Siddhartha Srivastava

sidsriva@auburn.edu | Department of Aerospace Engineering, Auburn University
QuAC Group | Google Scholar

EDUCATION

University of Michigan, Ann Arbor Jan 2016 – Apr 2021
Ph.D. and M.S.E. in Aerospace Engineering, M.S. in Mathematics
Thesis: Graph-theoretic algorithms adaptable to quantum computing
Advisor: Prof. Veera Sundararaghavan

Indian Institute of Technology Kanpur Jul 2010 – Aug 2015
B.Tech–M.Tech Dual Degree in Aerospace Engineering
Thesis: Constitutive modeling of rubber-like materials
Advisor: Prof. Chandra Shekhar Upadhyay

ACADEMIC APPOINTMENTS

Assistant Professor Aug 2025 – Present
Department of Aerospace Engineering, Auburn University
Quantum Algorithms and Continuum Physics (QuAC) Group
141 Engineering Dr, Auburn, AL 36849

Visiting Scholar Mar 2025 – Aug 2025
Senior Research Associate Jan 2024 – Dec 2024
Department of Aerospace and Mechanical Engineering, University of Southern California
Computational Physics Group (Prof. Krishna Garikipati)
3650 McClintock Ave, Los Angeles, CA 90089

Assistant Research Scientist Dec 2022 – Dec 2023
Research Fellow May 2021 – Nov 2022
Affiliated Faculty, Michigan Institute for Computational Discovery and Engineering (MICDE)
Affiliated Faculty, Michigan Institute for Data Science (MIDAS)
Department of Mechanical Engineering, University of Michigan, Ann Arbor
Computational Physics Group (Prof. Krishna Garikipati)
G.G. Brown Laboratory, 2350 Hayward Street, Ann Arbor, MI 48109

RESEARCH INTERESTS

- Quantum Computing
- Computational Continuum Mechanics
- Physics-Informed Machine Learning
- Multiscale Modeling and High-Performance Computing

PUBLICATIONS

Publications: 21 journal articles, 5 conference papers
Research Areas: Quantum Computing, Computational Mechanics, Scientific Machine Learning

Peer-Reviewed Journal Articles

[J1] Huang, C., S. Srivastava, K. K. Ho, K. E. Luker, G. D. Luker, X. Huan, and K. Garikipati. "FP-IRL: Fokker–Planck inverse reinforcement learning — A physics-constrained approach to Markov decision processes". *Computer Methods in Applied Mechanics and Engineering* 458 (2026): 119010. https://doi.org/10.1016/j.cma.2026.119010.

[J2] Livingston, E., S. Srivastava, J. Holber, H. M. Mourad, and K. Garikipati. "Inference of phase field fracture models". *Journal of the Mechanics and Physics of Solids* 209 (2026): 106495. https://doi.org/10.1016/j.jmps.2025.106495.

[J3] Villacís Núñez, C. N., S. Srivastava, U. Scheven, A. Bedi, K. Garikipati, and E. M. Arruda. "Constitutive parameter inference using physics-informed full volume inverse modeling of intact and torn rotator cuff tendons". *Journal of the Mechanics and Physics of Solids* (2026): 106668. https://doi.org/10.1016/j.jmps.2026.106668.

[J4] Srivastava, S., P. C. Kinnunen, Z. Wang, K. K. Y. Ho, B. A. Humphries, S. Chen, J. J. Linderman, G. D. Luker, K. E. Luker, and K. Garikipati. "Inference of weak-form partial differential equations describing migration and proliferation mechanisms in wound healing experiments on cancer cells". *PLoS Comput Biol* 21, no. 10 (Oct. 2025): e1013607. https://doi.org/10.1371/journal.pcbi.1013607.

[J5] Folk, T., S. Srivastava, D. Price, K. Garikipati, and B. Kochunas. "Analytic Error Analysis of the Partial Derivatives Cross-Section Model—I: Derivation". *Nuclear Science and Engineering* 198, no. 11 (Mar. 2024): 2080–2095. https://doi.org/10.1080/00295639.2023.2288308.

[J6] Folk, T., S. Srivastava, D. Price, K. Garikipati, and B. Kochunas. "Analytic Error Analysis of the Partial Derivatives Cross-Section Model—II: Numerical Results". *Nuclear Science and Engineering* 198, no. 11 (Feb. 2024): 2096–2119. https://doi.org/10.1080/00295639.2024.2303544.

[J7] Kinnunen, P. C., K. K. Y. Ho, S. Srivastava, C. Huang, W. Shen, K. Garikipati, G. D. Luker, N. Banovic, X. Huan, J. J. Linderman, and K. E. Luker. "Integrating inverse reinforcement learning into data-driven mechanistic computational models: a novel paradigm to decode cancer cell heterogeneity". *Frontiers in Systems Biology* 4 (Mar. 2024). https://doi.org/10.3389/fsysb.2024.1333760.

[J8] Srivastava, S., and K. Garikipati. "Pattern formation in dense populations studied by inference of nonlinear diffusion-reaction mechanisms". *International Journal for Numerical Methods in Engineering* 125, no. 12 (Mar. 2024). https://doi.org/10.1002/nme.7475.

[J9] Ho, K. K. Y., S. Srivastava, P. C. Kinnunen, K. Garikipati, G. D. Luker, and K. E. Luker. "Oscillatory ERK Signaling and Morphology Determine Heterogeneity of Breast Cancer Cell Chemotaxis via MEK-ERK and p38-MAPK Signaling Pathways". *Bioengineering* 10, no. 2 (Feb. 2023): 269. https://doi.org/10.3390/bioengineering10020269.

[J10] Srivastava, S., and V. Sundararaghavan. "Generative and discriminative training of Boltzmann machine through quantum annealing". *Scientific Reports* 13, no. 1 (May 2023). https://doi.org/10.1038/s41598-023-34652-4.

[J11] Duschenes, M., S. Srivastava, and K. Garikipati. "Numerical analysis of non-local calculus on finite weighted graphs, with application to reduced-order modeling of dynamical systems". A Special Issue in Honor of the Lifetime Achievements of J. Tinsley Oden, *Computer Methods in Applied Mechanics and Engineering* 402 (2022): 115513. https://doi.org/10.1016/j.cma.2022.115513.

[J12] Nikolov, D. P., S. Srivastava, B. A. Abeid, U. M. Scheven, E. M. Arruda, K. Garikipati, and J. B. Estrada. "Ogden material calibration via magnetic resonance cartography, parameter sensitivity and variational system identification". *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 380, no. 2234 (Aug. 2022). https://doi.org/10.1098/rsta.2021.0324.

[J13] Srivastava, S., and V. Sundararaghavan. "Bandgap optimization in combinatorial graphs with tailored ground states: application in quantum annealing". *Optimization and Engineering* 24, no. 3 (Aug. 2022): 1931–1949. https://doi.org/10.1007/s11081-022-09758-9.

[J14] Zhang, X., G. Teichert, Z. Wang, M. Duschenes, S. Srivastava, E. Livingston, J. Holber, M. F. Shojaei, A. Sundararajan, and K. Garikipati. "mechanoChemML: A software library for machine learning in computational materials physics". *Computational Materials Science* 211 (Aug. 2022): 111493. https://doi.org/10.1016/j.commatsci.2022.111493.

[J15] Srivastava, S., M. Yaghoobi, and V. Sundararaghavan. "A graph-theoretic approach for multiscale modeling and prediction of crack propagation in polycrystalline materials". *Engineering Fracture Mechanics* 241 (Jan. 2021): 107406. https://doi.org/10.1016/j.engfracmech.2020.107406.

[J16] Srivastava, S., and V. Sundararaghavan. "Graph Coloring Approach to Mesh Generation in Multiphase Media with Smooth Boundaries". *AIAA Journal* 58, no. 1 (Jan. 2020): 198–205. https://doi.org/10.2514/1.j058357.

[J17] Acosta, K. L., S. Srivastava, W. K. Wilkie, and D. J. Inman. "Primary and secondary pyroelectric effects in macro-fiber composites". *Composites Part B: Engineering* 177 (Nov. 2019): 107275. https://doi.org/10.1016/j.compositesb.2019.107275.

[J18] Srivastava, S., and V. Sundararaghavan. "Box algorithm for the solution of differential equations on a quantum annealer". *Physical Review A* 99, no. 5 (May 2019). https://doi.org/10.1103/physreva.99.052355.

[J19] Lakshmanan, A., S. Srivastava, A. Ramazani, and V. Sundararaghavan. "Thermal conductivity of pillared graphene-epoxy nanocomposites using molecular dynamics". *Applied Physics Letters* 112, no. 15 (2018). https://doi.org/10.1063/1.5022755.

[J20] Acar, P., S. Srivastava, and V. Sundararaghavan. "Stochastic design optimization of microstructures with utilization of a linear solver". *AIAA Journal* 55, no. 9 (2017): 3161–3168. https://doi.org/10.2514/1.J056000.

[J21] Sundararaghavan, V., and S. Srivastava. "MicroFract: An image based code for microstructural crack path prediction". *SoftwareX* 6 (2017): 94–97. https://doi.org/10.1016/j.softx.2017.04.002.

Preprints

[P1] Holber, J., S. Srivastava, and K. Garikipati. *Equivariant graph neural network surrogates for predicting the properties of relaxed atomic configurations*, 2026. https://doi.org/10.48550/arXiv.2505.08121.

Conference Papers

[C1] Folk, T., D. Price, B. Kochunas, S. Srivastava, and K. Garikipati. "Analytic error analysis of cross section interpolation methods in nodal diffusion codes-I: Theory". In *Proceedings of the international conference on physics of reactors-PHYSOR 2022*, 1282–1291. 2022. https://doi.org/10.13182/PHYSOR22-37828.

[C2] Folk, T., D. Price, B. Kochunas, S. Srivastava, and K. Garikipati. "Analytic error analysis of cross section interpolation methods in nodal diffusion codes-II: Numerical results". In *Proceedings of the international conference on physics of reactors-PHYSOR 2022*, 1292–1301. 2022. https://doi.org/10.13182/PHYSOR22-37832.

[C3] Price, D., T. Folk, S. Srivastava, K. Garikipati, and B. Kochunas. "Sensitivity Analysis of Homogenized Cross Sections in AP1000 Lattices". In *International Conference on Physics of Reactors 2022 (PHYSOR 2022)*, 1286–1295. PHYSOR22. American Nuclear Society, 2022. https://doi.org/10.13182/physor22-37383.

[C4] Srivastava, S., and V. Sundararaghavan. "An integer programming approach for mesh generation for polycrystals using the EBSD map". In *AIAA Scitech 2019 Forum*. American Institute of Aeronautics / Astronautics, Jan. 2019. https://doi.org/10.2514/6.2019-0966.

[C5] Acar, P., S. Srivastava, and V. Sundararaghavan. "Stochastic design optimization of microstructures with utilization of a linear solver". 2017. https://doi.org/10.2514/6.2017-1939.

RECENT TALKS

† Invited

1.† **Srivastava S** , *"Data-Driven Inverse Methods and Physics-Informed Learning for Complex Material Behavior and Transport"*, University of Utah, Salt Lake City, Jan 2025.

2. **Srivastava S**, Livingston E, Duschenes M, Garikipati K. *"Graph Calculus Neural Network for Representation of Physical Systems"*, 17^{th} USNCCM, Albuquerque, July 2023.

3.† **Srivastava S** , *"Data-driven inference of constitutive theories for complex materials"*, Corning, July, 2023.

4. **Srivastava S**, Livingston E, Duschenes M, Garikipati K. *"Graph Calculus Neural Network for Representation of Physical Systems"*, 17^{th} USNCCM, Albuquerque, July 2023.

5. **Srivastava S**, Huang C, Huan X, Garikipati K. *"Discovery of Cell Migration Models by Data Driven Variational System Identification and Inverse Reinforcement Learning"*, US-ACM Workshop on Establishing Benchmarks for Data-Driven Modeling of Physical Systems, University of Southern California, Los Angeles, April 2023.

6.† **Srivastava S**, Wang Z, Nikolov DN, Abeid BA, Scheven UM, Arruda EM, Weickenmeier J, Estrada JB, Garikipati K. *"Data-Driven Approach to Discovery of Physical Mechanisms in Biomechanical Systems"*, SES, College Station, Texas, October 2022.

7. **Srivastava S**, Duschenes M, Livingston E, Garikipati K. *"Reduced-order models using non-local calculus on unstructured weighted graphs"*, USNCTAM 19, Austin, Texas, July 2022.

8.† **Srivastava S**, Sundararaghavan V, *"Graph Theory Model for Fatigue Crack Path Modeling"*, PRISMS Center Annual Workshop, University of Michigan, Ann Arbor, August 2021.

9.† **Srivastava S** , *"Graph-theoretic methods in computational mechanics adaptable to Quantum annealers"*, California State University, Long Beach, March 2021.

TEACHING

AERO 7600: Aerospace Solid Mechanics Auburn University, Spring, 2026
AERO 7450: Aerospace Engineering Analysis Auburn University, Fall, 2025

Students Supervised

- Nirajan Prasad Gupta – Ph.D. Student, Auburn University (Fall 2026–Present)
- Jobait Alam Jitu – Ph.D. Student, Auburn University (Fall 2026–Present)

Member of Ph.D. dissertation committee, Aerospace Engineering, Auburn University

2026: Karan Sah, Robin Weaver, Stefanus Harris Putra

Member of Qualifying-exam committee, Aerospace Engineering, Auburn University

2026: Shafi Shahriar
2025: Robin Weaver, Karan Sah, Ethan Hofer, Mathew Hooks, Zachary Moore

SERVICE

Major committee assignments in the Department, College, and/or University

- Committee member, Graduate recruitment and admissions subcommittee
- Committee member, High performance computing committee
- Department representative, College AIE2 committee

Journal Review Service

International Journal of Mechanical Sciences; IOP Journal of Physics D: Applied Physics; Journal of Computational Physics; Applied Physics Letters ; Quantum Science and Technology; The Journal of The Minerals, Metals & Materials Society; Scientific Report (Nature Springer); Research: a Science Partner Journal; Computer Methods in Applied Mechanics and Engineering; Computational Materials Science; AIAA Journal.

Conference Review Service

Turbo Expo 2023 (ASME), SciPy 2022 (Scientific Computing with Python), WCCM/ECCOMAS 2021

Proposal Review Service

- Reviewer for DOE Advanced Scientific Computing Research, Early-Career Research Program (DOE-ASCR-ECRP), 2025

Other Service

- Mini-symposium chair for USNCTAM, July 2026, *Session: Quantum Algorithms for Forward and Inverse Problems in Computational Mechanics*
- Judge, Senior Division, State of Alabama Science and Engineering Fair, April 2026
- Panel Judge, Advanced Graduate Research session, Engineering Research Symposium, 2021
- Reviewer, Outstanding Postdoctoral Fellow Award 2021, Rackham Graduate School
- Mini-symposium co-chair for WCCM/ECCOMAS, Jan 2021, *Session: New Computational Frontiers in Microstructure-Sensitive Materials Design*

AWARDS AND HONORS

- Awarded 100 hour computation time on the Quantum Computer in the USRA-NASA-Google Quantum Artificial Intelligence Laboratory at NASA's Ames Research Center.
- Rackham Professional Development Diversity, Equity, and Inclusion Certificate (2022)
- Merit-based scholarship for graduate assistantship in Aerospace Dept. at IIT Kanpur covering monthly stipend for 1 year.
- Three Rackham travel grants to attend USNCCM, ESMC and TMS conferences.
- Two Dean of Research and Alumni travel grants to attend ESMC and ICIUS conferences.

REFERENCES

Available upon request.