

Tianju Xue (薛添驹)

Ph.D., Princeton University

Date of birth: Oct. 1994
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Research Interest

Additive Manufacturing (Multi-scale Multi-physics Simulation; Metamaterial Design)
Computational Mechanics (High Performance Computing; Topology Optimization)
Machine Learning (Automatic Differentiation; Bayesian Methods)

Professional Experience

01/2022- **Postdoctoral Scholar**, Northwestern University.
Now Mechanical Engineering, Advisor: Prof. *Jian Cao*

Education

2017–2022 **Ph.D.**, Princeton University.
Civil Engineering, Advisor: Prof. *Sigrid Adriaenssens*
Computer Science, Advisor: Prof. *Ryan P. Adams*

2013–2017 **B.Sc.**, Shanghai Jiao Tong University.
Mechanical Engineering (UM-SJTU Joint Institute), GPA - 3.80/4.0 (ranking 1/53)

2016 **Exchange Student**, The University of Hong Kong.
Mechanical Engineering

Peer-reviewed Publications

- 2022 **T.Xue**, S.Mao, Learning the nonlinear dynamics of soft mechanical metamaterials with graph networks, *International Journal of Mechanical Sciences*
- 2022 **T.Xue**, Z.Gan, S.Liao, J.Cao, Physics-embedded graph network for accelerating phase-field simulation of microstructure evolution in additive manufacturing, *npj Computational Materials*, 2022.
- 2022 **T.Xue**, S.Mao, Mapped shape optimization method for rational design of cellular mechanical metamaterials under large deformation, *International Journal for Numerical Methods in Engineering*, 2022.
- 2021 X.Sun, **T.Xue**, S.M. Rusinkiewicz, R.P.Adams, Amortized Synthesis of Constrained Configurations Using a Differentiable Surrogate, *NeurIPS*, 2021.
- 2021 **T.Xue**, S.Adriaenssens, S.Mao, Mapped phase field method for brittle fracture, *Computer Methods in Applied Mechanics and Engineering*, 2021.
- 2021 **T.Xue**, W.C.Sun, S.Adriaenssens, Y.Wei, C.Liu, A new finite element level set reinitialization method based on the shifted boundary method, *Journal of Computational Physics*, 2021.
- 2020 A.Beatson, J.T.Ash, G.Roeder, **T.Xue**, R.P.Adams, Learning Composable Energy Surrogates for PDE Order Reduction, *NeurIPS*, 2020.
- 2020 **T.Xue**, T.J.Wallin, Y.Menguc, S.Adriaenssens, M.Chiamonte Machine learning generative models for automatic design of multi-material 3D printed composite solids, *Extreme Mechanics Letters*, 2020.
- 2020 **T.Xue**, A.Beatson, S.Adriaenssens, R.P.Adams, Amortized Finite Element Analysis for Fast PDE-Constrained Optimization, *ICML*, 2020.

- 2020 **T.Xue**, A.Beatson, M.Chiamonte, G.Roeder, J.T.Ash, Y.Menguc, S.Adriaenssens, R.P.Adams, S.Mao, A data-driven computational scheme for the nonlinear mechanical properties of cellular mechanical metamaterials under large deformation, *Soft Matter*, 2020.
- 2019 Y.Wan, **T.Xue**, Y.Shen, The successive node snapping scheme for an evolving branched curve in 2D and 3D, *Computer-Aided Design*, 2019.
- 2019 Y.Wan, **T.Xue**, Y.Shen, The successive node snapping scheme: A method to obtain conforming meshes for an evolving curve in 2D and 3D, *Finite Elements in Analysis and Design*, 2019.
- 2017 M.Ma, **T.Xue**, S.Chen, Y.Guo, Y.Chen, H.Liu, Features of structural relaxation in diblock copolymers, *Polymer Testing*, 2017.

Submitted Works

M.Mozaffar, S.Liao, J.Jeong, **T.Xue**, J.Cao, Differentiable Simulation for Material Thermal Response Design in Additive Manufacturing Processes, *Additive Manufacturing* (Under Revision).

Teaching

- 2017-2021 **Graduate Teaching Assistant**, Princeton University.
 SML201 Introduction to Data Science
 COS424 Fundamentals of Machine Learning
 CEE205 Mechanics of Solids
- 2013-2017 **Undergraduate Teaching Assistant**, Shanghai Jiao Tong University.
 VM382 Mechanical Behaviour of Materials
 VP140 Physics

Internship

- 2020 **Quantitative Researcher**, Sixie Capital, Shanghai.
 Statistical analysis of market data: Seeking investment alpha
- 2019 **Research Intern**, Facebook, Inc., Redmond.
 AR/VR at Facebook Reality Labs: Deep learning for 3D printing material design
- 2017 **Product Design Engineer**, Apple, Inc., Shanghai.
 Apple accessories team: Keyboard design and manufacturing

Presentations

- 2022 Annual International Solid Freeform Fabrication Symposium
- 2021 USACM Workshop on New Trends and Open Challenges in Computational Mechanics: from Nano to Macroscale
- 2020 ICLR Workshop on Integration of Deep Neural Models and Differential Equations
- 2018 13th World Congress on Computational Mechanics

Reviewing

Nature Materials; Npj Computational Materials; Extreme Mechanics Letters; NeurIPS

Selected Honors

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|------|-----------------------------------|--|
| 2017 | Gordon Y.S. Wu Fellowships | <i>A highly prestigious award at Princeton University</i> |
| 2016 | The Merit Student Model | <i>Person of the year at Shanghai Jiao Tong University</i> |
| 2015 | National Scholarship | <i>Top scholarship for undergraduate students in China</i> |

Software

JAX-AM An open-source Python library for numerical simulations in additive manufacturing with GPU acceleration and automatic sensitivity analysis.

Skills

Tools Matlab, L^AT_EX

Programming Languages Python, C/C++

Languages

Mandarin

Native

English

TOEFL: 111/120

References

Jian Cao, Cardiss Collins Professor, NAE Member.
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Sigrid Adriaenssens, Professor.
Department of Civil and Environmental Engineering,
Princeton University.
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Ryan P. Adams, Professor.
Department of Computer Science,
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Zhengtao Gan, Assistant Professor.
Department of Aerospace & Mechanical Engineering,
The University of Texas at El Paso.
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