Tianran Chen

Curriculum Vitae

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Education

2012 **Ph.D. Applied Mathematics**, *Michigan State University*, (MI USA).
- Dissertation: *Projective path tracking for homotopy continuation method*
- Advisor: Tien-Yien Li

2005 **B.A. Computer Science**, *Western Connecticut State University*, (CT USA).
Secondary major in Mathematics

Experience

2012 – **Research Instructor**, *Michigan State University*.

2006 – 2012 **Research and Teaching Assistant**, *Michigan State University*.

2003 – 2005 **Research Assistant**, *Western Connecticut State University*.

2002 – 2004 **Assistant/Programmer**, *Western Connecticut State University, R. S. Young Library*.

Honors & Awards

2010 Dr. Paul & Wilma Dressel endowed scholarship award
(*Michigan State University*)

2005 Student leadership recognition award for outstanding leadership
(*Western Connecticut State University*)

2005 Sigma Xi research award in Physics, Astronomy & Meteorology
(*Western Connecticut State University*)

2004 Wohlever award in Computer Science
(*Western Connecticut State University*)

Research Interests

- Numerical analysis
- Scientific/parallel computing
- Numerical algebraic geometry
- Application of numerical methods in physics, chemistry, engineering

Publications

(11) 2015 Dhagash Mehta, Tianran Chen, John Morgan, and David Wales.
Response to "Comment on 'Exploring the potential energy landscape of the Thomson problem via Newton homotopies"'.
The Journal of Chemical Physics 143, 247102, 2015.
(http://dx.doi.org/10.1063/1.4939011)

(10) 2015 Tianran Chen and Tien-Yien Li.
Homotopy continuation method for solving systems of nonlinear and polynomial equations.
Communications in Information and Systems 15(2):119–307, 2015.
(http://dx.doi.org/10.4310/CIS.2015.v15.n2.a1)

(9) 2015 Tianran Chen, Tsung-Lin Lee, and Tien-Yien Li.
Mixed cell computation in Hom4PS-3.
Journal of Symbolic Computation (To appear).

(8) 2015 Tianran Chen and Dhagash Mehta.
Parallel degree computation for binomial systems.
Journal of Symbolic Computation (To appear).

(7) 2015 Dhagash Mehta, Tianran Chen, John Morgan, and David Wales.
Exploring the potential energy landscape of the Thomson problem via Newton homotopies. *The Journal of Chemical Physics* 142, 194113, 2015.
(http://dx.doi.org/10.1063/1.4921163)

(6) 2014 Tianran Chen, Tien-Yien Li, and Xiaoshen Wang.
Theoretical aspects of mixed volume computation via mixed subdivision.
Communications in Information and Systems 14(4):213–242, 2014.
(http://dx.doi.org/10.4310/CIS.2014.v14.n4.a1)

(5) 2014 Dhagash Mehta, Tianran Chen, Jonathan Hauenstein, and David Wales.
Newton homotopies for sampling stationary points of potential energy landscapes.
The Journal of Chemical Physics 141 (12), 121104, 2014.
(**Selected for a Journal of Chemical Physics Editors' Choice for 2014**)
(http://dx.doi.org/10.1063/1.4896657)
(http://scitation.aip.org/content/jcp-editors-choice-for-2014)

(4) 2014 Tianran Chen and Tien-Yien Li.
Solutions to systems of binomial equations.
Annales Mathematicae Silesianae 28:7–34, 2014.

(3) 2014 Tianran Chen, Tsung-Lin Lee, and Tien-Yien Li.
Hom4PS-3: A parallel numerical solver for systems of polynomial equations based on polyhedral homotopy continuation methods *Mathematical Software – ICMS 2014 – 4th International Congress, Seoul, South Korea, August 5-9, 2014. Proceedings* 8592:183–190, 2014. (http://dx.doi.org/10.1007/978-3-662-44199-2_30)

(2) 2014 Tianran Chen, Tsung-Lin Lee, and Tien-Yien Li.
Mixed cells computation in parallel.
Taiwanese Journal of Mathematics 18(1):93–114, 2014.
(http://dx.doi.org/10.11650/tjm.18.2014.3276)

(1) 2012 Tianran Chen and Tien-Yien Li.
Spherical projective path tracking for homotopy continuation methods.
Communications in Information and Systems 12(3):195–220, 2012.
(http://dx.doi.org/10.4310/CIS.2012.v12.n3.a2)

Preprints

2015 Tianran Chen and Dhagash Mehta. An index-resolved fixed-point homotopy and potential energy landscapes. (http://arxiv.org/abs/1504.06622)

2015 Tianran Chen and Dhagash Mehta. On the network topology dependent solution count of the algebraic load flow equations.
(http://arxiv.org/abs/1512.04987)

Scientific Software

All software are freely available at www.hom4ps3.org.

- Core developer of Hom4PS-3: A parallel numerical solver for systems of polynomial equations based on the Polyhedral Homotopy Method.
- Lead developer of MixedVol-3: A parallel software package for computing volume of polytopes, mixed volume, BKK bound, and fine mixed cells.
- Lead developer of BinomialSolver: A parallel solver for binomial systems.

Invited Presentations and Lectures

Mar. 2015 AMS Central Sectional Meeting Spring. East Lansing, MI USA.

Aug. 2014 The 4th International Congress on Mathematical Software. Seoul, South Korea.

Jan. 2014 AMS Joint Mathematics Meetings. Baltimore, MD USA.

Aug. 2013 SIAM Conference on Applied Algebraic Geometry. Fort Collins, CO USA.

Jun. 2013 Invited lecture for the Summer School On Numerical Algebraic Geometry, Chengdu Institute of Computer Applications. Chengdu, Sichuan, China.

Oct. 2011 SIAM Conference on Applied Algebraic Geometry. Raleigh, NC USA.

May 2011 Midwest Numerical Analysis Day. West Lafayette, IN USA.

Apr. 2011 Invited lecture for the Numerical Algebraic Geometry Lab seminar.
Colorado State University, Fort Collins, CO USA.

Nov. 2010 1064th AMS Meeting. Notre Dame, IN USA.

Student Projects Supervised

2013 Reliable communication in large scale parallel computing (with Nick Ovenhouse)

2012 A web interface for a scientific database based on Flask (with Jared Jonckheere)

2012 A JIT compiler for automatic differentiation based on LLVM (with Nick Ovenhouse)

Teaching Experience

2012 – **Instructor**.
Responsibilities: lecturing, designing exams, and supervising TAs.
Courses: *Calculus II, Linear Algebra, Transition to Advanced Mathematics*.

2007 – 2011 **Teaching assistant**.
Responsibilities: lecturing (as the main instructor), designing exams, and grading.
Courses: *College Algebra, Finite Mathematics and Elements of College Algebra, Survey of Calculus with Applications I & II (for business majors), Calculus I*.

2006 – 2007 **Teaching assistant**.
Responsibilities: grading and teaching recitation sessions.
Courses: *Calculus I & II*.

Professional Services

2015 Co-organizer for the *Special Session on Homotopy Continuation Methods and Their Applications to Science and Engineering* at the American Mathematical Society 2015 Central Spring Sectional Meeting, East Lansing, MI, March, 2015

Reviewer for *ACM Transactions on Mathematical Software*

Reviewer for *International Symposium on Symbolic and Algebraic Computation*

Memberships in Professional Organizations

- Association for Computing Machinery
- American Mathematical Society
- Mathematical Association of America
- Society for Industrial and Applied Mathematics

Computer Skills

- C/C++ (98,0x,11)
- Matlab/Octave
- CUDA/OpenCL/OpenACC
- HTML/CSS
- LINUX/UNIX
- Python
- Ruby
- Java
- LaTeX
- SQL