

PERSONAL

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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

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

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

TEACHING EXPERIENCE IN BINGHAMTON UNIVERSITY:

- Fall 2007: MATH508 Complex Analysis
- Spring 2008: On Title F Leave as CRM PostDoctoral Fellow
- Fall 2008: MATH478 Real Analysis I
- Spring 2009: MATH479 Real Analysis II and MATH505 Analysis I
- Fall 2009: MATH478 Real Analysis I, MATH508 Complex Analysis and Math590F Topics in Analysis
- Spring 2010: MATH479 Real Analysis II
- Fall 2010: Teaching waiver with Dean's Research Semester Award for Junior Faculty

AWARDS AND FELLOWSHIPS:

- Harpur College Grant in Support of Research, Scholarship and Creative Work in Year 2010-2011. (\$4,000)
- Dean's Research Semester Award for Junior Faculty from Harpur College with teaching waiver for 2010 Fall semester
- Travel grant from AMS-NSF to attend the International Congress of Mathematicians in Hyderabad, India, August 19-27, 2010. (\$3,050)
- NSF-DMS Grant 0852507: Eigenfunction estimates on manifolds with boundary and applications to partial differential equations, June 1, 2008 - May 31, 2010.(\$35,438)
- Title F Leave Award from Harpur College to attend "Theme Semester on Dynamical Systems and Evolution Equations", January-June 2008 at CRM, Montreal, CANADA
- CRM PostDoctoral Fellowship in connection with the Winter 2008 Theme Semester on Dynamics Systems and Evolution Equations, 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.(\$72,003)
- MSRI PostDoctoral Fellowship to attend MSRI research program: "Nonlinear Dispersive Equations" at MSRI, August- December, 2005.
- Summer visiting scholar 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.

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 Hörmander multiplier problems, Bochner-Riesz means for eigenfunction expansion on compact manifolds.

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.

PAPERS PUBLISHED OR ACCEPTED

1. Subharmonic solutions of a class of non-autonomous Hamiltonian systems. *Acta Sci. Nat. Univer. Nankai.* Vol. 32, No.2, (1999), 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. *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.
11. Gradient estimates for eigenfunctions of compact manifolds with boundary and the Hörmander multiplier theorem. *FORUM MATHEMATICUM* 21:3 (May 2009), 455-476.
12. Eigenfunction estimates for Neumann Laplacian on compact manifolds with boundary and multiplier problems. *Proc. Amer. Math. Soc.* 139 (2011), 3583-3599.

13. (with Junfang Li) Differential Harnack inequalities on Riemannian manifolds I : linear heat equation. *Advance in Mathematics*, Volume 226, Issue 5, (March 2011) Pages 4456-4491 doi:10.1016/j.aim.2010.12.009 (arXiv:0901.3849)
14. (With Liangui Wang) Hybrid state feedback, robust H_∞ control for a class switched systems with nonlinear uncertainty. (Accepted by conference proceeding of CSIE2011)
15. Gradient estimates for $u_t = \Delta F(u)$ on manifolds and some Liouville-type theorems. *Journal of Differential Equations* 252 (2012) pp. 1403-1420. doi:10.1016/j.jde.2011.08.004
16. Upper and lower bounds for normal derivatives of spectral clusters of Dirichlet Laplacian. *J. Math. Anal. Appl.* 387 (2012) 374383 doi:10.1016/j.jmaa.2011.09.003

PAPERS SUBMITTED AND PREPRINTS

17. Spectral Expansions of Piecewise Smooth Functions on compact Riemannian manifolds with boundary. (preprint)
18. (With Junfang Li) New Perelman type LYH differential Harnack inequalities and entropy formulas for linear heat equations. (in preparation)
19. Gradient estimates for spectral clusters and Carleson measures on compact manifolds with boundary. (in preparation)
20. Multiple periodic solutions of super-quadratic Hamiltonian systems with bounded forcing terms. (in preparation)
21. Periodic and subharmonic solutions of Hamiltonian systems possessing "super-quadratic" potentials. (in preparation)

TALK AND PAPER POSTER:

Year 1999 - Summer 2004

- Half an hour talk on the conference of Soliton Equations: Applications and Theory. University of Colorado, Colorado Springs, CO, August 10-12, 2001.
- 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.
- Half an hour talk on Harmonic Analysis / PDEs Conference, University of Missouri-Columbia, Missouri, May 8-11, 2002.
- 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.
- 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.
- Half an hour talk on Workshop on Inverse Spectral Geometry, University of Kentucky, Lexington, Kentucky, June 20-28, 2002.
- Paper poster on the conference, Quasi-convexity and its applications, Princeton, NJ, November 14-16 2002.

- Invited one hour talk on Workshop: Partial differential equations on non-compact manifolds, Penn State, PA, December 14-15, 2002.
- Paper poster on Conference on Spectral Analysis in Geometry and Physics, University of California, San Diego, CA, January 3-5, 2003.
- One hour talk in Analysis Seminar, Department of Mathematics, Johns Hopkins University, Baltimore, MD, October 6, 2003.
- Half an hour talk on The 5th International Conference on Dynamical Systems and Differential Equations, Pomona, CA, June 16-19, 2004.

Fall 2004- Spring 2007

- Two one-hour talks in differential equations and dynamical systems Seminar, Department of Mathematics, University of Virginia, Charlottesville, VA, October, 2004.
- One-hour talk in differential equations and dynamical systems Seminar, Department of Mathematics, University of Virginia, Charlottesville, VA, March, 2005.
- Half an hour talk in conference Minimal Surfaces, Sub-Elliptic PDEs and Geometric Analysis, Dartmouth College, Hanover, NH, March 9-12, 2005.
- 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.
- One hour talk in NDE seminar in MSRI, Berkeley, Oct. 20, 2005.
- Half an hour talk in Postdoc seminar in MSRI, Berkeley, Oct. 28, 2005.
- Invited talk in special section of 2006 AMS Spring Western Section Meeting, San Francisco State University, San Francisco, CA, April 29- 30, 2006.
- One hour talk in department of mathematics, East China Normal University, Shanghai, P. R. China, May 18, 2006.
- Half an hour talk on The 6th International Conference on Dynamical Systems and Differential Equations, University of Poitiers, Poitiers, France, June 25-28, 2006.
- Invited talk in International Conference on Nonlinear and Harmonic Analysis -The 2nd Nankai-Edinburgh Joint Symposia (2006), Tianjin, China, September 11-15, 2006.
- Mathematics Colloquium talk, Department of Mathematics, Washington State University, Pullman, Washington, February 9, 2007.
- Mathematics Colloquium talk, Department of Mathematical Sciences, SUNY-Binghamton University, Binghamton, New York, February 15, 2007.
- Mathematics Colloquium talk, Department of Mathematics, University of South Florida, Tampa, Florida, February 19, 2007.
- Mathematics Colloquium talk, Department of Mathematics, Wright State University, Dayton, Ohio, February 23, 2007.
- Mathematics Colloquium talk, Department of Mathematics and Statistics, University of North Carolina at Charlotte, Charlotte, North Carolina, February 26, 2007.

Summer 2007-current

- One hour talk in MSRI Summer Microprogram on Nonlinear Partial Differential Equations, MSRI, Berkeley, August 10, 2007.
- One Hour talk in Geometry and Topology Seminar, Department of Mathematical Sciences, Binghamton University, October 25, 2007.
- Half an hour talk in Young Mathematicians' Conference, CRM, Montreal, Canada, January 18-19, 2008.
- One hour talk in Workshop on Initial Conditions, CRM, Montreal, Canada, January 24-25, 2008.
- One hour talk in Analysis Seminar, Department of Mathematics and Statistics, McGill University, February 8, 2008.
- Half an hour talk in Workshop on Harmonic Analysis, Fields Institute, Toronto, Canada, February 19-23, 2008.
- Series talks in Geometric Analysis Working Seminar, McGill University, June and July, 2008.
- One hour talk in Cornell analysis seminar, Department of Mathematics, Cornell University, September 15th, 2008
- One hour talk in Nonlinear PDEs Seminar, Department of Mathematics, University of California, Irvine, October 9th, 2008
- One hour talk in Geometry and Topology Seminar, Department of Mathematical Sciences, Binghamton University, March 26, 2009
- Half an hour talk in 2010 CNA Summer School on New Vistas in Image Processing and PDEs, Carnegie Mellon University, June 7 - 12, 2010
- 25 minutes talk special session on Geometric analysis and flows at Fall 2010 AMS East Sectional Meeting in Syracuse, October 2-3, 2010
- 25 minutes talk special session on Nonlinear Analysis of PDEs at Spring 2011 AMS South-eastern Section Meeting, Georgia Southern University, Statesboro, GA, March 12-13, 2011
- Half an hour talk in the international conference: Recent development on L-infinity variational problems and associated nonlinear partial differential equations, May 12 - May 14, 2011, University of Kentucky, Lexington, KY.

OTHER RESEARCH ACTIVITIES:**Year 1999-Summer 2004**

- AMS conference: the Mathematical Challenges of 21st Century meeting. UCLA, Los Angeles, CA, August 7-12, 2000. (support from AMS)
- 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. (support from conference)
- Geometric Analysis: a Conference in Honor of Richard Melrose. MIT, Boston, MA, March 23-25, 2002 (support from conference)

- CBMS-NSF Conference - Nonhomogeneous Harmonic Analysis, University of North Carolina, Chapel Hill, NC, May 13-17, 2002 (support from NSF/CBMS)
- IPAM workshop: Emerging Applications of the Nonlinear Schrödinger Equations, IPAM in University of California, Los Angeles, CA, February 3-7, 2003 (support from IPAM)
- SCGAS Conference, University of California, San Diego, CA, February 8-9, 2003 (support from conference)
- IAS/PCMI summer school: Park city program in harmonic analysis and PDE , Park City, Utah, June 29-July 19, 2003 (support from IAS/PCMI)
- AMS National Meetings - Phoenix 2004, , Phoenix Civic Plaza, January 7-10, 2004
- The 3rd Duke Mathematical Journal Conference, Duke University, Durham, NC, April 23 - 25, 2004 (support from conference)
- NSF/CBMS Regional Conference in the Mathematical Sciences, School of Mathematics, Georgia Institute of Technology, Atlanta, GA, May 23- 28, 2004 (support from NSF/CBMS)
- 2004 CNA Summer School: Advances in Nonlinear Analysis, Carnegie Mellon University, Pittsburgh, PA, May 27 - June 5, 2004 (support from CNA)
- The 2nd Symposium on Analysis and PDEs, Purdue University, West Lafayette, Indiana, June 7-10, 2004 (support from conference)

Fall 2004-Spring 2007

- Midwest Partial Differential Equations Seminar: Wayne State University, Fall 2004 (support from conference)
- 2005 John H. Barrett Memorial Lectures, New Developments in Nonlinear Partial Differential Equations, Department of Mathematics, University of Tennessee, Knoxville, Tennessee, April 28-30, 2005 (support from conference)
- 2005 Charlotte Research Institute Summer Conference: Inverse Scattering workshop. University of North Carolina at Charlotte, Charlotte, North Carolina, May 30-June 3, 2005 (support from conference)
- 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 (support from MSRI)
- NSF-FRG Conference: Interactions between Harmonic Analysis and Partial Differential Equations. University of Missouri, Columbia, Missouri, March 24-26, 2006 (support from conference)
- 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 (support from conference)
- FRG/JAMI Workshop: Global Harmonic Analysis and its Applications, Johns Hopkins University, Department of Mathematics, November 10 - 12, 2006 (support from conference)
- AMS National Meetings - New Orleans 2007, New Orleans Marriott & Sheraton, New Orleans, LA, January 5-8, 2007
- JAMI Conference: Nonlinear dispersive equations, Johns Hopkins University, Department of Mathematics, March 14-18, 2007 (support from conference)
- 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 (support from conference)

Summer 2007-current

- MSRI Summer Microprogram on Nonlinear Partial Differential Equations, MSRI, Berkeley, CA, July 23 to August 10, 2007 (support from MSRI)
- Theme Semester on Dynamical Systems and Evolution Equations, January-June 2008 at CRM, Montreal, CANADA (support from CRM)
- 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 (support from conference)
- 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, Cambridge, MA, May 22-24, 2009 (support from conference)
- Participate "The 4th Symposium on Analysis and PDEs", Purdue University, May 26-29, 2009 (support from conference)
- Visit Dr. Huichao Chen in CBAR, Harvard School of Public Health, Cambridge, MA, November 24-29, 2009
- Participate "the 17th SCGAS: Southern California Geometric Analysis Seminar", University of California, Irvine, February 20-21, 2010
- Visit Dr. Huichao Chen in CBAR, Harvard School of Public Health, Cambridge, MA, March 27-April 5, 2010
- Participate in 2010 CNA Summer School on New Vistas in Image Processing and PDEs, Carnegie Mellon University, June 7 - 12, 2010 (support from CNA)
- Participate in ICM 2010 at Hyderabad, India (travel support from AMS)
- Participate in the Fall 2010 AMS East Sectional Meeting in Syracuse, October 2-3, 2010
- Participate in the Spring 2011 AMS Southeastern Section Meeting, Georgia Southern University, Statesboro, GA, March 12-13, 2011
- Participate in the international conference: Recent development on L-infinity variational problems and associated nonlinear partial differential equations, May 12 - May 14, 2011, University of Kentucky, Lexington, KY.
- Participate in the NSF-CBMS Conference "Global Harmonic Analysis" at the University of Kentucky, June 20-24, 2011.

PROFESSIONAL SERVICE:

Program Committee member: The 3rd International Congress on Image and Signal Processing (CISP'10) and the 3rd International Conference on BioMedical Engineering and Informatics (BMEI 2010), October 16-18 2010, Yantai, China.

Referee papers for:

- Acta Mathematica Scientia • Applicable Analysis • Applied Mathematics-A Journal of Chinese Universities • 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 • Journal of the Franklin Institute • Mathematical and computer Modeling • Nonlinear Analysis Series A: Theory, Methods & Applications • 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
- Anderson Room Committee since Fall 2011
- Assessment Committee since Fall 2011
- Committee member of PhD Thesis Defence Committee for REWAT THAMMA-APIROAM, Department of Economics, Binghamton University, April 24, 2009
- Member of Master's Oral Exam Committee for Jinghao Li, Department of Mathematical Sciences, Binghamton University, January 29, 2010
- Chair of Master's Oral Exam Committee for Michael Gillin, Department of Mathematical Sciences, Binghamton University, May 18, 2011