

Curriculum Vitae

Hui Yu

Department of Mathematics
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Research Interests

- Regularity of elliptic PDEs—classical and nonlocal,
- Optimal transport,
- Free boundary problems.

Employment

- Columbia University Aug 2017 -
Ritt Assistant Professor

Education

- PhD in Mathematics, May 2017.
The University of Texas at Austin.
Advisor: Luis A. Caffarelli.
- BSc in Mathematics, May 2013.
Chinese University of Hong Kong.

Awards and Grants

- NSF standard grant: DMS-1954363.
- AMS-Simons travel grant (Declined due to NSF grant).
- Silver Prize for Doctoral Thesis, New World Mathematics Award, International Congress of Chinese Mathematicians.

Publications and Preprints

1. (With O. Savin) *Contact points with integer frequencies in the thin obstacle problem*, preprint.
2. (With O. Savin) *On the fine regularity of the singular set in the nonlinear obstacle problem*, submitted.
3. (With Y. Wu) *On the fully nonlinear Alt-Phillips equation*, accepted by International Math. Research Notice.

4. (with O. Savin) *Free boundary regularity in the triple membrane problem*, submitted.
5. *A brief survey on the obstacle problem*, to appear in Proceedings of the 8th International Congress of Chinese Mathematicians.
6. (with O. Savin) *Regularity of the singular set in the fully nonlinear obstacle problem*, accepted by J. Euro. Math. Soc..
7. (with O. Savin) *Global $W^{2,1+\varepsilon}$ estimates for Monge-Ampère equation with natural boundary condition*, J. Math. Pures. Appl. 137 (2020), no. 9, 275-289.
8. (with O. Savin) *Regularity of optimal transport between planar convex domains*, Duke Math. J. 169 (2020), no. 7, 1305-1327.
9. (with O. Savin) *On the multiple membranes problem*, J. Funct. Anal. 277 (2019), no. 6, 1581-1602.
10. (with L. Caffarelli) *A curvature flow in the plane with a nonlocal term*, Calc. Var. Partial Differential Equations 57 (2018), no. 2, Art. 29, 8pp.
11. (with V. Millot and Y. Sire) *Minimizing fractional harmonic maps on the real line in the supercritical regime*, Discrete & Continuous Dynamical Systems-A 38(12), 2018, 6195-6214.
12. *What is a generalised mean-curvature flow?* Notices of AMS 64(6), 2017, 580-581.
13. *Motion of sets by curvature and derivative of capacity potential*, J. of Differential Equations 267 (2019), no. 1, 15-60.
14. *Unique continuation for fractional orders of elliptic equations*, Annals of PDE 3 (2017), Art. 16, 21pp.
15. *Small perturbation solutions for nonlocal elliptic equations*, Comm. in PDEs 42(1), 2017, 142-158.
16. *An optimization problem in heat conduction with minimal temperature constraint, interior heating and exterior insulation*, Calc. of Var. and PDEs 55(6), 2016, 1-15.
17. *A Dirichlet problem for nonlocal degenerate elliptic operators with interior nonlinearity*, Journal of Mathematical Analysis and Applications 448(1), 2017, 326-346.
18. *$W^{\sigma,\varepsilon}$ -estimates for nonlocal elliptic equations*, Annales l'Institut Henri Poincaré (C) Analyse Non Linéaire 34(5), 2017, 1141-1153.
19. *Smooth solutions to a class of nonlocal fully nonlinear elliptic equations*, Indiana U. Math. J. 66(6), 2017, 1895-1919.
20. (with S. Aaron, Z. Conn, R. Strichartz) *Hodge-deRham theory on fractal graphs and fractals*, Comm. Pure. Appl. Anal. 13(2), 2014, 903-928.

Professional Service

- NSF Review Panel (2020)
- On the thesis committee of: Keaton Naff (Columbia).

- Journal refereeing: Annals of Math, Journal of Functional Analysis, Comm. in PDEs, Calc. Var. PDEs, Analysis and PDE, Memoirs of AMS, Annales l'Institut Henri Poincaré (C), Nagoya Math. J., NoDEA, Nonlinear Analysis, Ann. Acad. Sci. Fenn. Math, Advances in Mathematics, Math. Research Letters, Proc. of the Edinburgh Math. Soc, Notices of AMS, Journal of Differential Equations, Annals of PDE.

Conference Organization

- Special Session on Elliptic PDEs and Geometric Flows, AIMS conference
Organizers: A. De Rosa, H. Yu
Atlanta, June 2021 (Expected).
- Workshop on Free Boundary Problems
Organizers: D. De Silva, O. Savin, N. Guillen, H. Yu
Columbia, May 2019.
- Workshop in Nonlinear PDEs
Organizers: D. De Silva, O. Savin, N. Guillen, H. Yu
Columbia, Nov 2018.

Invited Talks and Mini-courses

- Special session: Geometric and functional inequalities and nonlinear PDEs, AMS eastern sectional meeting, March 2021.
- Barcelona analysis seminar, Universitat Autònoma Barcelona and Universitat de Barcelona, Mar 2021.
- Analysis seminar, University of Maryland at College Park, Mar 2021.
- Learning seminar, Rutgers, Mar 2021.
- Nonlinear analysis seminar, Rutgers, Feb 2021.
- Special session: PDEs in optimization, control and games, JMM 2021, Jan 2021.
- Seminar, National University of Singapore, Nov 2020.
- Analysis seminar, University of Minnesota, Nov 2020.
- Analysis and PDE seminar, Peking University, Nov 2020.
- Zoom PDE Seminar, ShanghaiTech University, April 2020.
- Analysis Seminar, Institute for Advanced Study, March 2020 (Canceled due to Covid-19).
- Colloquium, University of Notre Dame, Jan 2020.
- Colloquium, University of Wisconsin at Madison, Dec 2019.

- Colloquium, University of Pennsylvania, Dec 2019.
- Special session on ‘Analysis of Nonlinear Partial Differential Equations and Applications’, AMS sectional meeting, Riverside CA, Nov 2019.
- Analysis seminar, University of Pennsylvania, Sep 2019.
- Analysis seminar, University of Maryland, Sep 2019.
- Special session on ‘Fully Nonlinear Elliptic and Parabolic Partial Differential Equations, Local and Nonlocal’, AMS sectional meeting, Madison, Wisconsin, Sep 2019.
- Swedish Summer Conference on PDEs, Stockholm, Sweden, Aug 2019.
- Seminar in PDE, Hong Kong University of Science and Technology, June 2019.
- 45min Talk, International Conference of Chinese Mathematicians, June 2019.
- Special session in ‘Regularity theory of PDEs and calculus of variations on domains with rough boundaries’, AMS sectional meeting, University of Connecticut, April 2019.
- Special session in PDE and GMT, AMS sectional meeting, Hawaii, March 2019.
- CNA seminar, Carnegie Mellon University, PA, Feb 2019.
- Workshop in Nonlinear PDEs, Columbia University, Nov 2018.
- Analysis seminar, Northwestern University, October 2018.
- Analysis seminar, Courant Institute, NYU, October 2018.
- PDE/ applied math seminar, Indiana University at Bloomington, Sep 2018.
- Seminar for School of Mathematics, Southeast University, China, Aug 2018.
- Special session in PDE and GMT, AMS sectional meeting, Portland Oregon, April 2018.
- PDE seminar, Brown University, Dec 2017.
- Nonlinear analysis seminar, Rutgers, Nov 2017.
- Geometry and analysis seminar, Columbia University, Sep 2017.
- Mini-course at BNU PDE workshop and minicourses, Beijing Normal University, July 2017.
- Talk at BNU PDE workshop, Beijing Normal University, June 2017.
- Analysis seminar, the University of Texas at Austin, May 2017.
- Seminar in pure math, Hong Kong University of Science and Technology, Aug 2016.
- Pizza seminar, the University of Texas at Austin, April 2016.
- Analysis seminar, the University of Texas at Austin, March 2016.

Academic Visits

- Courant Institute at New York University, Host: Fanghua Lin, Jan-March 2017.
- Johns Hopkins University, Host: Yannick Sire, March-April 2017.

Teaching

At Columbia:

- Instructor for Intro. to Modern Analysis I, Spring 2018, Spring 2019, Spring 2020.
- Instructor for Intro. to Modern Analysis II, Fall 2017, Fall 2018, Fall 2019, Fall 2020.

At UT Austin:

- TA for Calculus, Fall 2013, 2014, 2015.
- TA for Graduate Level Probability, Fall 2016.
- TA for Undergraduate Level Real Analysis, Spring 2015.

Mentoring

- Zhenfeng Tu, Spring 2020. Topic: Minimal Surface.
- Jieyin Yang, Spring 2020. Topic: Minimal Surface.
- Christian Serio, Spring 2019. Topic: Real and Functional Analysis.
- Ayeong Lee, Fall 2018. Topic: Intro. to Hamilton-Jacobi Equations.
- Zixiang Zhang, Summer 2018. Topic: Introduction to PDEs.
- Arvind Venkat Mahankali, Summer 2018. Topic: Intro. to PDEs.
- Cody Freitag, Fall 2015. Topic: Extremal combinatorics.
- Josselyn Gonzalez, Spring 2015. Topic: Complex analysis.
- Rafael Almeida, Fall 2014. Topic: Calculus on manifolds.
- Joey Tatro, Fall 2014. Topic: Intro. to graph theory.