

PERSONAL

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Citizenship: P. R. China Current VISA: H-1B

EDUCATION

- B.S. in Mathematics, Nankai University, July 1996
- M.S. in Mathematics, Nankai Institute of Mathematics, May 1999
Advisor: Professor Yiming Long
Thesis: Periodic solutions of Hamiltonian systems and differential systems
- PhD student in Mathematics, University of Pennsylvania, Jun,1999-Aug, 2000
- PhD in Mathematics, Johns Hopkins University, May 2004
Advisor: Professor Christopher Sogge
Thesis: Eigenfunction Estimates on Compact Manifolds with Boundary and Hörmander Multiplier Theorem.

EMPLOYMENT

Department of Mathematical Sciences, SUNY-Binghamton University
Assistant Professor, September 2007-

Centre de Recherches Mathematiques, Universite de Montreal
Postdoctoral Fellow, January - August 2008

Department of Mathematics, University of Virginia
Whyburn Instructor, August 2004 - August 2007

Chern Institute of Mathematics. University of Nankai, Tianjin, China
Visiting Scholar, May - July, 2006

Mathematical Sciences Research Institute in Berkeley
Postdoctoral Fellow, August - December 2005

AWARDS AND FELLOWSHIPS:

- NSF-DMS Grant 0852507: Eigenfunction estimates on manifolds with boundary and applications to partial differential equations, June 1, 2008 - May 31, 2010.
- CRM PostDoctoral Fellowship in connection with the Winter 2008 semester in Dynamics, January-August 2008
- Postdoctoral Fellowship at MSRI to attend MSRI Summer Microprogram on Nonlinear Partial Differential Equations, July 23, 2007 to August 10, 2007.
- NSF-DMS Grant 0602151: Eigenfunction Estimates on Manifolds with Boundary and Applications to Partial Differential Equations, June 1, 2006 - November 30, 2008.

- MSRI PostDoctoral Fellowship to attend MSRI research program: "Nonlinear Dispersive Equations" at MSRI, August- December, 2005.
- Support from Visiting Scholar Program in Chern Institute of Mathematics, University of Nankai, Tianjin, China, May - July, 2006
- Travel funds from Department of Mathematics, University of Virginia to support attending various conferences, each year of 2004-2007.
- Travel funds from Krieger School of Arts and Sciences, Johns Hopkins University to support attending various conferences, 2001, 2002, 2003.
- Teaching Assistantship, Department of Mathematics, Johns Hopkins University, September, 2000-May, 2004.
- Teaching Assistantship, Department of Mathematics, University of Pennsylvania, June, 1999-August, 2000.

RESEARCH INTERESTS

I. Harmonic Analysis on Manifolds:

- Study the L^p estimates and gradient estimates on eigenfunctions of Dirichlet (or Neumann) Laplacian, which includes a detailed study of the relationship between the growth estimates of the eigenfunctions and spectrum on the manifolds and global geometric properties.
- Apply the L^p estimates and gradients estimates on eigenfunctions to study the location, distribution and size of nodal sets of eigenfunctions.
- Apply the L^p estimates and gradient estimates to study Hormander multiplier problems, Bochner-Riesz means for eigenfunction expansion on compact manifolds. expansion.

II. Nonlinear Differential Equations:

- Apply the gradient, bilinear and multilinear estimates for spectral projectors on manifolds (with or without boundary) to study well-posedness problems for partial differential equations on compact manifolds, including linear or nonlinear wave equations, Schrodinger equations, 2D (dissipative) quasi-geostrophic equations, and 2D Euler equations.
- Study the global uniqueness problems and the boundary stabilization, controllability and observability problems for (linear and nonlinear) parabolic and hyperbolic PDE's on manifolds via Carleman estimates.
- Study gradient estimates for degenerate parabolic equations and Liouville's Theorems for Porous Media Equations and Fast Diffusion Equations.
- Study Li-Yau type differential Harnack inequalities and the monotonicity of entropy for linear heat equations on Riemannian manifolds with negative Ricci curvature lower bounds.
- Study the Periodic solutions, subharmonics and homoclinic orbits of Hamiltonian systems.

RECENT PUBLICATIONS AND PREPRINTS

1. Subharmonic solutions of a class of non-autonomous Hamiltonian systems. *Acta Sci. Nat. Univer. Nankai.* Vol. 32, No.2, (1999), pp. 46-50.(In Chinese)
2. (with Yiming Long) Periodic solutions for a class of nonautonomous Hamiltonian systems. *Nonlinear Anal.* 41 (2000), no. 3-4, Ser. A: Theory Methods, 455–463.
3. Homoclinic orbits for first order Hamiltonian systems possessing super-quadratic potentials. *Nonlinear Anal.* 51 (2002), no. 2, Ser. A: Theory Methods, 197–214.
4. Periodic solutions for non-autonomous Hamiltonian systems possessing super-quadratic potentials. *Nonlinear Anal.* 51 (2002), no. 6, 941–955.
5. Subharmonics for first order convex nonautonomous Hamiltonian systems. *J. Dynam. Differential Equations* 15 (2003), no. 1, 107–123.
6. Multiple solutions of super-quadratic second order dynamical systems. *Dynamical systems and differential equations (Wilmington, NC, 2002).* *Discrete Contin. Dyn. Syst.* 2003, suppl., 926–934.
7. Sub-harmonics of first order Hamiltonian systems and their asymptotic behaviors. *Nonlinear differential equations, mechanics and bifurcation (Durham, NC, 2002).* *Discrete Contin. Dyn. Syst. Ser. B* 3 (2003), no. 4, 643–654.
8. Homoclinic orbits for first order Hamiltonian systems with convex potentials. *Advanced Nonlinear Studies* 6 (2006), 399-410.
9. New Proof of Hörmander Multiplier Theorem on Compact manifolds without boundary. *Proc. Amer. Math. Soc.* 135 (2007), 1585-1595.
10. (with Roberto Triggiani) Pointwise Carleman Estimates, Global Uniqueness, Observability, and Stabilization for Schrödinger Equations on Riemannian Manifolds at the H^1 -Level. *AMS Contemporary Mathematics*, Volume 426, 2007, 339-404. (In *Control Methods in PDE Dynamical Systems*, AMS-IMS-SIAM Joint Summer Research Conference, July 3-7, 2005 Snowbird, Utah, Edited by F. Ancona, I. Lasiecka, W. Littman and R. Triggiani.)
11. Gradient estimates for eigenfunctions of compact manifolds with boundary and the Hörmander multiplier theorem. *FORUM MATHEMATICUM* 21:3 (May 2009), pp. 455-476.
12. Spectral Expansions of Piecewise Smooth Functions on compact Riemannian manifolds with boundary. (preprint)
13. Gradient estimates for spectral cluster with $C^{1,1}$ metrics and multiplier problems. (in preparation)
14. Eigenfunction estimates for Neumann Laplacian on compact manifolds with boundary and multiplier problems. (preprint)
15. Gradient estimates for the degenerate parabolic equation $u_t = \Delta F(u)$ on manifolds and some Liouville theorems of Porous Media Equations. arXiv:0805.3676
16. (with Junfang Li) Differential Harnack inequalities on Riemannian manifolds I : linear heat equation.arXiv:0901.3849

17. (With Junfang Li) New Perelman type LYH differential Harnack inequalities and entropy formulas for linear heat equations.(in preparation)
18. (with Evan Haldane and Dmitry Jakobson) Schrödinger eigenfunctions on S^2 and their nodal sets. (in preparation)
19. Upper and lower bounds for normal derivatives of spectral clusters of Dirichlet Laplacian. (in preparation)

TEACHING EXPERIENCE:

Assistant Professor, Binghamton University:

- Fall 2007: MATH 508 Complex Analysis
- Spring 2008: On leave as CRM PostDoctoral Fellow
- Fall 2008: MATH 478 Real Analysis I
- Spring 2009: MATH479 Real Analysis II and MATH505 Analysis I
- Fall 2009: MATH 478 Real Analysis I, MATH 508 Complex Analysis and Math 590F Topics in Analysis

Instructor, University of Virginia:

- Spring 2007: MATH 334 Complex Variables with Applications
- Fall 2006: MATH 351 Elementary Linear Algebra; MATH 121 Applied Calculus I
- Spring 2006: MATH 122 Applied Calculus II; MATH 325 Ordinary Differential Equations
- Fall 2005: On leave to MSRI as MSRI PostDoc Fellow
- Spring 2005: Math 872 Differential Geometry
- Fall 2004: APMA 213 Ordinary Differential Equations

Teaching Assistant, Johns Hopkins University and University of Pennsylvania:

- TA for course: Math 302 Differential Equations with Application, Fall 2001, Spring 2002, Fall 2002, Fall 2003.
- Instructor for graduate course: Math 660 Qualifying Exam Problems, Fall 2002, Spring 2003.
- Grader for undergraduate courses: Calculus, Linear Algebra, Analysis I, Differential Equations with Application, Partial Differential Equations for Applications;

Graduate courses: Real Analysis, Complex Analysis, Partial Differential Equation.

TALK AND PAPER POSTER:**Year 2001-2003**

1. Half an hour talk on the conference of Soliton Equations: Applications and Theory. University of Colorado, Colorado Springs, CO, August 10-12, 2001.
2. 15 minutes talk on Fields Institute workshop: Problems and Perspectives on the Calculus of Variations: Physics, Economics, and Geometry, the Fields Institute in Toronto, Ontario, August 20-25, 2001.
3. Half an hour talk on Harmonic Analysis / PDEs Conference, University of Missouri-Columbia, Missouri, May 8-11, 2002.
4. Paper poster on Nonlinear Differential Equations, Mechanics and Bifurcation, A conference in honor of David G. Schaeffer, Duke University, Durham, NC, May 20-22, 2002.
5. 20 minutes talk on The 4th International Conference on Dynamical Systems and Differential Equations, University of North Carolina at Wilmington, NC, May 24 - 27, 2002.
6. Half an hour talk on Workshop on Inverse Spectral Geometry, University of Kentucky, Lexington, Kentucky, June 20-28, 2002.
7. Paper poster on the conference, Quasi-convexity and its applications, Princeton, NJ, November 14-16 2002.
8. Invited one hour talk on Workshop: Partial differential equations on non-compact manifolds, Penn State, PA, December 14-15, 2002.
9. Paper poster on Conference on Spectral Analysis in Geometry and Physics, University of California, San Diego, CA, January 3 - 5, 2003.
10. One hour talk in Analysis Seminar, Department of Mathematics, Johns Hopkins University, Baltimore, MD, October 6, 2003.

Year 2004-2007

11. Half an hour talk on The 5th International Conference on Dynamical Systems and Differential Equations, Pomona, CA, June 16 - 19, 2004.
12. Two one-hour talks in differential equations and dynamical systems Seminar, Department of Mathematics, University of Virginia, Charlottesville, VA, October, 2004.
13. One-hour talk in differential equations and dynamical systems Seminar, Department of Mathematics, University of Virginia, Charlottesville, VA, March, 2005.
14. Half an hour talk in conference Minimal Surfaces, Sub-Elliptic PDEs and Geometric Analysis, Dartmouth College, Hanover, NH, March 9 - 12, 2005.
15. Half an hour talk in 2005 AMS-IMS-SIAM Summer Research Conferences: Control Methods in PDE-Dynamical Systems. Snowbird, UT, July 3-July 8, 2005.
16. One hour talk in NDE seminar in MSRI, Berkeley, Oct. 20, 2005.
17. Half an hour talk in Postdoc seminar in MSRI, Berkeley, Oct. 28, 2005.
18. Invited talk in special section of 2006 AMS Spring Western Section Meeting, San Francisco State University, San Francisco, CA, April 29 30, 2006.

19. One hour talk in department of mathematics, East China Normal University, Shanghai, P. R. China, May 18, 2006.
20. Half an hour talk on The 6th International Conference on Dynamical Systems and Differential Equations, University of Poitiers, Poitiers, France, June 25 - 28, 2006.
21. Invited talk in International Conference on Nonlinear and Harmonic Analysis -The 2nd Nankai-Edinburgh Joint Symposia (2006) September 11-15, Tianjin, China
22. Mathematics Colloquium talk, Department of Mathematics, Washington State University, Pullman, Washington, February 9, 2007.
23. Mathematics Colloquium talk, Department of Mathematical Sciences, SUNY-Binghamton University, Binghamton, New York, February 15, 2007.
24. Mathematics Colloquium talk, Department of Mathematics, University of South Florida, Tampa, Florida, February 19, 2007.
25. Mathematics Colloquium talk, Department of Mathematics, Wright State University, Dayton, Ohio, February 23, 2007.
26. Mathematics Colloquium talk, Department of Mathematics and Statistics, University of North Carolina at Charlotte, Charlotte, North Carolina, February 26, 2007.

Year 2007-current

27. One hour talk in MSRI Summer Microprogram on Nonlinear Partial Differential Equations, MSRI, Berkeley, August 10, 2007.
28. One Hour talk in Geometry and Topology Seminar, Department of Mathematical Sciences, Binghamton University, October 25, 2007.
29. Half an hour talk in Young Mathematicians' Conference, CRM, Montreal, Canada, January 18-19, 2008.
30. One hour talk in Workshop on Initial Conditions, CRM, Montreal, Canada, January 24-25, 2008.
31. Talk in Analysis Seminar, Department of Mathematics and Statistics, McGill University, February 8, 2008.
32. Half an hour talk in Workshop on Harmonic Analysis, Fields Institute, Toronto, Canada, February 19 - 23, 2008.
33. Series talks in Geometric Analysis Working Seminar, McGill University, June and July, 2008.
34. One hour talk in Cornell analysis seminar, Department of Mathematics, Cornell University, September 15th, 2008
35. One hour talk in Nonlinear PDEs Seminar, Department of Mathematics, University of California, Irvine, October 9th, 2008
36. One hour talk in Geometry and Topology Seminar, Department of Mathematical Sciences, Binghamton University, March 26, 2009

OTHER CONFERENCES ATTENDED:**Year 1999-2003**

- AMS conference: the Mathematical Challenges of 21st Century meeting. UCLA, Los Angeles, CA, August 7-12, 2000.
- Midwest Partial Differential Equations Seminar: Fall 1999, University of Illinois at Urbana-Champaign; Spring 2002, University of Kentucky; Fall 2002, Northwestern University; Spring 2003, University of Illinois at Chicago; Fall 2003, University of Minnesota; Fall 2004, Wayne State University.
- Geometric Analysis: a Conference in Honor of Richard Melrose. MIT, Boston, MA, March 23-25, 2002
- CBMS-NSF Conference - Nonhomogeneous Harmonic Analysis, University of North Carolina, Chapel Hill, NC, May 13-17, 2002.
- IPAM workshop: Emerging Applications of the Nonlinear Schrödinger Equations, IPAM in University of California, Los Angeles, CA, February 3-7, 2003.
- SCGAS Conference, University of California, San Diego, CA, February 8-9, 2003.
- IAS/PCMI summer school: Park city program in harmonic analysis and PDE , Park City, Utah, June 29-July 19, 2003.

Year 2004-2007

- AMS National Meetings - Phoenix 2004, January 7-10, 2004, Phoenix Civic Plaza
- The 3rd Duke Mathematical Journal Conference, Duke University, Durham, NC, April 23 - 25, 2004.
- NSF/CBMS Regional Conference in the Mathematical Sciences, School of Mathematics, Georgia Institute of Technology, Atlanta, GA, May 23- 28, 2004.
- 2004 CNA Summer School: Advances in Nonlinear Analysis, Carnegie Mellon University, Pittsburgh, PA, May 27 - June 5, 2004.
- The 2nd Symposium on Analysis and PDEs, Purdue University, West Lafayette, Indiana, June 7-10, 2004.
- 2005 John H. Barrett Memorial Lectures, New Developments in Nonlinear Partial Differential Equations, Mathematics Department, University of Tennessee, Knoxville, Tennessee, April 28-30, 2005.
- 2005 Charlotte Research Institute Summer Conference: Inverse Scattering workshop. University of North Carolina at Charlotte, Charlotte, North Carolina, May 30-June 3, 2005.
- Visiting in Nankai Institute of Mathematics. University of Nankai, Tianjin, China, August 1-8, 2005.
- MSRI research programs: "Nonlinear Dispersive Equations" and "Nonlinear Elliptic Equations and Its Applications" MSRI, Berkeley, CA, August 15 to December 16, 2005.
- NSF-FRG Conference: Interactions between Harmonic Analysis and Partial Differential Equations. University of Missouri, Columbia, Missouri, March 24-26, 2006.

- Visiting in Chern Institute of Mathematics. University of Nankai, Tianjin, China, May 28-July 16, 2006.
- 2006 International Conference on Applied Mathematics and Interdisciplinary Research-Nankai, June 12-15, Nankai University, Tianjin, P. R. China.
- 2006 Summer School Mini-Workshop and distinguished lectures on Geometric Analysis East China Normal University July 16-28, 2006.
- Conference on Geometric Analysis and Non-linear Elliptic PDEs, Johns Hopkins University, Department of Mathematics, October 27 - 29, 2006.
- FRG/JAMI Workshop: Global Harmonic Analysis and its Applications, Johns Hopkins University, Department of Mathematics, November 10 - 12, 2006
- AMS National Meetings - New Orleans 2007, January 5 - 8, 2007, New Orleans Marriott & Sheraton New Orleans
- JAMI Conference: Nonlinear dispersive equations, Johns Hopkins University, Department of Mathematics, March 14-18, 2007
- Fifty-ninth midwest partial differential equations seminar, University of Kentucky, 24-25 March 2007, Lexington, Kentucky.
- The Tenth Riviere-Fabes Symposium on Analysis and PDE School of Mathematics, University of Minnesota April 20-22, 2007

Year 2007-current

- MSRI Summer Microprogram on Nonlinear Partial Differential Equations, MSRI, Berkeley, CA, July 23,2007 to August 10,2007
- Theme Semester on Dynamical Systems and Evolution Equations, January-June 2008 at CRM, Montreal, CANADA
- Young Mathematicians' Conference at CRM, Montreal, CANADA, January 18 - 19, 2008
- Workshop on Initial Conditions, CRM, Montreal, CANADA, January 24-25, 2008
- Workshop on Harmonic Analysis, Fields Institute, Toronto, Canada, February 19 - 23, 2008.
- Workshop on Spectrum and Dynamics, CRM, Montreal, CANADA, April 7-11, 2008
- Workshop on Geometric Evolution Equations, CRM, Montreal, CANADA, April 16-27, 2008
- Workshop on Singularities, Hamiltonian and gradient flows, CRM, Montreal, CANADA, May 12-16, 2008
- Workshop on Floer Theory and Symplectic Dynamics, CRM, Montreal, CANADA, May 19-24, 2008
- Visit Professor Junfang Li in the Department of Mathematics, University of Alabama, Birmingham, September 27-Oct 1, 2008
- Visit Professor Yifeng Yu in the Department of Mathematics, University of California, Irvine, Oct. 7-11, 2008

- Participate "The 61st Fall 2008 Midwest Partial Differential Equations Seminar", The Ohio State University, November 7-9, 2008
- Participate "the 16th SCGAS: Southern California Geometric Analysis Seminar", University of California, San Diego, February 21-22, 2009
- Participate "Singer Conference 2009", MIT and Harvard, May 22-24, 2009
- Participate "The 4th Symposium on Analysis and PDEs", Purdue University, May 26-29, 2009,

PROFESSIONAL ACTIVITIES:

Membership: AMS

Referee papers for:

- Acta Mathematica Scientia
- Communications on Pure and Applied Analysis
- Computers and Mathematics with Applications
- Discrete and Continuous Dynamical Systems (DCDS)
- Indian Journal of Pure and Applied Mathematics.
- Journal of Mathematical Analysis and Application
- Mathematical and computer Modeling
- Physics Letters A
- Proceedings of the American Mathematical Society
- Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences

Reviewer papers for: Mathematical Reviews

DEPARTMENT SERVICE:

- Committee member of Undergraduate Committee since Fall 2007
- Committee member of Colloquium Committee since Fall 2007
- Master's Exam Coordinator since Fall 2009
- Committee member of PhD Thesis Defence Committee for REWAT THAMMA-APIROAM, Department of Economics, Binghamton University, April 24, 2009