Yadi Cao

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BIO

Yadi Cao is a Postdoc in the CSE at UCSD, working with Professor Rose Yu. He completed his Ph.D. in CS at UCLA, co-advised by Professors Demetri Terzopoulos and Chenfanfu Jiang. His doctoral research focused on numerical solutions and machine learning for Partial Differential Equations (PDEs) in computational solid and fluid dynamics.
Yadi's research interests lie in scientific machine learning and its engineering applications. He is particularly interested in enhancing the generalization ability of machine learning approaches in this domain. Yadi is actively seeking tenure-track positions and is open to collaboration opportunities.

PUBLICATIONS

MACHINE LEARNING FOR PREDICTIN PHYSICAL SYSTEMS

2023 Huang, Z, Zhao, W, Gao, J, Hu, Z, Luo, X, **Cao, Y**, Chen, Y, Sun, Y, Wang, W. TANGO: Time-Reversal Latent GraphODE for Multi-Agent Dynamical Systems. **Best Paper Award**. *DLDE workshop on Neural Information Processing Systems (NIPS).*

2023 **Cao, Y**, Chai, M, Li, M, Jiang, C. Efficient Learning of Mesh-Based Physical Simulation with Bi-Stride Multi-Scale Graph Neural Network. *International Conference on Machine Learning (ICML).*

2022 Li, X, **Cao, Y**, Li, M, Yang, Y, Zhang, X, Schroeder, C, Jiang, C. PlasticityNet: Learning to Simulate Metal, Sand, and Snow for Optimization Time Integration. *Conference on Neural Information Processing Systems (NIPS).*

PHYSICS SIMULATION AND ANALYSIS

2024 **Cao, Y**, Zhao, Y, Li, M, Yang, Y, Choo, J, Terzopoulos, D, Jiang, C. Unstructured moving least squares material point methods: a stable kernel approach with continuous gradient reconstruction on general unstructured tessellations. *Computational Mechanics.*

2023 Fang, Y, Li, M, **Cao, Y**, Li, X, Wolper, J, Yang, Y, Jiang, C. Augmented Incremental Potential Contact for Sticky Interactions. *IEEE Transactions on Visualization and Computer Graphics (TVCG).*

2022 **Cao, Y**, Chen, Y, Li, M, Yang, Y, Zhang, X, Aanjaneya, M, Jiang, C. An Efficient B-Spline Lagrangian/Eulerian Method for Compressible Flow, Shock Waves, and Fracturing Solids. *ACM Transactions On Graphics (presented at SIGGRAPH).*

2019 **Cao, Y**, Gao, X, Li, R. A Liquid Plug Moving in an Annular Pipe: Heat Transfer Analysis. *International Journal of Heat and Mass Transfer.*

2018 **Cao, Y**, Li, R. A Liquid Plug Moving in an Annular Pipe: Flow Analysis. **Editor's Pick**. *Physics of Fluids.*

TEACHING

2024 S	Teaching Fellow, Operating Systems Principles (CS 111), UCLA
2024 W	Teaching Fellow, Operating Systems Principles (CS 111), UCLA
2023 F	Teaching Fellow, Operating Systems Principles (CS 111), UCLA
2023 Su	Teaching Associate, Introduction to Algorithms and Complexity (CS 180), UCLA
2023 S	Teaching Associate, Operating Systems Principles (CS 111), UCLA
2023 W	Teaching Assistant, Operating Systems Principles (CS 111), UCLA
2022 F	Teaching Assistant, Operating Systems Principles (CS 111), UCLA
2020 F	Teaching Assistant, Advanced Physics Engines 2020: A Hands-on Tutorial (GAMES 201)
2018 S	Teaching Assistant, Heat Transfer Applications (ENGR385), UBC
2018 W	Lab Assistant, Measurement Principles in Thermal Fluids (ENGR479), UBC
2017 F	Teaching Assistant, Matter and Energy (APSC182), UBC
2016 F	Teaching Assistant, Matter and Energy (APSC182), UBC
2016 S	Assistant Lecturer, Introduction to C Programming Language, USTC

SERVICE

MENTOR

2024	Mentor, Summer Training Academy for Research Success (STARS) at UCSD

CONFERENCE

2024	Program Chair, International Joint Conference on Artificial Intelligence (IJCAI)
2023	Volunteer, Symposium on Computer Animation (SCA)

REVIEWER

2024	ACM SIGGRAPH
2024	International Conference on Machine Learning (ICML)
2024	International Conference on Learning Representations (ICLR)
2023	Neural Information Processing Systems (NIPS)
2018–2024	Physics of Fluids (POF)
2022, 2024	Pacific Graphics (PG)

EDUCATION

2021–2024 PhD, Computer Science Department, University of California, Los Angeles (UCLA)

Thesis: *Advancing physics-based simulations: Integrating conventional and machine learning approaches for enhanced computational efficiency.*

Advisors: Demetri Terzopoulos (Computer Science) and Chenfanfu Jiang (Applied Math).

Committee: Shaowu Pan (Mechanical and Aerospace Engineering), Aditya Grover (Computer Science), and Quanquan Gu (Computer Science).

2016–2018 MASc, Mechanical Engineering, University of British Columbia (UBC)

Thesis: *Analytical and numerical study of plug flow inside round/concentric microchannels.*

Advisors: Sunny Ri Li (Mechanical Engineering).

Committee: Joshua Brinkerhof (Mechanical Engineering), Clarie Yu Yan (Mechanical Engineering), and Kenneth Chau (Mechanical Engineering).

2012–2016 BEng, University of Science and Technology of China (USTC)

Thesis: *Experimental and numerical study of the film cooling on aircraft turbine cascade.*

ACADEMIC AND TECHNICAL TALKS

Feb/2024 Physical Simulations on Complex Geometries: Integrating Machine Learning and Numerical Methods for Complementary Solutions, UCLA Math

Feb/2024 Physical Simulations on Complex Geometries: Integrating Machine Learning and Numerical Methods for Complementary Solutions, UCSD CSE

Jan/2024 Physical Simulations on Complex Geometries: Integrating Machine Learning and Numerical Methods for Complementary Solutions, Yale CS (Remote)

Jan/2024 Physical Simulations on Complex Geometries: Integrating Machine Learning and Numerical Methods for Complementary Solutions, Caltech CMS

AWARDS & HONORS

2022 Non-residential Tuition Grant, University of California, Los Angeles.

2021 University Fellowship, University of California, Los Angeles.

2017–2018 University of British Columbia Graduate Fellowship.

2017 Funding for Exchange Research to Summer Institute in Taiwan, NSERC.

2017 USTC Alumni Fellowship of B.C. Canada.

2015 Bronze Prize, Zhongwei-cup Energy & Environment Protection contest, USTC.

2014 Outstanding Student Leader of the School, USTC.

2013–2014 Silver Prize, National Outstanding Undergraduate Scholarship (top 10%), USTC

INDUSTRY EXPERIENCE

2023–2024 **Student Researcher**
Google LLC
Efficient few-shot learning with Gaussian splatting for parametric digital human hand modeling, supervised by **Dr. Chai, Menglei**.

2022 **Researcher Intern**
Snap Inc
A robust, simple, and non-parametric pooling strategy for building multi-level GNNs for predicting mesh-based physical simulation, supervised by **Dr. Chai, Menglei**.

2021 **SDE Intern (remote)**
Taichi Graphics
HtoTi: A portable Houdini plug-in for the Taichi-Element (a high performance MPM solver), cooperated with **Dr. Yuanming Hu**, Dr. Tiantian Liu, and Yidong Ma.

2019–2020 **CAE Software Research Developer**
shonCloud Tech/shonDynamics
Algorithm and CAE software development for FEM heat transfer with multibody thermal contact, fluid-heat transfer conjugate, and fluid-solid coupling.