**Yixuan Wang (Roy)**

[roywang@caltech.edu](mailto:roywang@caltech.edun) | (1) 6264609554

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](https://www.scientificamerican.com/article/an-alternative-to-conventional-neural-networks-could-help-reveal-what-ai-is/) and [Quanta](https://www.quantamagazine.org/novel-architecture-makes-neural-networks-more-understandable-20240911/) 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