

XIANGYU SUN

Google Scholar: <https://scholar.google.com/citations?user=crHvJ64AAAAJ&hl=en>

RESEARCH INTERESTS

Scientific Machine Learning, Artificial Intelligence, Dynamic Impact, Structural Design, Topology Optimization, High Strain-Rate Experimentation, Computational Mechanics, Uncertainty Quantification.

EDUCATION

Johns Hopkins University, Baltimore, MD, USA *Aug 2015 - Dec 2020*
Ph.D. in Mechanical Engineering, Mechanics of Materials track GPA: A (3.9/4.0)
Ph.D. Thesis: Granular Flow of an Advanced Ceramic under Extreme Multi-axial Loading
Advisor: Prof. KT. Ramesh

Northwestern Polytechnical University, Xi'an, Shaanxi, China *Sep 2009 - May 2015*
B.Eng. in **Aeronautical Engineering**; M.Eng. in **Solid Mechanics** GPA: 89.2/100 (3.8/4.0)
M.S. Thesis: Fabrication and Mechanical Properties of Ultrafine-Grained Titanium
Advisor: Prof. Yulong Li

WORK EXPERIENCES

Northwestern University, IL, USA *July 2026 - Current*
Research Associate (with Prof. Wei Chen)
• Autonomous material discovery with AI.

University of California Irvine, CA, USA *Mar 2024 - Aug 2026*
Postdoctoral researcher (with Prof. Ramin Bostanabad)
• Materials Modeling under Uncertainty.
• Multi-Material and Multi-physics Topology Optimization.

Corning Science & Technology, Painted Post, NY, USA *Jan 2023 - Jan 2024*
Research Scientist, Applied Mechanics Modeling
• Computational and Experimental Analysis of Glasses Reliability.

University of Wisconsin-Madison, Madison, WI, USA *July 2021 - Jan 2023*
Research Associate (with Prof. Christian Franck and Prof. David Henann)
• Mechanical Characterization and Constitutive Modeling of Viscoelastic Foams.

PUBLICATIONS

- **X.Sun**, R. Bostanabad, *et al* "Multi-material Multi-physics Topology Optimization with Physics-informed GP Priors", **Computer Methods in Applied Mechanics and Engineering**, 2026.
- **X.Sun**, A. Yousefpour, *et al* "Compliance Minimization via Physics-Informed Gaussian Processes", **Structural and Multidisciplinary Optimization**, 2025.
- A. Yousefpour, **X.Sun**, *et al* "Localized Physics-informed Gaussian Processes with Curriculum Training for Topology Optimization", **IDETC Conference**, 2025.
- T. Johnson, J. Eweis-Labolle, **X.Sun**, R. Bostanabad, "Simultaneous Calibration of an Arbitrary Number of Multi-response Computer Models", **Journal of Mechanical Design**, 2025.
- J.Tao, **X.Sun**, C. Franck, "Experimental Characterization of the Large Deformation, Time- and Temperature-dependent Constitutive Response of Open-cell Polymer Foams", **Strain** 2023.
- **X.Sun**, K.T. Ramesh, L. Kecskes, "Properties and Hardening Behavior of Equal Channel Angular Extrusion Processed Mg-Al Binary Alloys", **Materials Characterization**, 2023.

- **X.Sun**, K.T. Ramesh, "Effects of particle size, shape and strain rate on the normal compaction of an advanced ceramic", **Powder Technology**, 2023.
- **X.Sun**, K.T. Ramesh, *et al*, "Granular Flow of an Advanced Ceramic under Ultra-high Strain Rates and High Pressures", **Journal of the Mechanics and Physics of Solids** 143 (2020) 104031.
- A.Chauhan, **X.Sun**, K.T.Ramesh, K.Hemker, "Dynamic failure mechanisms of granular boron carbide under multi-axial high-strain-rate loading", **Scripta Mater** 2019.
- **X.Sun**, Y.Guo, Q.Wei, *et al*, "A comparative study on the microstructure and mechanical behavior of titanium: Ultrafine grain vs. coarse grain", **Mater. Sci. Eng. A** 2016.
- Y.Guo, **X.Sun**, Q.Wei, *et al*, "Compressive responses of ultrafine-grained titanium within a broad range of strain rates and temperatures", **Mech. Mater** 2017.

PUBLICATIONS (UNDER REVIEW OR IN PREPARATION)

- **X.Sun**, R. Bostanabad, *et al* "Scalable Stress-Constrained Neural Topology Optimization via Additive Gradients", *to be submitted to CMAME*.
- **X.Sun**, C. Franck, *et al* "Thermoviscoelastic Characterization of an Open-cell Polyurethane Foam under a Variety of Loading Rates and Temperatures", *to be submitted to JMPS*.
- S.Hosseinmardi, **X.Sun**, *et al* "On the Importance of Geometric Nonlinearity and Temperature-Dependent Properties in Multi-Material Thermo-Mechanical Topology Optimization", *submitted to Journal of Mechanical Design*.

FELLOWSHIP & AWARDS

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| American Academy of Mechanics Travel Fellowship , U.S. National Congress on Theoretical and Applied Mechanics, Pasadena, CA | 2026 |
| Paper of Distinction , International Design Engineering Technical Conferences | 2025 |
| Travel Award , 44th International Conference and Expo on Advanced Ceramics & Composites | 2020 |
| Graduate Fellowship , Johns Hopkins University | 2015 - 2016 |

CONFERENCE & PRESENTATIONS

- **Invited seminar talk** for USACM Student Chapter, "**Multi-material Multi-physics Topology Optimization with Physics-informed Gaussian Process Priors**", Dec 2025.
- *Engineering Mechanics Institute Conference*, "**Compliance Minimization via Physics-informed Gaussian Processes**", Anaheim, CA, Jun 2025.
- 2022 SEM Annual Conference and Exposition on Experimental and Applied Mechanics, "**Temperature-rate-dependent Viscoelastic Foam: Characterization and Model**", Pittsburgh, PA, Jun 2022.
- 19th U.S. National Congress on Theoretical and Applied Mechanics, "**Temperature-rate-dependent Viscoelastic Foam: Characterization and Model**", Austin, Texas, Jun 2022.
- 44th International Conference and Expo on Advanced Ceramics and Composites, "**Particle Size Effect on Dynamic Granular Flow of Boron Carbide**" with , Daytona Beach, FL, Jan 2020.
- 43rd International Conference and Expo on Advanced Ceramics and Composites, "**Extreme Fast Granular Flow of Boron Carbide by Pressure Shear Plate Impact**", Daytona Beach, FL, Jan 2019.
- 21st Biennial Conference of the APS Topical Group on Shock Compression of Condensed Matter, "**Shear Enhanced Dynamic Compaction of a Granular Ceramic**", Portland, OR, Jun 2019.

- *42nd International Conference and Expo on Advanced Ceramics and Composites*, "**High Strain Rate Multi-axial Loading Behavior of Granular Phase Boron Carbide**", Daytona Beach, FL, Jan 2018.
- *2018 SEM Annual Conference and Exposition on Experimental and Applied Mechanics*, "**High Strain Rate Multi-axial Loading Behavior of Granular Boron Carbide**", Greenville, SC, Jun 2018.

TEACHING EXPERIENCE

- **Lecturer, Continuum Theories (2025 Spring)**: Taught two lectures about dynamic computational mechanics and nonlinear constitutive models to the graduate students.
- **Teaching Assistant, Stress Wave and Shock (2020 Spring)**: Led office hours, graded all homework and computation projects, and supported students with questions related to stress-wave propagation.
- **Teaching Assistant, Applied Finite Element Analysis (2019 Fall)**: Graded homework and exams, delivered computer lab sessions on implementing ABAQUS analyses for team projects.
- **Teaching Assistant, Mechanics of Solids and Materials (2017 Fall)**: Held regular and individual office hours, graded all assignments, and helped students master core concepts in solid mechanics.
- **Mentor, Research and Engineering Apprenticeship Program (REAP) (2017 Summer)**: Provided one-on-one training to a high school student on plate-impact experiments, fostered curiosity in science, encouraged critical thinking and effective communication, and guided the student in delivering a successful final presentation.

RESEARCH HIGHLIGHTS

Topology Optimization with Physics-informed Machine Learning *July 2024 - current*

- Developed a mesh-free physics-informed machine learning framework for topology optimization.
- Utilized Gaussian Processes for solving boundary value problems as a surrogate of FEM.
- Implemented continuous adjoint analysis for sensitivity analysis of non-self adjoint problems.
- Obtained optimum topologies for multi-physics, multi-material designs under thermo-mechanical loads.

Characterization and constitutive modeling of viscoelastic soft foam materials *July 2021 - Jan 2023*

- Designed an environmental chamber to control temperature (-20°C to 50°C) around specimens.
- Utilized digital imaging correlation (DIC) for full-field measurements during loading.
- Obtained temperature and rate-dependent properties of viscoelastic foam materials.
- Developed a novel constitutive model for highly nonlinear viscoelastic porous foams.

Extremely fast granular flow of ceramic powders under large pressures *Aug 2015 - Nov 2020*

- Investigated granular flow of boron carbide powders with varying particle sizes.
- Conducted plate impact experiments on powders under ultra-high rates and large pressures.
- Employed laser interferometry technique for velocity measurements during plate impact.
- Conducted SEM characterization to capture particle fragmentation after the impact.

REFERENCES

- Prof. Ramin Bostanabad, University of California Irvine, raminb@uci.edu
- Prof. K.T. Ramesh, Johns Hopkins University, ramesh@jhu.edu
- Prof. Christian Franck, University of Wisconsin-Madison, cfranck@wisc.edu
- Prof. David Henann, Brown University, david_henann@brown.edu
- Prof. Laszlo Kecskes, Johns Hopkins University, lkecske1@jhu.edu