Curriculum Vitae

Qian-Yong Chen

Personal Information

Department of Mathematics and Statistics
Lederle Graduate Research Tower
University of Massachusetts
Amherst, MA 01003-9305

Office: (413) 545-9611
Fax: (413) 545-1801
qchen@math.umass.edu

Education

- *Ph.D., Applied Mathematics.* Brown University, May 2004.

Academic Positions

- Associate Professor: University of Massachusetts at Amherst, Sept 2013 - present.
- Assistant Professor: University of Massachusetts at Amherst. 2006 - 2013.
- Industrial Postdoc: Institute for Mathematics and its Applications (IMA), University of Minnesota. Industrial partner: ExxonMobil Upstream Research Company. September 2004 - August 2006.

Research Interests

- Soliton solutions to Schrödinger, Gross-Pitaevskii type equations
- Efficient discretization of random functions
- Stochastic modeling of speed-density relation in traffic system
- Uncertainty modeling and analysis for solutions of partial differential equations with random inputs via probabilistic methods, e.g., polynomial chaos methods and Monte Carlo methods.
- Numerical modeling of multi-phase flow in heterogeneous anisotropic porous media with locally conservative flux continuous schemes such as the multi-point flux methods, mixed finite volume methods, mixed finite element methods.
- Numerical solutions to conservation laws using high order methods such as spectral element methods, finite element discontinuous Galerkin methods, ENO/WENO Methods, and spectral volume methods.

Grants

- Qian-Yong Chen (**PI**), *Efficient Methods for Random Field Approximation with Application to Nonlinear Schrödinger Equation*, NSF grant DMS-1016047, $116,704. August 2010 - July 2013.
- Daiheng Ni (**PI**), John Collura, and Qian-Yong Chen, *Stochastic Fundamental Diagram for Probabilistic Traffic Flow Modeling*. US DOT University Transportation Center (UTC) Region One. $99,431. November 2009 - September 2011.
- Qian-Yong Chen (**PI**), *A New Basis for Spectral (Element) Method* . University of Massachusetts Amherst, Faculty Research Grant. $11,622. 2007-2008.

Patent

- Q.-Y. Chen, J. Wan, Y. Yang, and R.T. Mifflin, *Enriched Multi-Point Flux Approximation*, Patent US 7,983,883.

Publications in Refereed Journals

1. J.Cuevas-Maraver, P.G. Kevrekidis, Q.Y. Chen, G.A. Kevrekidis, Víctor Villalobos-Daniel, Z.Rapti and Y. Drossinos. *Lockdown measures and their impact on single- and two-age-structured epidemic model for the COVID-19 outbreak in Mexico*. https://doi.org/10.1016/j.mbs.2021.108590

2. B. Turkington, Q.-Y. Chen and S. Thalabard *Coarse-graining two-dimensional turbulence via dynamical optimization.* Nonlinearity 29 (2016) 2961–2989. doi:10.1088/0951-7715/29/10/2961.

3. Q.-Y. Chen, P.G. Kevrekidis, B.A. Malomed, *Quenched dynamics of two-dimensional solitary waves and vortices in the Gross Pitaevskii equation* J. Opt. 2013, 15(4) 044012. doi:10.1088/2040-8978/15/4/044012.

4. Q.-Y. Chen, P.G. Kevrekidis, B.A. Malomed, *Dynamics of bright solitons and soliton arrays in the nonlinear Schroedinger equation with a combination of random and harmonic potentials*. Physica Scripta, 2012, 014001 (doi:10.1088/0031-8949/2012/T149/014001).

5. Haizhong Wang, Daiheng Ni, Qian-Yong Chen, and Jia Li, *Stochastic Modeling of Equilibrium Speed-Density Relationship*, J. Adv. Transp. 2013; 47:126-150. (DOI: 10.1002/atr.172).

6. Haizhong Wang, Jia Li, Q.-Y. Chen, Daiheng Ni, *Logistic Modeling of the Equilibrium Speed-Density Relationship*. Transportation Research Part A, 45 (2011) 554-566. Elsevier.

7. Jia Li, Haizhong Wang, Qian-Yong Chen, Daiheng Ni, *Analysis of LWR model with fundamental diagram subject to uncertainties*. Transportmetrica, 1-19, 2011. (DOI: 10.1080/18128602.2010.521532).

8. Jia Li, Haizhong, Wang, Qian-Yong Chen, and Daiheng Ni, *Traffic viscosity due to speed variation: modeling and implications*. Mathematical and Computer Modeling, 52(9-10):1626-1633, 2010

9. Q.-Y. Chen, P.G. Kevrekidis, B.A. Malomed, *Formation of fundamental solitons in the two-dimensional nonlinear Schrödinger equation with the lattice potential*. European Physical Journal D. 58(1):141-146, 2010

10. Q.-Y. Chen, P.G. Kevrekidis, B.A. Malomed, *Nonlinear Schrödinger equations under random nonlinearity management*. Physics Letters A. 373:1361-1367, 2009.

11. R.Wang, E. Cheslack-Postava, R. Wang, D. Luebke, Q.-Y. Chen, W. Hua, Q. Peng, H.Bao *Real-time Editing and Relighting of Homogeneous Translucent Materials*, The Visual Computer Journal 24(7-9):565-575, 2008.

12. Q.-Y. Chen, J. Wan, Y. Yang, and R.T. Mifflin *Enriched Multi-Point Flux Approximation For General Grids*, Journal of Computational Physics, 227:1701-1721, 2008.

13. I. D. Mishev, and Q.-Y. Chen *A Mixed Finite Volume Scheme for Elliptic Equations*, Numer. Methods Partial Differential Equations, 23(5):1122-1138, 2006.

14. Q.-Y. Chen, *Partitions for Spectral (Finite) Volume Reconstruction in the Tetrahedron*, J. Sci. Comput., 29(3):299-319, 2006.

15. Q.-Y. Chen, *Partitions of a Simplex Leading to Accurate Spectral (Finite) Volume Reconstructions*, SIAM J. Sci. Comput., 27(4):1458-1470, 2005

16. Q.-Y. Chen, D. Gottlieb, J. S. Hesthaven, *Uncertainty Analysis for the Steady-state Flows in a Dual Throat Nozzle*, J. Comput. Phys., 204(1):378-398, 2005.

17. Q.-Y. Chen, D. Gottlieb, J. S. Hesthaven, *Spectral Methods Based on Prolate Spheroidal Wave Functions for Hyperbolic PDEs*, SIAM J. Numer. Anal., 43(5):1912-1933, 2005

18. Z.-C. Shi, Q.-Y. Chen, *An efficient rectangular plate element*, SCIENCE IN CHINA SERIES A-MATHEMATICS PHYSICS ASTRONOMY 44 (2): 145-158 FEB 2001.

Publications in Refereed Proceedings

19. Jia Li, Qian-Yong Chen, Haizhong, Wang, and Daiheng Ni, *Analysis of LWR Model with Fundamental Diagram Subject to Uncertainties*. The 88th Transportation Research Board (TRB) Annual Meeting, Washington, D.C. 2009 (Paper # 09-1189).

20. Haizhong Wang, Jia Li, Qian-Yong Chen and Daiheng Ni, *Speed-Density Relationship: From Deterministic to Stochastic*. The 88th Transportation Research Board (TRB) Annual Meeting, Washington, D.C. 2009 (Paper # 09-1527).

21. Q.-Y. Chen, J.Wan, Y. Yang, and R. T. Mifflin, *A New Multipoint Flux Approximation for Reservoir Simulation.* In SPE Reservoir Simulation Symposium, Houston, Texas, 26-28 February 2007. SPE 106464

22. M.-S. Min, Q.-Y. Chen, and Y. Maday, *Spectral methods for 2D photonic band structures*, Proceedings of SPIE, Volume 5360, Photonic Crystal Materials and Devices II. Ali Adibi, Axel Scherer, Shawn-Yu Lin, Editors, July 2004, pp. 44-51.

Publications in Progress

23. Tao Jiang; Qian-Yong Chen, Daiheng Ni. Identifying significant lane change factors from field observations. Submitted to "Journal of Mathematical Analysis and Applications". 2019

Unpublished Paper

24. Q.-Y. Chen (2012). Fast Algorithm for Computing Karhunen-Loève Expansion"

Invited Presentations

- *Numerical Stability of Vortex Soliton under Optical Lattice and Harmonic Potential* SIAM Conference on Computational Science and Engineering (CSE13), Boston, MA, Feb. 25 - March 1, 2013.
- *Fast Algorithm for Computing Karhunen-Loève Expansion of Stationary Processes*. 3rd New York Conference on Applied Mathematics, Troy, NY. October 13, 2012.
- *Efficient Methods for Random Field Approximation with Application to Nonlinear Schrödinger Equation*, The SIAM Annual Meeting, July 11-16, 2010.
- *Capture Collapsing Soliton with Adaptive Time-stepping*, ICOSAHOM 2009, Trondheim, Norway. (**Canceled because of visa issue.**)
- *Uncertainty Analysis for Steady-State Flows in Dual Throat Nozzle*, Department of Mathematics and Statistics, UMass Amherst, January 2008.
- *A New Multipoint Flux Approximation for Reservoir Simulation*, SIAM Geoscience Conference, Santa Fe, New Mexico, March 2007. (**Canceled because of family emergency.**)
- *A New Multipoint Flux Approximation for Reservoir Simulation*, SPE Reservoir Simulation Symposium, Houston, Texas, 26-28 February 2007.
- *Spectral Methods Based on Prolate Spheroidal Wave Functions for Hyperbolic PDEs*, Department of Mathematics, Purdue University, March 2006.
- *Spectral Volume Reconstruction on Simplex*, Department of Mathematics, University of Notre Dame, December 2005.
- *Uncoupled Implementation of Generalized Polynomial Chaos Methods*, ICOSAHOM 2004, Brown University, July 21-25, 2004.

Contributed Presentations

- *A parallel algorithm for NLSE*, LCDS Nonlinear Optics Workshop, Brown University, July 16-19, 2002.
- *Spectral method on prolate spheroidal functions*, Applied Math Days, Rensselaer Polytechnic Institute, April 19-20, 2002.

Workshops

Participant:

- *Mathematics in Data Science*, ICERM, July 28-30, 2015
- *UQ: Uncertainty Quantification for High-Performance Computing*, SAMSI and Oak Ridge National Lab, May 2-4, 2012.
- *IPAM Random Media: Homogenization and Beyond workshop*, IPAM, UCLA, January 24 - 28, 2011.
- *SPDE Workshop on Advances and Challenges in the Solution of Stochastic Partial Differential Equation*, Brown University, October 20-22, 2006.
- *2003 AFOSR Workshop on Advances and Challenges in Time-Integration of PDE's ,* Brown University, Aug. 18-20, 2003.

Fellowships and Awards

University of Minnesota: IMA Industrial Postdoctoral Fellowship. 9/2004-8/2006.

Brown University: Graduate Dissertation Fellowship. 9/2002-5/2003.

Brown University: Graduate Student Fellowship. 9/1999-5/2000.

Brown University: Research and Teaching Assistantship. 6/2000-8/2002, 6/2003-8/2004.

University of Science and Technology of China: Guang Hua Fellowship for Excellent Students. 9/1991-5/1992, 9/1994-5/1995.

Student Advising

- *Dissertation Committee Member:*

  Javad Moshfegh, Electrical and Computer Engineering, 2019

  Haitao Xu, Math and Stat, 2016

  Mei Duanmu, Math and Stat, 2015

  Yannan Shen, Math and Stat, 2012

  Chenyu Wang, Math and Stat, 2010

  Haizhong Wang, Civil and Environmental Engineering, 2010

- *Masters Thesis Committee Member:*

  ADITYA MOHAN KULKARNI, Mechanical Engineering, 2017

- Graduate advising: All the students in the Applied Math Masters Program
- *Undergraduate advising*,

  Advise REU student Yaochao Chen, 2020

  Advise REU student Wenbo Xie, 2018

  Abdel Kader Geraldo: Honors thesis (2016)

  Advise REU students: Kai Xiao and Boxuan Cui (2009)

  Honors thesis supervised, Shaohan Hu, 2008 (joint with Weimin Chen)

  Advise and support REU student: Alex Levin, 2007.

  Advise 12 - 18 math majors each year since Fall 2008

Courses Taught at UMass

Math 131 - Calculus I, F2006, S2011(*Course Chair*), S2014(*Course Chair*).

Math 132 - Calculus II, S2007.

Math 132H - Honors Calculus II, S2009, S2013.

Math 233 - Multivariate Calculus, F2014.

Math 331 - Ordinary Differential Equations for Scientists and Engineers, F2009 (*Course chair*), F2015, F2016(*Course chair*), S2017.

Math 456 - Mathematical Modeling, F2019, S2020.

Math 545 - Linear Algebra for Applied Mathematics, S2008, S2010, F2012, S2014, F2017, S2018.

Math 551 - Introduction to Scientific Computing, F2010, F2013, S2019.

Math 552 - Applications of Scientific Computing, S2011, S2013.

Math 651 - Numerical Analysis I, F2008, F2011, F2015, F2016, F2018.

Math 652 - Numerical Solution to PDEs, S2009, S2012, S2016.

Math 691Y - Applied Math Masters Project, F2009-10, F2011-12, F2017-18, F2018-19.

Stat 515 - Statistics I, S2020

Professional Service

- Reviewer for Transportmetrica, Mathematics of Computation, Journal of Computational Physics, Journal of Engineering Mathematics, SIAM Journal on Scientific Computing, Numerische Mathematik, Journal of Scientific Computing, Discrete and Continuous Dynamical Systems, Series B, IMA Journal of Applied Mathematics, Discrete and Continuous Dynamical Systems, Series S (DCDS-S), Applied Mathematics and Computation, Transportation Research Part A: Policy and Practice, Applied Numerical Mathematics, Mathematical Problems in Engineering, Measurement Science and Technology,
- Panelist: NSF, DMS, 2011, 2013.
- Co-organizer for conference ”HPC day“, 2016, 2017, 2019
- Co-organizer for conference ”2012 New England Numerical Analysis Day”.

Departmental and Campus-Wide Services

- AHCLP: Ad-hoc committee for language proficiency
- SAUL: Student Affairs and University Life
- Director of the Applied Math Masters Program
- Other departmental committees served: Graduate Affairs Committee; Graduate admission committee for both Math PhD and Applied Math Masters program; Faculty search committee; VAP search committee; RCF committee; Qualify exam committee; Colloquium committee; Climate committee