Yixuan Wang (Roy)

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Applied and Comput. Math., Caltech, Pasadena, CA 91125

EDUCATION BACKGROUND

Peking University

B.S., School of Mathematics, Peking University, **Summa Cum Laude** in Beijing   2016—2020

Elite Undergraduate Training Programs in Applied Math and in Pure Math, Excellent Graduate

California Institute of Technology

Graduate Student, Computing + Mathematical Sciences, supervised by Prof. Thomas Hou   2020—2026

MATHEMATICAL ENGAGEMENT

- Founding President of the SIAM Student Chapter at Caltech   2021-2023
- Member of DEI committee at Caltech

RESEARCH HIGHLIGHT

I develop analytical and computational frameworks for understanding singularity formation in PDEs, motivated by the Clay prize problem on blowup of Navier-Stokes equations. I build systematic proofs inspired by numeric and amenable to computer-assisted verification, design high-precision machine learning tools, including neural networks and neural operators, and pioneer Kolmogorov–Arnold Network (KAN) for broad application to AI.

Citations: 2081 as of July 20, 2025

PUBLICATIONS

- R. Li, Y. Wang and **Y. Wang**. Approximation to Singular Quadratic Collision Model in Fokker-Planck-Landau Equation, SIAM Journal on Scientific Computing, 42(3), 2020, pp. B792-B815.
- Y. Chen, T.Y. Hou and **Y. Wang**. Exponential Convergence for Multiscale Linear Elliptic PDEs via Adaptive Edge Basis Functions, Multiscale Modeling and Simulation, 19(2), 2021, pp. 980–1010.
- Z. Liu, S. Qian, **Y. Wang,** Y. Yan and T Yang. Schrödinger Principal-component Analysis: On the Duality between Principal-component Analysis and the Schrödinger Equation, Physics Review E, 104(2), 2021, 025307.
- Y. Chen, T.Y. Hou and **Y. Wang**. Exponentially Convergent Multiscale Methods for 2D High Frequency Heterogeneous Helmholtz Equations, Multiscale Modeling and Simulation, 21(3), 2023, pp. 849–883.
- Z. Liu, A. Stuart and **Y. Wang**. Second Order Ensemble Langevin Method for Sampling and Inverse Problems, Communications in Mathematical Sciences, 23(5), 2025, 1299-1317.
- H. Maust, Z. Li, **Y. Wang**, D. Leibovici, O. Bruno, T.Y. Hou and A. Anandkumar. Fourier Continuation for Exact Derivative Computation in Physics-Informed Neural Operators, NeurIPS 2022, 3rd AI for Science workshop.
- Y. Chen, T.Y. Hou and **Y. Wang**. Exponentially Convergent Multiscale Finite Element Method, Communications on Applied Mathematics and Computation, 6(2), 2024, 862-878.
- T.Y. Hou and **Y. Wang**. Blowup Analysis for a Quasi-exact 1D Model of 3D Euler and Navier-Stokes, Nonlinearity, 37(3), 2024, 035001.
- T.Y. Hou, V.T. Nguyen and **Y. Wang**. (2024) L^2-based Stability of Blowup with Log Correction for Semilinear Heat Equation.
- Z. Liu, **Y. Wang**, S. Vaidya, F. Ruehle, J. Halverson, M. Soljacic, T.Y. Hou and M. Tegmark. KAN: Kolmogorov-Arnold Networks, ICLR Oral 2025.
  Github: most starred repo May 2024 (15.6k), [Scientific American](#) and [Quanta](#) coverage
- J. Chen, T.Y. Hou, V.T. Nguyen and **Y. Wang.** (2024) On the Stability of Blowup Solutions to the Complex Ginzburg-Landau Equation in R^d.
- Z. Liu, P. Ma, **Y. Wang**, W. Matusik and M. Tegmark. (2024) KAN 2.0: Kolmogorov-Arnold Networks Meet Science.
- **Y. Wang,** J.W. Siegel, Z. Liu and T.Y. Hou. On the Expressiveness and Spectral Bias of KANs, ICLR 2025.
- Z. Li, S. Lanthaler, C. Deng, **Y. Wang**, K. Azizzadenesheli and A. Anandkumar. Scale-consistent Learning with Neural Operators, Neurips 2024, Workshop Foundation Models for Science: Progress, Opportunities, and Challenges.

- J. Liu, **Y. Wang,** and T. Zhou. (2025) Finite Time Blowup for Keller-Segel Equation with Logistic Damping in Three Dimensions.
- **Y. Wang**, Z. Liu, Z. Li, A. Anandkumar, and T.Y. Hou. (2025) High Precision PINNs in Unbounded Domains: Application to Singularity Formulation in PDEs.

SELECTED INVITED TALKS

- Ensemble Hamiltonian Monte Carlo, EnKF workshop at Balestrand, Norway, May. 2022
- ExpMsFEM, University of Hong Kong, Sep. 2022
- Blowup for a quasi-exact 1D model of 3D Euler, Workshop on Fluids at Duke University, May. 2023
- ExpMsFEM, Minisymposium on rough PDEs, ICIAM at Waseda University, Aug. 2023
- ExpMsFEM, Ohio State University, Nov. 2023
- KAN, National University of Singapore, Aug. 2024
- Stable type-I blowup by local normalization conditions: NLH and CGL, NUS, Aug. 2024
- KAN, Peking University, Sep. 2024
- Stable type-I blowup by local normalization conditions: NLH and CGL, PKU, Sep. 2024
- KAN, Shanghai Jiaotong University, Sep. 2024
- KAN, UCLA, Sep. 2024
- KAN, University of Chicago, Oct. 2024
- KAN, Courant Institute, NYU, Nov. 2024
- Stable type-I blowup by local normalization conditions: NLH and CGL, Duke, Nov. 2024
- KAN, University of Hong Kong, Nov. 2024
- Stable type-I blowup, NCTS workshop on PDEs at National Taiwan University, Apr. 2025
- KAN, ICLR Oral at Singapore, Apr. 2025
- KAN and high precision training of PINNs, Seoul National University, June. 2025
- High precision training of PINNs, Brown University, Sep. 2025
- Singularity formation: synergy in theoretical, numerical and machine learning approaches, Texas A&M University, Sep. 2025
- Singularity formation, Caltech, Oct. 2025

TEACHING EXPERIENCE

- ACM 106a (Numerical linear algebra) 22/23/24/25 Fall   ACM 106b (Numerical analysis) 23/24/25 Winter
- ACM 107a (Linear analysis) 21 Fall   ACM 107b (Real and functional analysis) 22 Winter
- ACM 127 (Calculus of variations) 22 Spring
- ACM 180a (Multiscale modeling) 23 Spring
- ACM 270 (Machine learning for inverse problems and data assimilation) 24 Spring

AWARDS AND HONORS

- Silver Award at 56th International Mathematical Olympiad, 2016
- All Three 2nd Places in Analysis, Applied Math, and Overall Individual Competitions, S.-T. Yau College Mathematics Contests, 2019
- 1st Place in Team Competition, S.-T. Yau College Mathematics Contests, 2019
- 1st Prize in National University Math Competition, 2017
- 1st Prize in National University Math Modeling Competition, 2017
- 1st Place in Citadel Datathon, China, 2018
- National Scholarship, 2018, 2019
- Representative of PKU for National Scholarship, 2019
- PKU Person of the Year, 2019
- PKU May 4th-Award, 2020