

Curriculum Vitae: Jiaxin HU (胡家信)

Date: October 19, 2011

Record:

- Name: Jiaxin Hu.
- Current Post and details of contract:
Full Professor
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Education:

- 1986, B.S., Central China Normal University, Wuhan, China.
- 1989, M.S., The Chinese Academy of Sciences, Beijing, China.
- 2001, PhD., The University of St Andrews, United Kingdom.
(Advisor: Prof. Kenneth J. Falconer).

Experiences:

- Jan. 1990–Oct. 1997, Instructor and Lecturer, Wuhan Institute of Physics and Mathematics, Academia Sinica.
- Nov. 1997–Sep. 1998, Visiting Fellow at Centre de Mathématiques Appliquées, Ecole Polytechnique, Palaiseau, France.
- Oct. 1998–Aug. 2001, PhD candidate and undergraduate tutor, University of St Andrews, United Kingdom.
- Sep. 2001–Aug. 2002, Research Fellow and Instructor, Department of Mathematics, The Chinese University of Hong Kong.
- Sep. 2002–Nov. 2007, Associate Professor, Department of Mathematical Sciences, Tsinghua University, China.
- Feb. 2003–Jul. 2004, Humboldt Research Fellow, University of Jena, Germany.
- Feb. 2005– May 2005, Visitor, Department of Mathematics, the Chinese University of Hong Kong.

- Jul. 2007–Sep. 2007, Humboldt Research Fellow, University of Jena, Germany.
- Dec. 2007–present, Full Professor, Department of Mathematical Sciences, Tsinghua University, China.
- Jul. 2008–Nov. 2008, Visiting Professor, University of Bielefeld, Germany.
- Jan. 2009–Apr. 2009, Visiting Professor, Chinese University of Hong Kong, Hong Kong.
- Jul. 2009–Sep. 2009, Visiting Professor, University of Bielefeld, Germany.
- Feb. 2010–Apr. 2010, Visiting Professor, Chinese University of Hong Kong, Hong Kong.
- Jul. 2010–Sep. 2010, Visiting Professor, University of Bielefeld, Germany.
- Jan. 2011–Apr. 2011, Visiting Professor, Chinese University of Hong Kong, Hong Kong.
- Jun. 2011–Sep. 2011, Visiting Professor, University of Bielefeld, Germany.

Courses Taught in recent years:

- Linear Algebra and Geometry (for undergraduates).
- Calculus (for undergraduates).
- Advanced Calculus (for undergraduates).
- Probability (for undergraduates).
- Integration and Measure theory (for postgraduates).
- Fractal Geometry (for postgraduates).
- Harmonic Analysis (for postgraduates).
- Complex Analysis (for postgraduates).

Awards.

- Excellence Student Awards of Central China Normal University (highly competitive).
- University of St Andrews Scholarships.
- ORS from British Council
(This award is for overseas research students coming to study in Britain on a very highly competitive basis).
- Humboldt Research Fellowship, Germany.

Grants (since 2003).

- Grant from Ministry of Education of China (PI).
Title of Project: Nonlinear fractional diffusion equations on a class of fractal domains.
Executed period: Sep. 2003–Aug. 2004.
Amount of Grant: 40,000RMB.
- Grant from Natural Science Foundation of China (PI).
Title of Project: Partial differential equations on fractals.
Executed period: Jan. 2004–Dec. 2005.
Amount of Grant: 80,000 RMB.
- Grant from Natural Science Foundation of China (One of Principal Investigators).
Title of Project: Several frontier open problems in fractal geometry.
Executed period: Jan. 2007–Dec. 2010.
Amount of Grant: 1,250,000 RMB.
- Grant from Natural Science Foundation of China (PI).
Title of Project: A study of heat kernels and their applications on fractal sets. (Grand No. 11071138)
Executed period: Jan. 2011–Dec. 2013.
Amount of Grant: 220,000 RMB.

Some conferences attended.

- The Seventh International Conference on Nonlinear Problems and Its Applications, 1998, Zürich, Switzerland.
- Differential Equations and Physics in Fractals, 1999, Cambridge, England.
- The Third International Congress of Chinese Mathematicians, Hong Kong, Dec. 2004.
- Geometric Measure Theoretic Approaches to Potentials on Fractals and Manifolds, MFO, Germany, April 2007.
- International Conference: Fractal Geometry and Stochastics, Greifswald, Germany, Sep. 2008.
- The 5th International Congress of Chinese Mathematicians (45-minute invited talk), Beijing, China, Dec. 2010.
- Stochastic and Real World Models 2011, Bielefeld, Germany, July 2011.

Reviewing Duties:

In recent years, I've been a Referee for the following journals, Awards and Grants:

- Acta Mathematica Scientia.
- Advances in Mathematics(China).
- Arabain Journal for Science and Engineering.
- Asian Journal of Mathematics.
- Bulletin of the Australian Mathematical Society.
- Chaos, Solitons & Fractals.
- Chinese Annals of Mathematics.
- Fractals.
- Frontiers of Mathematics in China.
- International Journal of Mathematics and Mathematical Sciences
- Journal of Applied Polymer Science.
- Manuscripta Mathematica.
- Mathematische Nachrichten.
- Nonlinear Differential Equations and Applications.
- Progress in Natural Sciences.
- Quarterly of Applied Mathematics
- Science in China.
- Zeitschrift für Analysis und ihre Anwendungen.
- The Hang Lung Mathematics Awards, Hong Kong.
- The Overseas Returned Chinese Scholars Grant.
- NSFC for "TianYuan"Grant.
- Best Doctoral papers for Hubei Provincial Government.

Referees.

- (1) Prof. Alexander Grigor'yan
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- (2) Prof. Kenneth J. Falconer
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- (3) Prof. Martina Zaehle
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Research Interests.

- Partial differential equations.
- Fractal geometry.
- Potential theory.
- Stochastic processes.

Keywords:

1. Conservation laws, Cauchy and Riemann problems, weak or generalized solution, elliptic equation, hyperbolic equation, parabolic (diffusion) equation.
2. Fractals, Hausdorff and walk dimensions, Dirichlet form, heat kernel, Sobolev or Besov space, potentials.
2. Hunt process, exit time, Markov property.

Three Selected Papers

- (1) A. Grigor'yan; Jiabin Hu : Off-diagonal upper estimates for the heat kernel of the Dirichlet forms on metric spaces, *Invent. Math.* 174 (2008), 81-126.
- (2) A. Grigor'yan; Jiabin Hu; and Ka-Sing Lau: Obtaining upper bounds of heat kernels from lower bounds, *Comm. Pure Appl. Math.* 61 (2008), 639-660.
- (3) Jiabin Hu; P.G. LeFloch: L^1 continuous dependence property for systems of conservation laws. *Arch. Rational Mech. Anal.* 151(2000), 45-93.

Other Publications and Preprints: Publications

- (4) A. Grigor'yan; Jiixin Hu; and Ka-Sing Lau: Comparison inequalities for heat semigroups and heat kernels on metric measure spaces, *J. Funct. Anal.* 259 (2010), 2613-2641.
- (5) Jiixin Hu; Martina Zaehle: Schrödinger equations and heat kernel upper bounds on metric spaces, *Forum Math.* 22 (2010), 1213-1234.
- (6) A. Grigor'yan; Jiixin Hu; and Ka-Sing Lau: Heat kernels on metric spaces with doubling measure, *Proceedings of Conference on Fractal Geometry in Greifswald IV*, Birkhäuser, 2009, 3-44.
- (7) Jiixin Hu; Martina Zähle: Generalized Bessel and Riesz potentials on metric measure spaces, *Potential Analysis* 30 (2009), 315-340.
- (8) Jiixin Hu; and X.P. Huang: A note on the limiting weak-type behavior for maximal operators, *Proc. Amer. Math. Soc.* 136 (2008), 1599-1607.
- (9) Jiixin Hu: An analytical approach to heat kernel estimates on strongly recurrent metric spaces, *Proc. Edin. Math. Soc.* 51 (2008), 171-199.
- (10) Jiixin Hu; Yuan Ji; and Z.Y. Wen: Heat kernel estimates on effective-resistance metric spaces, *Progress in Natural Science* 17 (2007), 775-783.
- (11) Jiixin Hu; K.-S. Lau; and S.-M. Ngai: Laplace operators related to self-similar measures on \mathbb{R}^d , *J. Funct. Anal.* 239 (2006), 542-565.
- (12) Jiixin Hu; T. Kumagai: Nash-type inequalities and heat kernels for non-local Dirichlet forms, *Kyushu J. Math.* 60 (2006), 245-265.
- (13) Jiixin Hu; and X.S. Wang: Domains of Dirichlet forms and effective resistance estimates on p.c.f. fractals, *Studia Math.* 177 (2006), 153-172.
- (14) Jiixin Hu; Martina Zähle: Jump processes and nonlinear fractional heat equations on fractals, *Math. Nachr.* 279 (2006), 150-163.
- (15) A. Grigor'yan; Jiixin Hu; and Ka-Sing Lau: Equivalence conditions for on-diagonal upper bounds of heat kernels on self-similar spaces, *J. Funct. Anal.* 237 (2006), 427-445.
- (16) Jiixin Hu; Martina Zähle: Potential spaces on fractals, *Studia Math.* **170** (2005), 259-281.

- (17) Jiabin Hu; Ji Yuan; Zhi-Ying Wen: Hajłasz-Sobolev type spaces on fractals, *Ann. Acad. Sci. Fenn.* 30 (2005), 99-111.
- (18) Jiabin Hu: Multiple solutions for a class of nonlinear elliptic equations on the Sierpiński gasket, *Sci. in China* 47 (2004), 772-786.
- (19) Jiabin Hu: A note on Hajłasz-Sobolev spaces on fractals. *J. Math. Anal. Appl.* 280 (2003), 91-101.
- (20) A. Grigor'yan; Jiabin Hu; and Ka-Sing Lau: Heat kernels on metric-measure spaces and an application to semi-linear elliptic equations. *Trans. Amer. Math. Soc.* 355 (2003), 2065–2095.
- (21) Jiabin Hu: Nonlinear wave equations on a class of bounded fractal sets. *J. Math. Anal. Appl.* 270 (2002), 657–680.
- (22) Jiabin Hu: The Nagumo equation on self-similar fractal sets. *Chinese Ann. Math. Ser. B* 23 (2002), 519–530.
- (23) Jiabin Hu: Nonlinear diffusion equations on bounded fractal domains. *Z. Anal. Anwendungen* 20 (2001), no. 2, 331–345.
- (24) Kenneth J. Falconer; Jiabin Hu: Nonlinear diffusion equations on unbounded fractal domains. *J. Math. Anal. Appl.* 256 (2001), no. 2, 606–624.
- (25) Jiabin Hu: Two-dimensional Riemann problem for pressureless gas dynamics equations with functional solutions. *Quart. Appl. Math.* 58(2000), 251-264.
- (26) K.J. Falconer; Jiabin Hu: Non-linear elliptic equations on the Sierpiński gasket. *J. Math. Anal. Appl.* 140(1999), 552-573.
- (27) Jiabin Hu: A two-dimensional hyperbolic system of nonlinear conservation laws with functional solutions. *Acta Math. Sin. (Engl. Ser.)* 15 (1999), no. 3, 317–332.
- (28) Jiabin Hu: One-dimensional Riemann problem for equations of constant pressure fluid dynamics with functional solutions by the viscosity method. *Acta Applicandae Mathematicae*, 55 (1999), no. 2, 209–229.
- (29) Jiabin Hu: The Riemann problem for pressureless fluid dynamics with distribution solutions in Colombeau's sense. *Comm. Math. Phys.* 194(1998),

191-205.

- (30) Jiaxin Hu: The Riemann problem for a two-dimensional hyperbolic system of conservation laws with non-classical weak solutions. *Acta Math. Sci.*, (English Ed.) 18 (1998), no. 1, 45–56.
- (31) Jiaxin Hu: The Riemann problem for a two-dimensional hyperbolic system of nonlinear conservation laws: multiplication of distribution solutions. *Z. Anal. Anwendungen* 17 (1998), no. 3, 743–757.
- (32) Jiaxin Hu: The Riemann problem for a resonant nonlinear system of conservation laws with Dirac-measure solutions. *Proc. Roy. Soc. Edinburgh Sect. A* 128 (1998), no. 1, 81–94.
- (33) Jiaxin Hu: A limiting viscosity approach to Riemann solutions containing delta-shock waves for nonstrictly hyperbolic conservation laws. *Quart. Appl. Math.* 55 (1997), no. 2, 361–373.
- (34) Jiaxin Hu: The Riemann problem for a two-dimensional hyperbolic system of conservation laws with non-classical weak solutions: some one- J and non- R initial data. *Acta Math. Sci.* (English Ed.) 17 (1997), no. 4, 361–375.
- (35) Jiaxin Hu: A kinetic approach to scalar multi-dimensional conservation laws. *Acta Math. Sci.* (English Ed.) 16 (1996), no. 2, 218–228.
- (36) Jiaxin Hu: A kinetic formulation for scalar balance laws. *Transport Theory Statist. Phys.* 24 (1995), no. 9, 1369–1384.
- (37) Jiaxin Hu; HuiJiang Zhao; ChangJiang Zhu: Globally smooth solutions to an inhomogeneous quasilinear hyperbolic system arising in chemical engineering. *J. Partial Differential Equations* 7 (1994), no. 4, 351–358.
- (38) GuangFa Wang; Jiaxin Hu; HuiJiang Zhao; ChangJiang Zhu: Existence of global continuous solutions to a nonstrictly hyperbolic conservation law. *J. Central China Normal Univ. Natur. Sci.* 28 (1994), no. 2, 146–150
- (39) YunGuang Lu; Jiaxin Hu: Existence of generalized solutions to a hyperbolic model of combustion. *Acta Math. Sci.* (English Ed.) 13 (1993), no. 2, 195–201.

- (40) Jiixin Hu: A limiting viscosity approach to the Riemann problem for transonic flow. *Acta Math. Sci. (English Ed.)* 12 (1992), no. 2, 130–138.
- (41) Jiixin Hu; JingHua Wang: The Cauchy problem for a special system of quasilinear equations. *J. Partial Differential Equations* 4 (1991), no. 1, 33–44.
- (42) Jiixin Hu: Existence of weak solutions to single balance law equations. (Chinese) *Acta Math. Sci. (Chinese)* 10 (1990), no. 3, 325–335.

Preprints:

- (43) A. Grigor'yan; Jiixin Hu : Upper bounds of heat kernels on doubling spaces (57 pages).
- (44) A. Grigor'yan; Jiixin Hu; and Ka-Sing Lau: Estimates of heat kernels for non-local regular Dirichlet forms (39 pages).
- (45) K.J. Falconer; Jiixin Hu; Yuhua Sun: Inhomogeneous parabolic equations on unbounded metric measure spaces, *Proceedings of the Royal Society of Edinburgh* (to appear).