

# Yazhuo Liu

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## Education

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| <b>Southern University of Science and Technology</b> , Shenzhen, China<br><i>B.Sc. in Theoretical and Applied Mechanics</i> | Sep. 2017 – Jun. 2021 |
| <b>Georgia Institute of Technology</b> , Atlanta, USA<br><i>Ph.D. in Mechanical Engineering</i>                             | Jan. 2022 – Now       |

## Experience

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| <b>Cornell University</b> , Ithaca, New York<br><i>Summer Research Intern. Advisor: Prof. Chung-Yuen Hui</i>                    | Jun. 2020 – Sep. 2020 |
| <b>Southern University of Science and Technology</b> , Shenzhen, China<br><i>Research Assistant. Supervisor: Prof. Wei Hong</i> | Jul. 2021 – Dec. 2021 |
| <b>Georgia Institute of Technology</b> , Atlanta, USA<br><i>Instructor. Teaching COE3001 - Deformable Bodies</i>                | Aug. 2025 – May. 2026 |

## Publications

- Liu, Y.**, Zhang, Y., Ding, K., Yang, Y., Barrios, A., Maeder, X., Pierron, O., Liu, X.\*, & Zhu, T.\* (2026). Phase-field modeling of abnormal grain growth. *Acta Materialia* (in progress)
- Liu, Y.**, Ding, K., Birnbaum, A. J., Rawlings, A., Sun, A., Chen, W., McDowell, D. L., Michopoulos, J. G., & Zhu, T.\* (2026). Surface plasticity in laser scanning of metals. *Acta Materialia*, 302, 121667.
- Liu, Y.**, Feng, X., & Hong, W.\* (2023). Non-affine dissipation in polymer fracture. *Extreme Mechanics Letters*, 59, 101955.
- Liu, Y.**, Hui, C.-Y., & Hong, W.\* (2021). A clean cut. *Extreme Mechanics Letters*, 46, 101343.

## Patents

- CN Patent No. CN202020206173.X: “Logistics Unmanned Aerial Vehicle”, October 27, 2020. (Shared)

## Presentations

- TMS 2024 Annual Meeting & Exhibition** - oral presentation. “*Crystal plasticity modeling of thermo-elastic-plastic deformation during laser-based additive manufacturing*”, Orlando, Florida, USA
- 2025 SES Annual Technical Meeting** - oral presentation. ‘*Abnormal grain growth under cyclic loading*’, Atlanta, Georgia, USA
- 2025 Physical Metallurgy Gordon Research Conference** - poster. “*Driving force of abnormal grain growth*”, Easton, Massachusetts, USA

## Awards & Honors

- *SUSTech Summa Cum Laude Graduates*, 2021.
- *CSTAM Finite Element Modeling Competition*, Third Prize, 2019.
- *COMAC 3D Printing Structure Optimization Competition*, Third Prize, 2018.
- *SUSTech Excellent Student*, First Class, 2018, 2019, 2020.

## Projects

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| <b>Dislocation-defect interaction in irradiated low alloy steel</b>   | Aug. 2025 - now       |
| <ul style="list-style-type: none"><li>Reviewed the radiation embrittlement in low alloy steel</li><li>Project details are confidential.</li></ul>   |                       |
| <b>Stress induced phase separation of Li dendrite in LLZTO solid-state electrolyte</b>  | Apr. 2025 - now       |
| <ul style="list-style-type: none"><li>Identified an early-stage, mesh-pattern morphology of Li dendrite growth in LLZTO under low-current short-circuit conditions through experimental observations.</li><li>Developed a phase-field model to capture the stress-assisted phase separation and self-organization of Li and the subsequent evolution of the dendritic network structure.</li><li>Revealed that the formation of the mesh-pattern arises from the minimization of elastic energy and the surface energy due to dendrite growth.</li></ul>  |                       |
| <b>Laser-scanning-induced plastic deformation in metal 3D printing</b>  | Apr. 2023 - Aug. 2025 |
| <ul style="list-style-type: none"><li>Investigated the influence of laser scanning on stress and plastic strain evolution in Ni single crystals, visualizing plastic deformation through surface slip traces and dislocation patterns.</li><li>Developed a temperature-dependent crystal plasticity finite element (CPFE) model to simulate thermal effects and plastic deformation during laser scanning along various directions.</li><li>Validated the CPFE model with experimental data, providing insights into controlling thermo-mechanical responses in laser-based additive manufacturing.</li></ul>   |                       |
| <b>Abnormal grain growth in ultra-fine grained metals</b>   | Sep. 2022 - Aug. 2025 |
| <ul style="list-style-type: none"><li>Developed a micromechanics-based analytical solution to predict grain boundary motion in thin-film metals using local stress-strain and crystallographic data.</li><li>Utilized continuum phase field modeling to simulate multi-grain systems, capturing spatial and temporal evolution of grain structures under various loading conditions.</li><li>Validated the phase field model through comparisons with analytical predictions and experimental data, demonstrating its accuracy in predicting grain growth behavior.</li></ul>   |                       |
| <b>Energy dissipation mechanism in polymer fracture</b>   | Feb. 2021 – Dec. 2021 |
| <ul style="list-style-type: none"><li>Revealed a significant energy dissipation mechanism in polymeric fracture, attributed to non-affine deformation near the crack tip, beyond traditional viscoelastic hysteresis.</li><li>Demonstrated that reducing inter-chain friction through methods like lateral stretching or solvent dilution lowers fracture energy to intrinsic thresholds, while cyclic training maintains high fracture toughness.</li><li>Identified non-affine dissipation as a key factor for developing soft materials with superior elasticity and fracture resistance, offering new design principles for advanced materials.</li></ul> |                       |
| <b>Effect of Friction in Cutting Soft Solids</b>  | Jun. 2020 – Jun. 2021 |
| <ul style="list-style-type: none"><li>Investigated the role of friction and slicing motion in cutting soft solids, revealing how friction influences stress distribution and fracture initiation during the process.</li><li>Developed a numerical model to analyze frictional contact and stress diversion, demonstrating how slicing minimizes vertical resistance and facilitates clean cutting.</li><li>Studied the energetics of cutting by computing the energy landscape, showing that friction reduction lowers the energy barrier for crack opening and enhances cutting efficiency.</li></ul>   |                       |