Personal Home Page of Xiangjin Xu

RESEARCH INSTERESTS

I. Harmonic Analysis on Manifolds:

• Detailed study of the spectral theory of elliptic operators (Laplace operator and Schrödinger operator) on compact or complete manifolds, in particular, on the growth estimates (Lp, bilinear, and gradient estimates) of eigenfunctions, multiplier problems, Carleson measures and Logvinenko-Sereda sets on compact or complete manifolds with or without boundary.

II. Geometric PDEs:

• Li-Yau and Hamilton type gradient estimates, sharp estimates for the heat kernel and the Green's function for heat equations and Schrödinger operators on Riemannian manifolds (Finsler manifolds, metric measure spaces). Gradient estimates, Liouville's Theorems and entropy formulae for linear and nonlinear (possible degenerate) parabolic equations. Control theoretic problems for (linear and nonlinear) parabolic and hyperbolic PDE systems on manifolds via Carleman estimates. Periodic solutions, subharmonics and homoclinic orbits of Hamiltonian systems.

THESIS

1. **Master Thesis:** Periodic solutions of Hamiltonian systems and differential systems. Nankai Institute of Mathematics, Tianjin, China, June 1999.
2. **PhD Thesis:** Eigenfunction Estimates on Compact Manifolds with Boundary and H\"ormander Multiplier Theorem. Johns Hopkins University, Baltimore, Maryland, May 2004.(PDF)

PUBLICATIONS

1. **Xiangjin Xu**, 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. Yiming Long, **Xiangjin Xu**, Periodic solutions for a class of nonautonomous Hamiltonian systems. *Nonlinear Anal. Ser. A: Theory Methods,* 41 (2000), no. 3-4, 455-463. (PDF)
3. **Xiangjin Xu**, Homoclinic orbits for first order Hamiltonian systems possessing super-quadratic potentials. *Nonlinear Anal. Ser. A: Theory Methods,* 51 (2002), no. 2, 197-214. (PDF)
4. **Xiangjin Xu**, Periodic solutions for non-autonomous Hamiltonian systems possessing super-quadratic potentials. *Nonlinear Anal. Ser. A: Theory Methods,* 51 (2002), no. 6, 941-955. (PDF)
5. **Xiangjin Xu**, Subharmonics for first order convex nonautonomous Hamiltonian systems. *J. Dynam. Differential Equations* 15 (2003), no. 1, 107-123. (PDF)
6. **Xiangjin Xu**, 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. (PDF)
7. **Xiangjin Xu**, 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. (PDF)
8. **Xiangjin Xu**, Homoclinic orbits for first order Hamiltonian systems with convex potentials. *Advanced Nonlinear Studies* 6 (2006), 399-410. (PDF)
9. **Xiangjin Xu**, New Proof of H\"ormander Multiplier Theorem on Compact manifolds without boundary. *Proc. Amer. Math. Soc.* 135 (2007), 1585-1595.(PDF)
10. Roberto Triggiani, **Xiangjin Xu**, Pointwise Carleman Estimates, Global Uniqueness, Observability, and Stabilization for Schrodinger Equations on Riemannian Manifolds at the H^1-Level. *AMS Contemporary Mathematics*, Volume 426, 2007, 339-404. (PDF)
11. **Xiangjin Xu**, Gradient estimates for eigenfunctions of compact manifolds with boundary and the H\"ormander multiplier theorem. *Forum Mathematicum* 21:3 (May 2009), pp. 455-476. (PDF)
12. **Xiangjin Xu**, Eigenfunction estimates for Neumann Laplacian on compact manifolds with boundary and multiplier problems. Proc. Amer. Math. Soc. 139 (2011), 3583-3599.(PDF)
13. Junfang Li, **Xiangjin Xu**, 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. Liangui Wang, **Xiangjin Xu**, Hybrid state feedback, robust H_{∞} control for a class switched systems with nonlinear uncertainty. Z. Qian et al.(Eds.):Recent Advances in CSIE 2011, Lecture Notes in Electrical Engineering, Volume 129, 2012, pp 197-202
15. **Xiangjin Xu**, Gradient estimates for $u_t=\Delta F(u)$ on manifolds and some Liouville-type theorems. Journal of Differential Equation (2011) doi:10.1016/j.jde.2011.08.004 arXiv:0805.3676
16. **Xiangjin Xu**, Upper and lower bounds for normal derivatives of spectral clusters of Dirichlet Laplacian. Journal of Mathematical Analysis and Applications, Volume 387, Issue 1, (March, 2012), Pages 374-383 doi:10.1016/j.jmaa.2011.09.003 , ArXiv:1004.2517
17. Huichao Chen, **Xiangjin Xu**, Power analysis of a left-truncated normal mixture distribution with applications in red blood cell velocities. Presentation (by **H. Chen**) at Joint Statistical Meetings (JSM), Montreal, August, 2013.()
18. **Xiangjin Xu**, Characterization of Carleson Measures via Spectral Estimates on Compact Manifolds with Boundary. Springer Proceedings in Mathematics & Statistics, vol 471. Page 1-23, Springer,2024. https://doi.org/10.1007/978-3-031-69706-7_1()

PREPRINTS AND WORK IN PROGRESS

1. **Xiangjin Xu**, Heat kernel Gaussian bounds on manifolds I: manifolds with non-negative Ricci curvature, arXiv:1912.12758 [math.DG] ()
2. **Xiangjin Xu**, Sharp Hamilton's Gradient and Laplacian Estimates on noncompact manifolds. (Submitted April 2025) ()
3. **Xiangjin Xu**, Heat kernel and Green's function on manifolds with nonnegative Ricci curvature. (Submitted May 2025) ()
4. Xing Wang,**Xiangjin Xu**, Cheng Zhang, L^p-Logvinenko-Sereda sets and L^p-Carleson measures on compact manifolds. arXiv:2506.22759 [math.AP]. (Submitted July 2025) ()
5. **Xiangjin Xu**, Heat kernel Gaussian bounds on manifolds II: manifolds with negative Ricci curvature, preprint. ()
6. **Xiangjin Xu**, Sharp Hamilton's Gradient and Laplacian Estimates on noncompact manifolds.preprint. ()
7. **Xiangjin Xu**, Differential Harnack inequalities on Riemannian manifolds II: Schr\"odinger operator. (In Progress) ()
8. **Xiangjin Xu**, The Perelman-type entropy formula for linear heat equation on noncompact manifolds. (In Progress) ()
9. **Xiangjin Xu**, New uniqueness criteria of tangent cones for manifolds with nonnegative Ricci curvature. (In Progress) ()
10. **Xiangjin Xu**, Multiple periodic solutions of super-quadratic Hamiltonian systems with bounded forcing terms.(In Progress) ()
11. **Xiangjin Xu**, Periodic and subharmonic solutions of Hamiltonian systems possessing "super-quadratic" potentials. (In Progress) ()

My research is partially supported by:
NSF-DMS 0602151(2006 - 2008) and NSF-DMS-0852507 (2008 - 2010), **Harpur College Grants in Support of Research, Scholarship and Creative Work:** Year 2010-2011, Year 2012-2013, Year 2017-2018, Year 2019-2020. **NYS/UUP Individual Development Awards:** Year 2013-2014. **AMS-NSF Travel grants:** ICM 2010 in Hyderabad, India, Augest 2010. PIMS conference, UBC, Canada, July 2013. The Second PRIMA Congress, Shanghai, China, June 2013. MCA 2021 (Online), July, 2021. MCA 2025, Miami, July, 2025.

Last updated: 07/01/2025