

Curriculum Vitae: Xiaodong Cao

Contact Information

Department of Mathematics
Cornell University
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Employment

- Assistant Professor, Cornell Mathematics Dept. (2006-present)
- Postdoctoral Fellow, MSRI Berkeley (Spring 2007)
- Ritt Assistant Professor, Columbia Mathematics Dept. (2002-2006)

Education

- Ph.D. Mathematics: Massachusetts Institute of Technology, 2002
- M.A. Mathematics: University of California, Los Angeles, 1998
- B.S. Mathematics: University of Science and Technology of China, 1996

PhD Thesis Advisor

Professor Gang Tian

Awards, Honors and Fellowships

- 2006 - 2007 Postdoctoral Fellowship, MSRI.
- 1996 - 1997 Pauley Fellowship, UCLA.
- 1996 - 1997 University Fellowship, UCLA.

Research grants

- 2009 - 2011 NSF Grant DMS-0904432.
- 2010 - 2011 Jeffrey Sean Lehman Fund, Cornell University.
- 2007 - 2008 Jeffrey Sean Lehman Fund, Cornell University.

Publications

1. Cao, X. and Zhang, Z., *Differential Harnack Estimates for Parabolic Equations*, **Proc. of Complex and Differential Geometry**, accepted, 2010.
2. Cao, X., Hou, S. and Ling, J., *Estimate and Monotonicity of the First Eigenvalue under the Ricci Flow*, **Math. Ann.**, accepted, 2010.

3. Cao, X., Wang, B. and Zhang, Z., *On Locally Conformally Flat Gradient Shrinking Ricci Solitons*, **Commun. Contemp. Math.**, accepted, 2010.
4. Bailesteanu, M., Cao, X. and Pulemotov, A., *Gradient Estimates for the Heat Equation under the Ricci Flow*, **J. Funct. Anal.**, Vol. 258 (10): 3517 - 3542, 2010, doi:10.1016/j.jfa.2009.12.003.
5. Cao, X. and Saloff-Coste, L., *Cross Curvature Flow on Locally Homogeneous Three-manifolds (II)*, **Asian J. Math.**, Vol. 13 (4): 421 - 458, 2009.
6. Cao, X., Guckenheimer, J. and Saloff-Coste, L., *The Backward Behavior of the Ricci and Cross Curvature Flows on $SL(2, \mathbb{R})$* , **Comm. Anal. Geom.**, Vol. 17 (4): 777-796, 2009.
7. Cao, X. and Hamilton, R., *Differential Harnack Estimates for Time-dependent Heat Equations with Potentials*, **Geom. Funct. Anal.**, Vol. 19 (4): 989-1000, 2009, doi: 10.1007/s00039-009-0024-4.
8. Cao, X. and Saloff-Coste, L., *Backward Ricci Flow on Locally Homogeneous Three-manifolds*, **Comm. Anal. Geom.**, Vol. 17 (2): 305-325, 2009.
9. Cao, X., *Differential Harnack Estimates for Backward Heat Equations with Potentials under the Ricci Flow*, **J. Funct. Anal.**, Vol. 255 (4): 1024-1038, 2008, doi: 10.1016/j.jfa.2008.05.009.
10. Cao, X., *First Eigenvalues of Geometric Operators under the Ricci flow*, **Proc. Amer. Math. Soc.**, Vol. 136 (11): 4075-4078, 2008, doi: 10.1090/S0002-9939-08-09533-6.
11. Cao, X., Ni, Y. and Saloff-Coste, L., *Cross Curvature Flow on Locally Homogeneous Three-manifolds (I)*, **Pacific J. Math.**, Vol. 236 (2): 263-281, 2008, doi: 10.2140/pjm.2008.236.263.
12. Cao, X., *Compact Gradient Shrinking Ricci Solitons with Positive Curvature Operator*, **J. Geom. Anal.**, Vol. 17 (3): 451-459, 2007.
13. Cao, X., *Dimension Reduction under the Ricci Flow on Manifolds with Positive Curvature Operator*, **Pacific J. Math.**, Vol. 232 (2): 263-268, 2007, doi: 10.2140/pjm.2007.232.263.
14. Cao, X., *Eigenvalues of $(-\Delta + \frac{R}{2})$ on Manifolds with Nonnegative Curvature Operator*, **Math. Ann.**, Vol. 337 (2): 435-441, 2007, doi: 10.1007/s00208-006-0043-5.
15. Cao, X., *Isoperimetric Estimate for the Ricci Flow on $S^2 \times S^1$* , **Comm. Anal. Geom.**, Vol. 13 (4): 727-739, 2005.
16. Cao, X., *Ricci Flow on Three-manifolds with Symmetry*, **MIT Thesis**, 2002

Preprints

1. Cao, X. and Zhang, Q. S., *The Conjugate Heat Equation and Ancient Solutions of the Ricci Flow*, arXiv:1006.0540v1 [math.DG], 2010.
2. Cao, X., *Curvature Pinching Estimate and Singularities of the Ricci Flow*, arXiv:1010.6064v2 [math.DG], 2010.

Teaching

- **Cornell University(spring 2011)**, Multivariable Calculus.
- **Cornell University(fall 2010)**, Calculus I.
- **Cornell University(spring 2010)**, Linear Algebra.

- Cornell University(spring 2010), Riemannian Geometry.
- Cornell University(spring 2009), Calculus II.
- Cornell University(fall 2008), Topics in Riemannian Geometry and Geometric Analysis.
- Cornell University(spring 2008), Riemannian Geometry.
- Cornell University(spring 2008), Introduction to Partial Differential Equation.
- Cornell University(fall 2007), Techniques in the Ricci Flow.
- Cornell University(fall 2006), Introduction to the Ricci Flow.
- Columbia University(spring 2006), Calculus, Linear Algebra.
- Columbia University(fall 2005), Differential Geometry, Calculus II.
- Columbia University(spring 2005), Linear Algebra, Calculus III.
- Columbia University(fall 2004), Linear Algebra, Calculus II.
- Columbia University(spring 2004), Calculus III.
- Columbia University(fall 2003), Calculus I.
- Columbia University(spring 2003), Calculus IIS.
- Columbia University(fall 2002), Calculus IS, IIIA.

PhD Student

- Mihai Bailesteanu
- Hung Tran

Invited Talks

- *Nonlinear Analysis Seminar, Rutgers University; Nov. 2010*
- *Geometry and Analysis Seminar, Columbia University; Nov. 2009*
- *Conference on Complex and Differential Geometry, Leibniz Universitaet Hannover, Germany; Sept. 2009*
- *Department Colloquium, University of Alabama at Birmingham; Aug. 2009*
- *Karcher Colloquium, University of Oklahoma; Apr. 2009*
- *Geometry Seminar, University of Rochester; Dec. 2008*
- *PDE, Applied Math and Analysis Seminar, University of Toronto, Canada; Nov. 2008*
- *Geometry and Topology Seminar, McMaster University, Canada; Nov. 2008*
- *Geometry Seminar, University of Michigan; Nov. 2008*
- *Perspectives in Geometric Analysis, Beijing International Mathematical Research Center, Chern Institute of Mathematics, China; Oct. 2008*

- *AMS Fall Eastern Sectional Meeting, Special Session on Complex Geometry and Partial Differential Equations, Middletown, CT; Oct. 2008*
- *Department Colloquium, Indiana Univ.-Purdue Univ., Indianapolis; Sept. 2008*
- *ECNU Geometric Analysis Workshop, East China Normal University, China; July 2008*
- *Geometry Seminar, Capital Normal University, China; July 2008*
- *Workshop on Geometric Analysis, Wuhan University, China; July 2008*
- *International Conference on Ricci Flow and Related Topics, Institut Henri Poincare, France; June 2008*
- *School and Conference on Differential Geometry, International Centre for Theoretical Physics, Italy; June 2008*
- *Workshop on Curvature Flows and Applications, Centre de Recherches Mathematiques, Canada; April 2008*
- *Geometric Analysis Seminar, University of Oregon; Feb. 2008*
- *Geometry and Analysis Seminar, Columbia University; Nov. 2007*
- *Analysis Seminar, Cornell University; Sept. 2007*
- *Joint Postdoctoral Seminar , MSRI; May 2007*
- *Differential Geometry Seminar, UC San Diego; May 2007*
- *Department Colloquium, UC Davis; May 2007*
- *Differential Geometry Seminar and Geometry, Topology and Physics Seminar, UC Santa Barbara; April 2007*
- *Differential Geometry Seminar, UC Irvine; April 2007*
- *Geometric Evolution Seminar, MSRI; April 2007*
- *Differential Geometry and Lie Theory Seminars, CUNY Graduate Center ; March 2007*
- *Analysis Seminar, Cornell University; Sept. 2006*
- *Analysis Seminar, Cornell University; Feb. 2006*
- *Differential Geometry and Lie Theory Seminars, CUNY Graduate Center ; Jan. 2006*
- *Topology and Geometry Seminar, Rutgers University, New Brunswick; Jan. 2006*
- *Geometry and Analysis Seminar, Columbia University; Dec. 2005*
- *Department Colloquium, Rutgers University, Newark; Nov. 2005*
- *Workshop on Geometric Analysis, Changsha, China; May 2005*
- *Workshop on Geometric Evolution Equations, Banff, Canada; July 2004*
- *AMS Spring Eastern Sectional Meeting, Special Session on Nonlinear Partial Differential Equations in Differential Geometry, New York, NY; April 2003*
- *Geometry and Analysis Seminar, Columbia University; Sept. 2002*

Upcoming Talks and Lecture series

- *Differential Geometry Seminar, UC San Diego; Feb. 2011*
- *Complex Geometry and PDE Seminar, Columbia University; Mar. 2011*
- *Ricci Solitons Days in Pisa 2011, Centro De Giorgi, Pisa, Italy; Apr. 2011*
- *Calderón-Zygmund Analysis Seminar, University of Chicago; May 2011*
- *Partial Differential Equation Seminar, Ohio State University; May 2011*
- *AMS Fall Western Sectional Meeting, 40-minute Lecture for Special Session on Geometric Evolution Equations and Related Topics, Salt Lake City, UT; Oct. 2011*

Professional Activities

- Co-organizer, AMS 2011 Fall Eastern Sectional Meeting, Special Session on Parabolic Evolution Equations of Geometric Type, Sept. 2011.
- Co-organizer, AMS 2010 Fall Eastern Sectional Meeting, Special Session on Geometric Analysis and Flows, Oct. 2010.
- REU Advisor, Geometric Differential Equations (6 students), Cornell University, Summer 2010.
- Co-organizer, Joint Cornell-Rochester Analysis and Geometry seminar, Spring 2008 - 2009.
- Organizer, MSRI Geometric Evolution Program Postdoctoral Seminar, Spring 2007.
- Co-organizer, MSRI Joint Postdoctoral Seminar, Spring 2007.
- Co-organizer, Columbia Geometry and Analysis Seminar, 2005-2006.
- Reviewer, Mathematical Review.
- Journal Referee for:
 1. *Inventiones Mathematicae*,
 2. *Journal of the American Mathematical Society*,
 3. *Advances in Mathematics*,
 4. *Journal of Functional Analysis*,
 5. *Commentarii Mathematici Helvetici*,
 6. *International Mathematics Research Notices*,
 7. *Mathematical Research Letters*,
 8. *Mathematische Annalen*,
 9. *Mathematische Zeitschrift*,
 10. *Mathematische Nachrichten*,
 11. *Quarterly Journal of Mathematics*,
 12. *Journal of Geometric Analysis*,
 13. *Annals of Global Analysis and Geometry*,
 14. *Pacific Journal of Mathematics*,
 15. *Indiana University Mathematics Journal*,

16. Journal of Nonlinear Mathematical Physics,
 17. Proceedings of the American Mathematical Society,
 18. Geometriae Dedicata,
 19. Potential Analysis,
 20. Illinois Journal of Mathematics,
 21. Michigan Mathematical Journal,
 22. Acta Mathematica Sinica,
 23. Archiv der Mathematik,
 24. Communications on Pure and Applied Analysis,
 25. Canadian Mathematical Bulletin,
 26. Science China Mathematics,
 27. Science in China Series A: Mathematics.
- Book Referee for:
 1. Chapman & Hall/ CRC Press,
 2. W.H. Freeman and Company Publishers.