

Xinyan Yang

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EDUCATION

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- Northwestern University, Evanston, IL** 09/2019 - 08/2024
Ph.D. in Mechanics, Materials, and Structures (MMS); GPA: 4.0/4.0
• Terminal Year Fellowship recipient
- University of California at Berkeley, CA** 08/2017 - 05/2018
M.S. in Structural Engineering, Mechanics and Materials (SEMM); GPA: 4.0/4.0
- Dalian University of Technology, China** 09/2013 - 07/2017
B.E. in Structural Engineering; GPA: 3.9/4.0
• National Fellowship recipient (1%)

SKILLS

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- **Programming Languages:** Python, C, Matlab, R, Bash, Tcl, SQL, Java.
 - **Software and Tools:** High performance computing (**HPC**) - MPI, CUDA; Molecular dynamics (**MD**) simulation - LAMMPS, NAMD, HOOMD-blue; Finite element modeling (**FEM**) - ABAQUS, FEniCS; Machine learning (**ML**) - Scikit-learn, TensorFlow, Torch; Visualization - VMD, Ovito; Structural design - ETABS; Solid modeling: AutoCAD, Autodesk Inventor; Building information modeling (**BIM**) - Revit and Revit API; Photoshop; Quarto.

WORK EXPERIENCE

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- **Northwestern University, Evanston, IL** 09/2024 - Current
• Postdoctoral Researcher in Mechanical Engineering
 - **Northwestern University, Evanston, IL** 09/2019 - 08/2024
• Teaching and Research Assistant
 - **TA Responsibilities:** Led recitations and experiments, held office hours, and graded homework and exams for courses including Structural Dynamics, Mechanical Vibrations, and Engineering Analysis II.
 - **KPFF Consulting Engineers, San Francisco, CA** 07/2018 - 05/2019
• Entry-level Structural Engineer (Full-time)
 - **Design project (steel):** Google Caribbean Campus, Sunnyvale, CA. Participated in the torsional analysis, lateral system design (collectors, details), and feature design (hanging mezzanines) of two office buildings.
 - **Seismic retrofit project (composite):** INSPUR, Milpitas, CA. Designed the anchorage for server racks and roof top units. Evaluated and strengthened the existing roof framing.

RESEARCH PROJECTS

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- **Designing Robust Self-assembled Self-healing Magneto-elastic Networks** (Thesis)
 - Developed particle dynamics simulators for magneto-elastic units with **Python** and MPI (**mpi4py**) acceleration.
 - Implemented replica exchange Monte Carlo (**REMC**) simulations to achieve low-energy stable states.
 - Investigated the mechanical properties of self-assembled magneto-elastic networks in **HOOMD-blue**.
 - **Engineering Complex Energy Landscape of Magneto-Kresling Truss (MKT) Structures**
 - Designed the MKT unit by embedding magnets into the Kresling truss and developed the computational model.
 - Engineered complex energy landscapes of MKT units and visualized the folding paths with **matplotlib**.
 - Modeled a chain of MKT units in **LAMMPS** and tested wave propagation properties under harmonic excitations.
 - **Sequence and Processing Condition Investigation of Spider Silk Protein**
 - Conducted dissipative particle dynamics (**DPD**) simulations on coarse-grained spider silk proteins in **LAMMPS**.
 - Wrote Python scripts to perform network analysis on semi-crystalline silk proteins obtained from DPD simulations.
 - Computationally studied the effect of silk processing conditions on protein crystallization and mechanical properties.
 - **SARS-CoV-2 Spike Protein Head Protomer Opening and Closing Transitions**
 - Realized the glycosylated spike protein (S-protein) head protomer opening and closing transitions with the targeted molecular dynamics (TMD) simulations in **NAMD**.
 - Performed principal component analysis (**PCA**) to identify S-protein global motions along binding to human ACE2.
 - Investigated local conformational changes during the transition using **MDAnalysis** package in Python.
 - **FEM and Data-driven Analysis in Investigating Thermal Conductivity of Heterogeneous Material**
 - Conducted **FEM** to study the heterogeneous material heat flux distribution and effective thermal conductivity.
 - Built a heat flux model to predict element-wise heat flux given a material thermal conductivity ratio using **PCA**-based data compression and feed-forward neural network (**FFNN**) regression.
 - Built a thermal conductivity model with a trained convolutional neural network (**CNN**) to directly output the effective thermal conductivity using the ABAQUS heat flux contour as the input.

PUBLICATIONS

- Journal: Graham, J., Subramani, S., Yang, X., Russell, T., Zhang, F., and Keten, S. (2025). “Charting the Envelope of Mechanical Properties of Synthetic Silk Fibers through Predictive Modeling of the Drawing Process.” *Sci. Adv.* 11, eadr3833.
- Journal: Yang, X., Leng, J., Sun, C., and Keten, S. (2025). “Highly Ordered 2D Open Lattices Through Self-Assembly of Magnetic Units.” *Adv. Funct. Mater.* 2412326.
- Journal: Yang, X., and Keten, S. (2023). “Emergent Elasticity Relations for Networks of Bars with Sticky Magnetic Ends.” *Extreme Mech. Lett.* 65: 102093.
- Journal: Yang, X., Leng, J., Sun, C., and Keten, S. (2023). “Self-assembled Robust 2D Networks from Magneto-elastic Bars.” *Adv. Mater. Technol.* 2202189.
- Journal: Cui, Y., Yang, X., Liu, H., and Yamada, S. (2022). “Seismic behavior of steel space truss connections to reinforced concrete supporting columns.” *Adv. Struct. Eng.* 25(8): 1714-29.
- Journal: Yang, X., and Keten, S. (2021). “Multi-Stability Property of Magneto-Kresling Truss Structures.” *ASME. J. Appl. Mech.* 88(9): 091009.

CONFERENCE ABSTRACTS

- Graham, J., Yang, X., and Keten, S. (December 2023). “Extensional Flow Induces Order and Improves Fiber Mechanical Properties Over Shear Flow in Spider Silk.” 9th International Conference on Mechanics of Biomaterials & Tissues.
- Yang, X. and Keten, S. (June 2023). “Healable Magneto-elastic Networks from Self-assembly with Tunable Network Patterns and Mechanical Properties.” Engineering Mechanics Institute Conference 2023, Atlanta, GA.
- Yang, X., Leng, J., Sun, C., and Keten, S. (March 2023). “Healable Self-assembled Magneto-elastic Networks with Robust Mechanical Properties.” American Physical Society’s March Meeting 2023, Las Vegas, NV.
- Yang, X. and Keten, S. (June 2022). “Engineering Complex Energy Landscapes with Magneto-Elastic Structures.” Engineering Mechanics Institute Conference 2022, Baltimore, MD.

CERTIFICATIONS

- Passed **National PE Civil Structural** Exam, NCEES ID: 18-861-54 *08/2018*
- Engineer in Training (**EIT**), CA *02/2018*