

HONGJIE DONG

Division of Applied Mathematics
Brown University
182 George Street
Providence, RI 02912

phone: (401) 863-7297
e-mail: hdong@brown.edu
<http://www.dam.brown.edu/people/dong.htm>

EDUCATION

University of Minnesota: 2001.9–2005.8.

Ph.D. in Mathematics.

Ph.D. thesis: On some problems related to the regularity theory for second-order elliptic-parabolic equations and their numerical approximations.

Thesis advisor: Professor Nicolai V. Krylov.

Fudan University: 1997.9–2001.7.

B.S. in Mathematics.

B.S. thesis: On the compatibility condition of a system of nonlinear first order partial differential equations and its connection to the Frobenius theorem.

Thesis advisor: Professor Jiaying Hong.

RESEARCH INTERESTS

Partial Differential Equations: nonlinear elliptic and parabolic PDEs, Navier-Stokes equations and related equations, reaction diffusion equations, unique continuation problems, solvability of PDEs with rough coefficients.

Probability: probabilistic approach of PDEs, stochastic processes, stochastic control theory.

Numerical Analysis: rates of convergence of finite difference approximations.

EXPERIENCE AND EMPLOYMENT

Institute for Advanced Study: 2008.9–2008.12

Visiting Scholar.

Brown University: 2007.7–

Assistant Professor (tenure track).

Member of the Lefschetz Center for Dynamical Systems.

2009, APMA 1200 (Operational Analysis: Probabilistic models),

2009, APMA 2821C (Topics in Partial Differential Equations),

2007, APMA 0350 (Methods of Applied Mathematics),

2007, APMA 2810V (Topics in Partial Differential Equations).

Mathematical Sciences Research Institute: 2007.7–2007.8

Member of "MSRI Summer Microprogram on Nonlinear Partial Differential Equations".

Date: December 3, 2008.

Institute for Advanced Study: 2006.9–2007.6*Postdoctoral Member.***University of Chicago:** 2005.9–2006.8*L.E. Dickson Instructor and research post-doctor.*

2006 Lecturer, Math 275 (Basic Theory of Partial Differential Equations),

2006 Lecturer, Math 201 (Math Methods For Physical Sciences-2),

2006 Lecturer, Math 200 (Math Methods For Physical Sciences-1),

2005 Lecturer, Math 200 (Math Methods For Physical Sciences-1).

University of Minnesota: 2001.9–2005.8.*Research Assistant of Prof. Nicolai V. Krylov.**Teaching Assistant.*

2005 Teaching Assistant, Math 2243 (Linear Algebra and Differential Equations),

2004 Teaching Assistant, Math 2243 (Linear Algebra and Differential Equations),

2002 Teaching Assistant, Math 1272 (Calculus II),

2002 Teaching Assistant, Math 2374 (Multivariable Calculus and Vector Analysis),

2001 Teaching Assistant, Math 1272 (Calculus II).

Fudan University: 1997.9–2001.7.*Member of university funded programs in applied math:*

Computer-aid realization of Conformal maps, with Prof. Jinghao Zhang.

Optimization of errors in rapid prototyping, with Prof. Yuan Cao.

PUBLICATIONS

- About smoothness of solutions of the heat equations in closed smooth space-time domains, *Comm. Pure Appl. Math.* **58** (2005) no. 6, 799–820.
- On the rate of convergence of finite-difference approximations for Bellman's equations with constant coefficients, with N.V. Krylov, *Algebra i Analis (St. Petersburg Math. J.)* **17** (2005), no. 2, 108–132.
- On the local smoothness of solutions of the Navier-Stokes equations, with D. Du, *J. Math. Fluid Mech.* **9** (2007), no. 2, 139–152.
- Rate of convergence of finite-difference approximations for degenerate linear parabolic equations with C^1 and C^2 coefficients, with N.V. Krylov, *Electro. J. Differential Equations* **2005** (2005), no. 102, 1–25.
- Hessian equations with elementary symmetric functions, *Comm. Partial Differential Equations.* **31** (2006) no. 7, 1005–1025.
- On time inhomogeneous controlled diffusion processes in domains, with N.V. Krylov, *Annal. Prob.* **35**, no. 1 (2007), 206–227.
- On the rate of convergence of finite-difference approximations for Bellman equations with Lipschitz coefficients in domains, with N.V. Krylov, *Appl. Math. Optim.*, **56**, (2007) no. 1, 37–66.
- Unique continuation for the Schrödinger equation with gradient vector potentials, with W. Staubach, *Proc. Amer. Math. Soc.* **135** (2007), no. 7, 2141–2149.
- On uniqueness of boundary blow-up solutions of a class of nonlinear elliptic equations, with S. Kim and M.V. Safonov, *Comm. Partial Differential Equations*, **33** (2008), no. 2, 177–188.

- Partial regularity of weak solutions of the Navier-Stokes equations in \mathbb{R}^4 at the first blow-up time, with D. Du, *Comm. Math. Phys.*, **273**, (2007) no. 3, 785–801.
- Spatial analyticity of the solutions to the sub-critical dissipative Quasi-geostrophic equations, with D. Li, *Arch. Rational Mech. Anal.*, **189** (2008) no. 1, 131–158.
- Global well-posedness and a decay estimate for the critical dissipative quasi-geostrophic equation, with D. Du, *Discrete Contin. Dyn. Syst.*, **21** (2008) no. 4, 1095–1101.
- Finite time singularities for a class of generalized surface quasi-geostrophic equations, with D. Li, *Proc. Amer. Math. Soc.*, **136** (2008), 2555–2563.
- On the Green’s matrices of strongly parabolic systems of second order, with S. Cho and S. Kim, *Indiana Univ. Math. J.*, **57** (2008) no. 4, 1633–1678.
- Optimal local smoothing and analyticity rate estimates for the generalized Navier-Stokes equations, with D. Li, *Comm. Math. Sci.*, to appear (2008).
- On the 2D critical and supercritical dissipative quasi-geostrophic equation in Besov spaces, with D. Li, submitted (2007).
- Dissipative quasi-geostrophic equations in critical Sobolev spaces: smoothing effect and global well-posedness, submitted (2007).
- Green’s matrices of second order elliptic systems with measurable coefficients in two dimensional domains, with S. Kim, *Trans. Amer. Math. Soc.*, to appear (2007).
- Well-posedness for a transport equation with nonlocal velocity, *J. Funct. Anal.*, to appear (2008).
- A regularity criterion for the dissipative quasi-geostrophic equations, with N. Pavlović, *Ann. Inst. H. Poincaré Anal. Non Linéaire*, to appear (2008).
- Finite time singularities and global well-posedness for fractal Burgers’ equation, with D. Du and D. Li, *Indiana Univ. Math. J.*, to appear (2008).
- Parabolic and elliptic systems with VMO coefficients, with D. Kim, submitted (2008).
- Regularity criteria for the dissipative quasi-geostrophic equations in Hölder spaces, with N. Pavlović, *Comm. Math. Phys.*, to appear (2008).
- Solvability of parabolic equations in divergence form with partially VMO coefficients, submitted (2008).
- Second-order elliptic and parabolic equations with $B(\mathbb{R}^2, VMO)$ coefficients, with N. V. Krylov, submitted (2008).
- Elliptic equations in divergence form with partially BMO coefficients, with D. Kim, submitted (2008).
- Parabolic and elliptic systems in divergence form with partially BMO coefficients, with D. Kim, submitted (2008).
- Parabolic equations with variably partially VMO coefficients, submitted (2008).
- Rigidity of Landau’s solutions to the Navier-Stokes equations, in preparation (2008).
- The Navier-Stokes equations in the critical Lebesgue space, with D. Du, in preparation (2008).

HONORS AND AWARDS

- NSF Grant:** DMS-0800129 (P.I.), 2008.7–2011.6.
- MSRI Membership:** 2007.7–2007.8.
- IAS Membership:** 2006–2007, 2008.9–2008.12.
- Travel Grant from AMS for ICM 2006, Madrid, Spain:** August 22-30, 2006.
- Outstanding Graduate:** Fudan University, 2001.
- The First, Second Prizes of People’s Scholarship:** Fudan University, 1998-2001.
- Meritorious Winner of Mathematical Contest in Modeling:** The Consortium for Mathematics and its Applications, 2000.
- Perfect Paper on the American Invitational Mathematics Examination:** The Mathematical Association of America, 1997.
- The First Prize of Chinese Mathematical Olympiad:** rank top 4 in P.R.China, 1997.
- The First, Second Prizes:** in contests of Mathematics, Physics and Chemistry, 1991–1997.

CONFERENCE AND WORKSHOP TALKS

- The Twelfth Riviere-Fabes Symposium on Analysis and PDE, School of Mathematics, University of Minnesota, April 17-19, 2009.
- AMS/MAA Joint meeting, Washington, DC, January 8, 2008. *Rigidity of Landau’s solutions to the Navier-Stokes equations.*
- 7th AIMS International Conference on Dynamical Systems, Differential Equations and Applications, UT Arlington, Arlington, TX, May 18, 2008 to May 21, 2008. *Finite time singularities and global well-posedness for fractal Burgers equation .*
- MSRI Summer Microprogram on Nonlinear Partial Differential Equations, MSRI, Berkeley, CA, July 23, 2007 to August 10, 2007. *On the Green’s matrices of strongly elliptic and parabolic systems of second order.*
- Asymtotic Analysis in Stochastic Processes, Nonparametric Estimation and Related Problems, Wayne State University, Detroit, MI, September 16, 2006. *On time inhomogeneous controlled diffusion processes in domains.*
- Probabilistic and Analytical Perspectives on Contemporary PDEs, Carnegie Mellon University, Pittsburgh PA, May 29, 2006. *About smoothness of solutions of the heat equations in closed smooth space-time domains.*
- Frontiers of Applied Analysis, Carnegie Mellon University, Pittsburgh PA, Sept. 9, 2005. *Rate of convergence of finite-difference approximations for Bellman’s equations with constant coefficients.*
- International Summer School on Fully Nonlinear Partial Differential Equations and Applications, Zhejiang University, June 7, 2005. *Hessian equations with elementary symmetric functions.*
- Statistics, Numerical Analysis, II, AMS/MAA Joint meeting, Atlanta, Georgia, January 6, 2005. *Rate of convergence of finite-difference approximations for Bellman’s equations with constant coefficients.*

SEMINAR TALKS

- *Guest lecture in Geometric PDE*, IAS, November 26, 2008.
- *Nonlinear Analysis and PDEs Seminar*, Rutgers University, November 19, 2008.
- *Analysis/PDE Seminar*, MIT, September 10, 2008.
- *Analysis Seminar*, University of Texas at Austin, March 26, 2008.
- *PDE Seminar*, Brown University, October 12, 2007.
- *Ergodic Theory and Statistical Mechanics Seminar*, Princeton University, March 8, 2007.
- *Mathematical physics seminar*, IAS, February 21, 2007.
- *Nonlinear Analysis and PDEs Seminar*, Rutgers University, February 13, 2007.
- *School of Mathematical Sciences*, Fudan University, January 8, 2007.
- *PDE/Applied Math Seminar*, University of Maryland, December 14, 2006.
- *Special Talk – Stochastic Systems Seminar*, Brown University, December 5, 2006.
- *PDE Seminar*, Brown University, December 1, 2006.
- *Analysis Seminar*, Princeton University, November 27, 2006.
- *PDE Seminar*, University of Minnesota, November 8, 2006.
- *Talks by Postdoctoral Members*, Institute for Advanced Study, October 11, 2006.
- *PDE Seminar*, Northwestern University, Evanston IL, May 11, 2006.
- *Calderón-Zygmund Analysis Seminar*, University of Chicago, Chicago IL, May 1, 2006.
- *Calderón-Zygmund Analysis Seminar*, University of Chicago, Chicago IL, Oct. 24, 2005.
- *Applied Mathematics and Numerical Analysis Seminar*, University of Minnesota, February 24, 2005.
- *PDE Seminar*, University of Minnesota, November 6, 2004.

OTHER PROFESSIONAL ACTIVITIES

Membership in Professional Organizations: American Mathematical Society (AMS), Society for Industrial and Applied Mathematics (SIAM).

Journal Refereed: Trans. AMS, Math. Comp., Appl. Math. Optim., Numer. Math., SIAM J. Control Optim., SIAM J. Math. Anal., Int. Math. Res. Not., Arch. Rational Mech. Anal., Dyn. Partial Differ. Equ.

Reviewer of Mathematical Reviews: since 2007.