Jingye **Tan, Ph.D.**

Postdoctoral Research Associate · Scientific AI Developer · Computational Scientist · Educator

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Recent Experience

Postdoctoral Research Associate

Nov. 2023 - Present

Sibley School of Mechanical and Aerospace Engineering, Cornell University — *Ithaca, NY*

- Principal Investigator: Nikolaos Bouklas
- Developing pioneering AI methods and approaches that facilitate human-machine partnerships in scientific discovery
- Leading research in physics-informed neural networks for constitutive model discovery and optimization
- Advancing scientific machine learning methodologies for solid mechanics and uncertainty quantification
- Collaborating with interdisciplinary teams including the Scientific AI Center to push the frontiers of computational science
- Research initially supported through Scientific AI Center funding, currently continuing under MAE departmental support
- Incubating entrepreneurial ventures to commercialize scientific foundation models and translate research into scalable solutions

Lecturer

Aug. 2024 - Dec. 2024

Sibley School of Mechanical and Aerospace Engineering, Cornell University — *Ithaca, NY*

- MAE Department Chair: David Erickson
- Primary instructor of MAE-4700/5700 Finite Element Analysis for MAE Design (50 students: undergrad seniors & first-year graduates)
- Developed comprehensive curriculum integrating theoretical foundations with practical engineering applications
- Mentored students in advanced computational mechanics and finite element methodologies
- Achieved consistently high student evaluation scores and engagement metrics

Education

Doctor of Philosophy, Mechanical Engineering (GPA 3.959/4.00)

Aug. 2019 - Aug. 2023

Department of Mechanical and Aerospace Engineering, University at Buffalo, SUNY — *Buffalo, NY*

- Dissertation: Predictive Modeling and Design of Ceramic Porous Materials Under Uncertainty
- Advisor: Danial Faghihi; Committee: G. Dargush, D. Salac, C. Zhou

Bachelor of Science in Mechanical Engineering (Summa Cum Laude, GPA 3.837/4.00)

Aug. 2015 - May 2019

Department of Mechanical and Aerospace Engineering, University at Buffalo, SUNY — *Buffalo, NY*

Bachelor of Art in Mathematics (Summa Cum Laude, with distinction, GPA 4.00/4.00)

Aug. 2015 - May 2019

Department of Mathematics, University at Buffalo, SUNY — *Buffalo, NY*

Current Research Projects

Adjoint-Assisted Physics-Augmented Neural Networks for Constitutive Model Discovery

Primary Research Focus — *Cornell MAE (& SciAI)*

- Developing physics-augmented neural networks for automated rapid material model discovery
- Architecting foundation models for solid mechanics leveraging transformer architectures and multi-modal learning frameworks
- Advancing scientific reasoning capabilities through emergent scaling laws for next-generation computational materials science
- Implementing adjoint-based optimization for PDE-constrained parameter identification
- Integrating automatic differentiation with digital image correlation techniques
- Advancing gradient-enhanced damage models and novel topology optimization methods

Bayesian Inverse Problems in Computational Oncology and Neurodegeneration

Personal Research Interest — *Collaborative Research*

- Developing thermodynamics-and-biology-inspired neural networks for biological systems
- Implementing physics-constrained transfer learning for medical applications
- Researching pharmacodynamics-and-pharmacokinetic-driven disease-specific foundation models for patient-specific modeling
- Advancing patient-specific modeling using magnetic resonance imaging
- Optimizing treatment strategies under uncertainty using Bayesian methods

Model Reliability Standards: Verification, Validation and Uncertainty Quantification

Personal Research Interest — *Methodological Development*

- Establishing computational model validation frameworks and standards
- Developing uncertainty propagation methodologies for scientific computing
- Creating reliability assessment protocols for predictive models
- Contributing to best practices in scientific computing verification

Skills

Research Areas	Uncertainty Quantification, Scientific ML, Physics-Informed Neural Networks, Scientific Foundation Models
Computational Methods	Bayesian Inference, Continuum Mechanics, Finite Element Analysis
Programming	Python, MATLAB, C/C++, R, SQL, Unix/Linux, Shell Scripting
ML & Computing	TensorFlow, PyTorch, JAX, PETSc, FEniCS, MPI, OpenMP, NumPy, SciPy
Software & Tools	LaTeX, Git, Paraview, Abaqus, ANSYS, Jupyter, VS Code, HPC
Language	English, Mandarin, Cantonese

Teaching Experience

2024	**Lecturer,** MAE 4700/5700 Finite Element Analysis for MAE Design (50 students)	*Cornell University*
2019-22	**Graduate Teaching Assistant,** MAE 381 Engineering Materials, MAE 311 Machine & Mechanism, MAE 345 Intermediate Dynamics, MAE 376 Applied Mathematics	*University at Buffalo*
2019	**Adjunct Instructor,** MTH 141 Calculus I, MTH 122 Survey of Calculus II, MTH 309 Linear Algebra	*University at Buffalo*
2017-19	**Undergraduate Teaching Assistant,** Fluid Mechanics, Heat Transfer, Statics, Solid Mechanics, Calculus Courses, Differential Equations	*University at Buffalo*

Academic Mentorship

University at Buffalo	B. Liang, P. Singh, S. Bhattacharjee, W. Hilbert, G. Keller, L. Sullivan
Cornell University	M. Mousavi, S. Joshi
External Collaborations	R. Shoghi (Ruhr-Universität Bochum), M. Alishiri (University of Utah)

Academic and Professional Affiliations

2025	**Reviewer,** International Journal of Plasticity	*Online*
2024	**COMPASS Scolar,** Washington University School of Medicine	*St. Louis, MO*
2024	**Academic Affiliate,** Cornell Atkinson Center for Sustainability	*Ithaca, NY*
2024	**Academic Affiliate,** Cornell Brooks School Tech Policy Institute	*Ithaca, NY*
2024	**Reviewer,** Foundations of Data Science, American Institute of Mathematical Sciences	*Online*
2023	**Inaugural Member-at-Large,** Student Chapter, United States Association for Computational Mechanics	*Austin, TX*

Publications

NN-EVP: A Physics Informed Neural Network-Based Elasto-Viscoplastic Framework for Predictions of Grain Size-Aware Flow Response under Large Deformations — *Published Jul. 2024*

A. Eghtesad, J. Tan, J. Fuhg, N. Bouklas — *Int. J. Plasticity*

A Scalable Framework for Multi-objective PDE-Constrained Design of Building Insulation under Uncertainty — *Published Nov. 2023*

J. Tan, D. Faghihi — *CMAME*

A Nonlocal Theory of Heat Transfer and Micro-Phase Separation of Nanostructured Copolymers — *Published Jul. 2023*

P. Singh, L. Cao, J. Tan, D. Faghihi — *IJHMT*

Bayesian Inference of Tissue Heterogeneity for Individualized Prediction of Glioma Growth — *Published Apr. 2023*

J. Tan, B. Liang, Baoshan Liang, L. Lozenski, D.Hormuth, T.Yankeelov, U. Villa, D. Faghihi — *IEEE-TMI*

A Scalable Algorithm for Multi-material Design of Thermal Insulation Components under Uncertainty — *Mar. 2023*

J. Tan, D. Faghihi — *USNCCM17*

Toward Selecting Optimal Predictive Multiscale Models — *Published Dec. 2022*

J. Tan, B. Liang, P. Singh, K. Maupin, D. Faghihi — *CMAME*

A Predictive Multiphase Model of Silica Aerogels for Building Envelope Insulations — *Published Feb. 2022*

J. Tan, P. Maleki, L. An, M. Di Luigi, U. Villa, C. Zhou, S. Ren, D. Faghihi — *Computational Mechanics*

Flexible Percolation Fibrous Thermal Insulating Composite Membranes for Thermal Management — *Published Nov. 2022*

L. An, M. Di Luigi, J. Tan, D. Faghihi, S. Ren — *Materials Advances*

Shearing Thermal-Conductive and Electric-Insulating Dielectric Polymer — *Published Oct. 2021*

Z. Li , L. An , S. Khuje , J. Tan , Y. Hu , Y. Huang , D. Petit , D. Faghihi , J. Yu, S.Ren — *Science Advances*

A Bayesian Machine Learning Framework for Selection of the Strain Gradient Plasticity Multiscale Model — *Published Nov. 2021*

J. Tan, K. Maupin, S. Shao, D. Faghihi — *Proceedings of ASME 2021 IMECE*

A Predictive Discrete-Continuum Multiscale Model of Plasticity With Quantified Uncertainty — *Published Jan. 2021*

J. Tan, U. Villa, N. Shamsaei, S. Shao, H. Zbib, D. Faghihi — *Int. J. Plasticity*

Presentations and Conferences

From Modeling to Learning with HPC, ICERM Brown University	*Providence, RI*	*Sep. 2025*
Cornell Quantum Day	*Ithaca, NY*	*July 2025*
18th U. S. National Congress on Computational Mechanics	*Chicago, IL*	*July. 2025*
Uncertainty Quantification for Mathematical Biology, ICERM Brown University	*Providence, RI*	*May 2025*
Engineered Living Materials Institute Research Symposium	*Ithaca, NY*	*Apr. 2025*
K.K. Wang Day on Simulation and Design Education	*Ithaca, NY*	*Apr. 2025*
2025 SIAM Conference on Computational Science and Engineering	*Fort Worth, TX*	*Mar. 2025*
Computational Learning for Model Reduction, ICERM Brown University	*Providence, RI*	*Jan 2025*
2nd USACM Thematic Conference on Uncertainty Quantification for ML Integrated Physics Modeling	*Arlington, VA*	*Aug. 2024*
Office of Naval Research SciAI Center Program Review & Engagement, Cornell University	*Ithaca, NY*	*Jun. 2024*
Random Matrices and Applications, ICERM Brown University	*Providence, RI*	*May 2024*
The Industrialization of SciML, ICERM Brown University	*Providence, RI*	*Mar. 2024*
2023 International Mechanical Engineering Congress & Exposition	*New Orleans, LA*	*Nov. 2023*
17th U. S. National Congress on Computational Mechanics	*Albuquerque, NM*	*July. 2023*
The Fourth International Conference on Damage Mechanics	*Baton Rouge, LA*	*May. 2023*
2022 International Mechanical Engineering Congress & Exposition	*Columbus, OH*	*Nov. 2022*
USACM Thematic Conference on Uncertainty Quantification for ML Integrated Physics Modeling	*Arlington, VA*	*Aug. 2022*
19th U.S. National Congress on Theoretical and Applied Mechanics	*Austin, TX*	*Jun. 2022*
ASME Verification, Validation and Uncertainty Quantification Symposium	*College Station, TX*	*May. 2022*
USACM Thematic Conference on the Role of Mathematical and Computational Modeling in Cancer Research	*Virtual*	*Jan. 2021*
2021 International Mechanical Engineering Congress & Exposition	*Virtual*	*Nov. 2021*
16th U.S. National Congress on Computational Mechanics	*Virtual*	*Jul. 2021*
16th U.S. National Congress on Computational Mechanics	*Virtual*	*Jul. 2021*
14th World Congress in Computational Mechanics and ECCOMAS Congress	*Virtual*	*Jan. 2021*
2020 International Mechanical Engineering Congress & Exposition	*Virtual*	*Nov. 2020*
Southeastern Undergraduate Mathematics Workshop	*Atlanta, GA*	*Aug. 2019*
5th SUNY Undergraduate Research Conference 2019	*Sanborn, NY*	*Apr. 2019*
15th Annual Celebration of Student Academic Excellence	*Buffalo, NY*	*Apr. 2019*
5th Annual CDSE Days 2019	*Buffalo, NY*	*Apr. 2019*
Finite Element in Fluids 2019	*Chicago, IL*	*Mar. 2019*

(under)Graduate Student Lecture Series — *Buffalo, NY* *Mar. 2019*

Celebration of 75 years of Mathematics of Computation, ICERM Brown University — *Providence, RI* *Nov. 2018*

Honors & Awards

Domestic

2025 **Awardee,** U.S. National Congress on Computational Mechanics Conference Travel Award — *Chicago, IL*

2024 **Awardee,** UQ-MLIP Travel Award — *Arlington, VA*

2023 **Finalist,** USNCCM17 Uncertainty Quantification Student Paper Competition — *Albuquerque, NM*

2023 **Awardee,** U.S. National Congress on Computational Mechanics Conference Travel Award — *Albuquerque, NM*

2021 **Awardee,** U.S. National Congress on Computational Mechanics Conference Travel Award — *Chicago, IL*

2019 **Awardee,** SEAS Dean's Undergraduate Achievement Award — *Buffalo, NY*

2019 **Finalist,** Undergraduate Student (Morning) 2019 Commencement Speaker Competition — *Buffalo, NY*

2019 **Undergraduate Finalist,** MAE Research Poster Competition 2019 — *Buffalo, NY*

2019 **Awardee,** CURCA Undergraduate Research Award — *Buffalo, NY*

2019 **Awardee,** School of Engineering and Applied Science Senior Scholar Research Scholarship — *Buffalo, NY*

2019 **Awardee,** Woeppel Mathematics Fund — *Buffalo, NY*

2019 **Nominee,** SUNY Chancellor's Award — *Buffalo, NY*

2019 **Nominee,** Outstanding Senior Award — *Buffalo, NY*

2018 **Awardee,** CAS Experiential Learning Fund — *Buffalo, NY*

2018 **Awardee,** Gustav and Grete Zimmer Memorial Scholarship — *Buffalo, NY*

2018 **Awardee,** Honors College Academic Enrichment Fund — *Buffalo, NY*

2018 **Awardee,** College Ambassador Academic Enrichment Award — *Buffalo, NY*

2018 **Awardee,** Hazel and John Wilson Scholarship — *Buffalo, NY*

2018 **Awardee,** Honors College Advanced Honor — *Buffalo, NY*

2018 **Awardee,** Engineering Fellowship and Scholarship Fund — *Buffalo, NY*

2015 **Awardee,** International Admissions Scholarship, 4 years — *Buffalo, NY*

2015 **Awardee,** Dean's List, 4 years — *Buffalo, NY*

International

2020 **Runner-up,** IMECE Student Poster Competition on Computing and Applied Mechanics — *Virtual*

2019 **Awardee,** Finite Element in Fluids Conference Travel Award — *Chicago, IL*

2019 **Meritorious Winner,** Mathematical Contest in Modeling 2019 Continuous Problem — *Bedford, MA*