

# Dr. Chao Zhang

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<b>Personal Data</b>	Nationality: P. R. China Date of birth: Feb 06, 1981 Marital status: Married	
<b>Education</b>	Ph.D. in School of Mathematical Sciences, <b>Peking University</b> , China, • Supervisor: Prof. Shulin Zhou 2007.9–2011.7 Joint Ph.D., 2009.9–2010.9 in Department of Mathematics, <b>University of Iowa</b> , USA • Co-supervisor: Prof. Lihe Wang M.D. in School of Mathematical Sciences, <b>Jilin University</b> , China • Supervisor: Prof. Jingxue Yin 2005.9–2007.7 B.D. in School of Mathematical Sciences, <b>Jilin University</b> , China 2001.9–2005.7	
<b>Professional Experience</b>	<ul style="list-style-type: none"><li>• December 2013–present, Associate Professor, Department of Mathematics, Harbin Institute of Technology</li><li>• July 2011–December 2013, Assistant Professor, Department of Mathematics, Harbin Institute of Technology</li></ul>	
<b>Honours and Awards</b>	<ul style="list-style-type: none"><li>• Excellent Doctorate Theses, Peking University, 2011</li><li>• Scholarship Award for Excellent Doctoral Student granted by Ministry of Education, 2010</li><li>• Scholarship from China Scholarship Council, 2009.9–2010.9</li><li>• Peking University, Top Scholarship, 2009–2010</li></ul>	
<b>Teaching Activities</b>	<ul style="list-style-type: none"><li>• Calculus I, at Harbin Institute of Technology, Fall 2017</li><li>• Mathematical Analysis for Engineering, at Harbin Institute of Technology, Fall 2015 and Spring 2016</li><li>• Mathematical Analysis(selected), at Harbin Institute of Technology, Summer 2015</li><li>• Mathematical Analysis for Engineering, at Harbin Institute of Technology, Fall 2012 and Spring 2013</li><li>• Advanced Mathematics, at Harbin Institute of Technology, Spring 2012</li><li>• Exercise Courses of Advanced Mathematics, at Peking University, Spring and Fall 2008–2009</li><li>• Teaching Assistant: Elliptic Partial Differential Equations of Second Order, Spring 2011, Peking University</li></ul>	
<b>Research Interests</b>	Partial differential equations, mainly nonlinear elliptic and parabolic equations; Calculus of variations	
<b>Preparations and Publications</b>	<ol style="list-style-type: none"><li>1. <b>Chao Zhang</b> and Xia Zhang, Renormalized solutions for the fractional <math>p(x)</math>-Laplacian equation with <math>L^1</math> data, submitted.</li><li>2. Kaimin Teng, <b>Chao Zhang</b> and Shulin Zhou, Renormalized and entropy solutions for the fractional <math>p</math>-Laplacian parabolic equation with <math>L^1</math> data, submitted.</li><li>3. <b>Chao Zhang</b>, Xia Zhang and Shulin Zhou, Gradient estimates for the strong <math>p(x)</math>-Laplacian equation, <i>Discrete and Continuous Dynamical Systems - Series A</i>, 37 (7) (2017), 4109–4129.</li><li>4. Lihe Wang, <b>Chao Zhang</b> and Shulin Zhou, Existence and uniqueness of weak solutions for a 2D Low-Curvature equation, <i>Journal of Mathematical Analysis and Applications</i>, 452 (1) (2017), 297–311.</li><li>5. Xia Zhang and <b>Chao Zhang</b>, Existence of solutions for critical fractional Kirchhoff problems, <i>Mathematical Methods in the Applied Sciences</i>, 40 (5) (2017), 1649–1665.</li><li>6. <b>Chao Zhang</b> and Shulin Zhou, The well-posedness of renormalized solutions for a non-uniformly parabolic equation, <i>Proc. Amer. Math. Soc.</i>, 145 (6) (2017), 2577–2589.</li><li>7. <b>Chao Zhang</b> and Shulin Zhou, Bounded very weak solutions for some non-uniformly elliptic equation with <math>L^1</math> datum, <i>Ann. Acad. Sci. Fenn. Math.</i>, 42 (2017), 95–103.</li><li>8. <b>Chao Zhang</b>, Global weighted estimates for the nonlinear parabolic equations with non-standard growth, <i>Calc. Var. Partial Differential Equations</i>, (2016) 55:109.</li></ol>	

9. Bin Ge and **Chao Zhang**, On the superlinear problems involving the fractional Laplacian, *Rev. Acad. Cienc. Ser. A Math.*, 110 (2016), 343–355.
10. Kaimin Teng and **Chao Zhang**, Infinitely many solutions for quasilinear elliptic equations involving  $(p, q)$ -Laplacian in  $\mathbb{R}$ , *Nonlinear Analysis: Real World Applications*, 32 (2016), 242–259.
11. **Chao Zhang**, Gradient estimates for  $p$ -Laplacian equation in composite Reifenberg domains, *Nonlinear Analysis: Theory, Methods & Applications*, 133 (2016), 134–143.
12. Bin Ge and **Chao Zhang**, Existence of a positive solution to Kirchhoff problems involving the fractional Laplacian, *Zeitschrift für Analysis und Ihre Anwendungen (Z. Anal. Anwend.)*, 34 (4) 2015, 419–434.
13. **Chao Zhang**, Shulin Zhou and Bin Ge, Gradient estimates for the  $p(x)$ -Laplacian equation in  $\mathbb{R}^N$ , *Annales Polonici Mathematici*, 114 (1) (2015), 45–65.
14. **Chao Zhang** and Shulin Zhou, Global weighted estimates for quasilinear elliptic equations with non-standard growth, *Journal of Functional Analysis*, 267 (2014), 605–642.
15. **Chao Zhang**, Lihe Wang, Shulin Zhou and Yun-Ho Kim, Global gradient estimates for  $p(x)$ -Laplace equation in non-smooth domains, *Communications on Pure and Applied Analysis*, 13 (6) (2014), 2559–2587.
16. **Chao Zhang**, Shulin Zhou and Xiaoping Xue, Global gradient estimates for the parabolic  $p(x, t)$ -Laplacian equation, *Nonlinear Analysis: Theory, Methods & Applications*, 105 (2014), 86–101.
17. **Chao Zhang**, Entropy solutions for nonlinear elliptic equations with variable exponents, *Electron. J. Differential Equations*, 2014 (92) (2014), 1–14.
18. **Chao Zhang** and Shulin Zhou, Renormalized solutions for a non-uniformly parabolic equation, *Ann. Acad. Sci. Fenn. Math.*, 37 (2012), 175–189.
19. **Chao Zhang** and Shulin Zhou, On a class of non-uniformly elliptic equations, *Nonlinear Differential Equations and Applications NoDEA*, 19 (3) (2012), 345–363.
20. **Chao Zhang** and Shulin Zhou, Hölder regularity for the gradients of solutions of the strong  $p(x)$ -Laplacian, *Journal of Mathematical Analysis and Applications*, 389 (2) (2012), 1066–1077.
21. **Chao Zhang** and Shulin Zhou, Renormalized and entropy solutions for nonlinear parabolic equations with variable exponents and  $L^1$  data, *Journal of Differential Equations*, 248 (6) (2010), 1376–1400.
22. **Chao Zhang** and Shulin Zhou, Entropy solutions for a non-uniformly parabolic equation, *Manuscripta Mathematica*, 131 (3-4) (2010), 335–354.
23. **Chao Zhang** and Shulin Zhou, Entropy and renormalized solutions for the  $p(x)$ -Laplacian equation with measure data, *Bulletin of the Australian Mathematical Society*, 82 (3) (2010), 459–479.
24. **Chao Zhang** and Yun-Ho Kim, A global bifurcation for  $p(x)$ -Laplacian, *Proceedings of Nonlinear Analysis and Convex Analysis II* (2011), 305–319.
25. Kaimin Teng and **Chao Zhang**, Existence of solutions to boundary value problem for impulsive differential equations, *Nonlinear Analysis: Real World Applications*, 11 (5) (2010), 4431–4441.
26. Yun-Ho Kim, Lihe Wang and **Chao Zhang**, Global solution branches for elliptic equations with inclusions, *Journal of Nonlinear and Convex Analysis*, 12 (2) (2011), 341–349.
27. Yun-Ho Kim, Lihe Wang and **Chao Zhang**, Global bifurcation for a class of degenerate elliptic equations with variable exponents, *Journal of Mathematical Analysis and Applications*, 371 (2) (2010), 624–637.
28. **Chao Zhang** and Shulin Zhou, A general fourth-order parabolic equation, *Differential Equations & Applications*, 2 (2) (2010), 265–281.
29. **Chao Zhang** and Shulin Zhou, A fourth-order degenerate parabolic equation with variable exponent, *Journal of Partial Differential Equations*, 22 (4) (2009), 376–392.

**Research Grant**

- Natural Science Foundation of China  
Amount granted: RMB 480,000, Period: Jan 01, 2017–Dec 31, 2020
- Natural Science Foundation of China  
Amount granted: RMB 230,000, Period: Jan 01, 2013–Dec 31, 2015
- Postdoctoral Science Foundation of China  
Amount granted: RMB 80,000, Period: Jan 01, 2012–Dec 31, 2013
- Research Fund for the Doctoral Program of Higher Education of China  
Amount granted: RMB 40,000, Period: Jan 01, 2013–Dec 31, 2015

**Visiting  
Position**

- February 2014–May 2014, Ohio State University, USA, Host: Avner Friedman and Bo Guan
- August 2013–August 2013, Sangmyung University, Korea, Host: Yun-Ho Kim

**Conferences  
Attended**

- International Conference “Analysis and PDEs on Manifolds”, Nankai University, Tianjin, September 21–23, 2017 (Invited speaker)
- 2nd International Workshop on “Nonlinear Analysis and Its Applications”, Heilongjiang Institute of Technology, Harbin, China, July 14–16, 2017 (Invited speaker)
- PDE Seminar, Beijing Computational Science Research Center, November 28, 2016 (Invited speaker)
- PDE Seminar, Peking University, November 23, 2016 (Invited speaker)
- The International Symposium on Functional Space Theory, Soochow, China, October 20–25, 2016 (Invited speaker)
- Chinese Mathematical Society 2016 Annual Conference, Huhehot, China, September 23–26, 2016 (Invited speaker)
- The 14th Mathematics Annual Meeting of Heilongjiang Province, Qiqihar, China, August 14–16, 2016
- International Conference on Nonlinear Analysis and Nineteenth National Conference on Nonlinear Analysis, Wuhan, China, May 19–22, 2016
- Workshop on Nonlinear Analysis and Its Applications, Heilongjiang Institute of Technology, Harbin, China, January 7–8, 2016 (Invited speaker)
- 2015 NIMS Hot Topics Workshop on Regularity Theory on Elliptic and Parabolic Equations, Seoul National University, December 9–12, 2015 (Invited speaker)
- Workshop on Nonlinear Diffusion Equations, South China Normal University, Guangzhou, China, November 20–22, 2015 (Invited speaker)
- The 5th International Conference on Analytic Mathematics and its Applications, Harbin University of Science and Technology, Harbin, China, August 12–16, 2015 (Invited speaker)
- The Fourth International Conference on Nonlinear Evolutionary Partial Differential Equations—Theories and Applications, Shanghai Jiao Tong University, Shanghai, China, June 2–7, 2015
- Joint Workshop on Mathematics between HIT and Dalian University of Technology, Dalian University of Technology, China, November 21–23, 2014 (Invited speaker)
- The 18th National Conference on Nonlinear Functional Analysis, Harbin Normal University, China, July 14–16, 2014 (Invited speaker)
- The 13th Mathematics Annual Meeting of Heilongjiang Province, Daqing, China, July 5–7, 2014 (Invited speaker)
- International Conference on Partial Differential Equations, South China Normal University, Guangzhou, China, December 7–10, 2013
- Workshop on Nonlinear PDE and Calculus of Variation, Chern Institute of Mathematics, Nankai University, Tianjin, China, September 16–20, 2013
- International Workshop on Mathematical Modeling of Biological Processes, Harbin Institute of Technology, China, September 3–7, 2012
- Beijing Summer Program in Mathematical Relativity, Beijing International Center for Mathematical Research, Peking University, Beijing, China, June 6–25, 2011
- The 2010 Iowa PDE Conference, April 30–May 2, USA, 2010

**Research  
Summary**

My research topics are in the area of nonlinear elliptic and parabolic PDEs. More precisely, my research focuses on the following three aspects:

- *The wellposedness of solutions, such as weak solutions, very weak solutions, entropy solutions and renormalized solutions*
- *The regularity for nonlinear elliptic and parabolic PDEs, such as Hölder regularity and Calderón–Zygmund estimates*
- *Applications of functional analysis to partial differential equations*