Mellon University, Pittsburgh, PA May 29-June 7, 2008
- The 25th (2002), 27th (2004) and 29th (2006) Annual Texas PDE Conferences

TECHNICAL REPORTS

- (Co-author) *Modeling and 3-D simulation of oxygen leak and diffusion in a sealed chamber*, 2001
- (Co-author) *A ship scheduling optimization decision support system and computer simulation on running of Three Gorges permanent ship lock*, 2000

COMPUTER SKILLS

- Operating Systems: Unix/Linux, Windows
- Languages: C/C++, Visual C++, MATLAB/COMSOL, MAPLE, LATEX, HTML
- Packages developed:
 - ◇ A nonlinear solver for several classes of semilinear elliptic problems including semilinear elliptic systems and nonlinear biharmonic equations
 - ◇ A 2-D symmetric triangular mesh generator (written in Matlab) for symmetrical domains such as disks, annuli

OTHER ACTIVITIES

- Volunteered in a Chinese school as a temporary lecturer for high school students, College Station, TX 2004
- Volunteered with "CombinaTexas: Combinatorics in the South-Central U.S." as a conference receptionist, TAMU 2004