

# Yuming (Paul) Zhang

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## EMPLOYMENT

Assistant Professor

Department of Mathematics and Statistics, Auburn University

*Aug 2022 – present*

SEW Assistant Professor, University of California, San Diego

*2019 – 2022*

Mentor: Professor Andrej Zlatoš

## EDUCATION

University of California, Los Angeles

*2013 – 2019*

Ph.D. in Mathematics

Advisor: Professor Inwon C. Kim

Fudan University

*2009 – 2013*

B.A. in Mathematics

Thesis advisor: Professor Tijun Xiao

## RESEARCH INTERESTS

Reaction-diffusion equations, homogenization, free boundary problems, Porous Medium type equations, Hamilton Jacobi equation, control problems, chemotaxis models and mean field games

## PREPRINTS

6. J. Tong and Y. P. Zhang, *Convergence of Free Boundaries in the Incompressible Limit of Tumor Growth Models*, preprint, 2024.
5. Z. Hassan, W. Shen and Y. P. Zhang, *Global existence of classical solutions of chemotaxis systems with logistic source and consumption or linear signal production on  $\mathbb{R}^n$* , preprint, 2023.
4. W. Tang, Y. P. Zhang, *The convergence rate of vanishing viscosity approximations for mean field games*, preprint, 2023.
3. W. Tang, H. V. Tran, Y. P. Zhang, *Policy iteration for the deterministic control problems – a viscosity approach*, preprint, 2023.
2. E. Bayraktar, G. Guo, W. Tang, Y. P. Zhang *Systemic robustness: a mean-field particle system approach*, preprint, 2022.
1. I. Kim, Y. P. Zhang, *Regularity of Hele-Shaw Flow with source and drift*, preprint, 2022.

## PUBLICATIONS

18. Y. P. Zhang, A. Zlatoš, *Homogenization for space-time-dependent KPP reaction-diffusion equations and G-equations*, Calc. Var. Partial Differential Equations, 62 (2023), no. 9, 238.
17. Y. P. Zhang, A. Zlatoš, *Optimal estimates on the propagation of reactions with fractional diffusion*, Arch. Ration. Mech. Anal., 247(2023) no. 5, 93.
16. Y. P. Zhang, A. Zlatoš, *Subadditive theorems and first-passage percolation in time-dependent environments*, Electron. J. Probab., 28(2023) no. 96, 1-23.
15. Y. P. Zhang, A. Zlatoš, *Quantitative homogenization for combustion in random media*, Ann. Inst. H. Poincaré Anal. Non Linéaire (2023).

14. E. Bayraktar, G. Guo, W. Tang, Y. P. Zhang, *McKean-Vlasov equations involving hitting times: blow-ups and global solvability*, Ann. Appl. Probab., 34 (2024) no. 1B, 1600-1622.
13. W. Tang, Y. P. Zhang, X. Y. Zhou, *Exploratory HJB equations and their convergence*, SIAM J. Control Optim., 60 (2022) no. 6, 3191-3216.
12. Y. P. Zhang, A. Zlatoš, *Long time dynamics for combustion in random media*, Arch. Ration. Mech. Anal., (2021) 1-62.
11. T. T. Ke, W. Tang, J. M. Villas-Boas, Y. P. Zhang, *Parallel search for information*, Appl. Math. Optim., 85 (2022) no.2, 1-23.
10. Y. P. Zhang, *Free Boundary Regularity of the Porous Medium Equation with nonlocal drifts in Dimension One*, Calc. Var. Partial Differential Equations, 61(2022) no. 2, 1-35.
9. I. Kim, Y. P. Zhang, *Porous medium equation with a drift: free boundary regularity*, Arch. Ration. Mech. Anal., 242(2021) no.2, 1177-1228.
8. S. Hwang, Y. P. Zhang, *Continuity results for degenerate diffusion equations with  $L_t^p L_x^q$  drifts*, Non-linear Anal., 211(2021) 112413.
7. Y. P. Zhang, *On homogenization problems with oscillating dirichlet conditions in space-time domains*, J. London Math. Soc., 105 (2022) no. 2, 909-949.
6. C. Mou, Y. P. Zhang, *Regularity theory for second order integro-PDEs*, Potential Anal., 54(2020) no.2 387-407.
5. Y. P. Zhang, *On a class of diffusion-aggregation equations*, Discrete Contin. Dyn. Syst., 40(2020) no.2, 907.
4. W. M. Feldman, Y. P. Zhang, *Continuity properties for divergence form boundary data homogenization problems*, Anal. PDE, 12(2019) no.8, 1963-2002.
3. I. Kim, Y. P. Zhang, *Regularity properties of degenerate diffusion equations with drifts*, SIAM J. Math. Anal., 50(2018) no.4, 4371-4406.
2. Y. P. Zhang, *On continuity equations in space-time domains*, Discrete Contin. Dyn. Syst., 38(2018) no.10, 4837-4873.
1. T. Xiao, Y. P. Zhang, *Lack of exponential decay in viscoelastic materials with voids*, Systems Control Lett., 63(2014) 39-42.

## INVITED TALKS

- AMS Eastern Sectional Meeting at Howard University, Washington, DC, April 6–7, 2024
- Seminars on Analysis and Stochastic Analysis at Auburn University, Auburn, March 20, 2024
- PDE&GA seminar at University of Wisconsin-Madison, March 4, 2024
- Analysis and Probability Seminar at Iowa State University, Ames, Feb 14, 2024
- Virtual Analysis and PDE Seminar (online), Dec 14, 2023
- Math Finance Colloquium, University of Southern California, Los Angeles, Nov 20, 2023
- Special Session in Fall Southeastern Sectional Meeting at the University of South Alabama, Mobile, AL, Oct 13-15, 2023
- SAMSA Masamu CRN Virtual Colloquia Series, Sep 26, 2023
- Applied and Computational Math Seminar, Auburn University, Sep 15, 2023
- Mini-symposium of ICIAM, Waseda University, Tokyo, Japan, Aug 20–25, 2023
- Mathematics seminar, Shanghaijiaotong University, July 24, 2023

- Mathematics seminar, Fudan University, June 12, 2023
- Analysis Seminar at UCSD, May 30, 2023
- AMS Southeastern Sectional Meeting at Georgia Institute of Technology, Atlanta, Mar 18–19, 2023
- PDE seminar at Georgia Tech, Atlanta, Feb 14, 2023
- The 2023 Joint Mathematics Meeting (JMM 2023), Boston, January 04–07, 2023
- Applied Math Seminar, Auburn University, Oct 28, 2022
- Graduate Student Seminar, Auburn University, Oct 12, 2022
- Applied Math Seminar, Auburn University, Sep 30, 2022
- Zu Chongzhi Center Mathematics Research Seminar, Duke Kunshan, Sep 19, 2022
- University of Electronic Science and Technology of China, Aug, 2022
- Applied Math Seminar, Auburn University, June 15, 2022
- UCSD postdoc seminar, May 12, 2022
- Beijing International Center for Mathematical Research (online), Mar 8, 2022
- Yau Mathematical Sciences Center (online), Tsinghua University, Mar 4, 2022
- Financial Math Seminar, University of Michigan (online), Jan 19, 2022
- Analysis seminar (online), UCLA/USC joint seminar, Nov 2, 2021
- Undergraduate Colloquium, Mathematics Department, UCSD, Oct 25, 2021
- Analysis seminar (online), UCSD, Oct 12, 2021
- Applied Mathematics Seminar (online), The University of Utah, Oct 4, 2021
- Mathematics seminar (online), Fudan University, Sep 8, 2021
- Analysis and PDE seminar (online), Durham University, UK, June 2, 2021
- Topics in qualitative and quantitative properties of partial differential equations mini-symposium (online), 3rd Annual Meeting of the SIAM Texas-Louisiana Section, Oct 16-18, 2020
- Southern California Applied Mathematics Symposium, California Institute of Technology, Apr 27, 2019
- Analysis Seminar, University of California San Diego, Apr 4, 2019
- Analysis and PDE Seminar, University of California Los Angeles, Nov 20, 2018
- Analysis Seminar, University of California San Diego, Oct 23, 2018
- PDE seminar, Georgia Institute of Technology, Sep 4, 2018
- Southern California Applied Mathematics Symposium, University of California Santa Barbara, Apr 28, 2018
- Particle Methods and Nonlocal Partial Differential Equations, AMS Sectional Meeting, University of California Riverside, Nov 4-5, 2017
- GSO Seminar, Analysis and PDE Seminar, University of California Los Angeles, Apr 2014

## HONORS AND AWARDS

- AMS-Simons travel grant, 2021–2022 (extended to 2023)
- Pacific Journal of Mathematics Dissertation Prize, 2019
- Girsky Fellowship Award, 2018–2019

## TEACHING

**Auburn University Department of Mathematics and Statistics, Auburn, as *Instructor***

- Math 7210 Real Analysis II, Spring 2024
- Math 7200 Real Analysis I, Fall 2023
- Math 1627 Honors Calculus II, Fall 2023
- Math 2630 Calculus III, Spring 2023
- Math 2637 Honors Calculus III, Spring 2023

**UCSD Department of Mathematics**, San Diego, *as Instructor*

- Math 20A Calculus for Science and Engineering I: Fall 2019, Fall 2021
- Math 20B Calculus for Science and Engineering II: Winter 2020, Spring 2021
- Math 20D Introduction to Differential Equations: Fall 2020, Winter 2020, Summer I 2021
- Math 109 Mathematical Reasoning: Spring 2020
- Math 130 Differential Equations and Dynamical Systems: Winter 2021, Winter 2022
- Math 148 Analysis of PDE: Spring 2022

**UCLA Department of Mathematics**, Los Angeles, *as Teaching assistant*

- Math 31A Differential and Integral Calculus I: Fall 2015
- Math 32A Calculus of Several Variables I: Fall 2017
- Math 32B Calculus of Several Variables II: Fall 2015
- Math 33A Linear Algebra and Applications: Spring 2017
- Math 33B Differential Equations: Winter 2014, Fall 2014, Winter 2015, Spring 2015, Summer 2016, Spring 2017
- Math 131C Topics in Analysis: Spring 2015
- Math 132 Complex Analysis for Applications: Spring 2014
- Math 132H Complex Analysis (Honors): Winter 2015
- Math 134 Linear and Nonlinear Systems of Differential Equations: Fall 2018
- Math 135 Ordinary Differential Equations: Spring 2014, Fall 2014, Winter 2016
- Math 151A Applied Numerical Methods: Fall 2016
- Math 170A Probability Theory: Winter 2016
- Math 170B Probability Theory: Spring 2016, Winter 2019
- Math 171 Stochastic Processes: Winter 2017
- PIC 10A Introduction to Programming: Spring 2018

**SERVICE**

- Co-organizer of AMS Southeastern Sectional Meeting, Mobile, AL, October 13 – 15, Fall 2023.
- Co-organize Seminars on Analysis and Stochastic Analysis in Auburn University with Prof. Le Chen, Fall 2023.
- Journal refereeing: SICON, J. Funct. Anal., JDE, Nonlinearity, SIAM J. Math. Anal., SIAM J. Appl. Math., Nonlinear Anal., Adv. Nonlinear Stud., Math. Methods Appl. Sci, Comput. Appl. Math., Stoch. Partial Differ. Equ. Anal. Comput., Differential Integral Equations, Proc. AMS.
- Co-organized UCSD Analysis Seminar with Prof. Andrej Zlatoš, Fall 2021 – Spring 2022.

**GRADUATE STUDENTS**

Zulaihat Hassan

current, co-advising with Prof. Wenxian Shen.

**UNDERGRADUATE MENTEES**

Ayush Singh

2021 Fall.

Hanbei Xiong

2022 Spring.