Department of
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Advancing Metal Additive Manufacturing: Process Optimization, Data-Driven Modeling, and Composition Control

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Abstract

In recent decades, metal additive manufacturing (AM) has seen rapid advancements, offering transformative potential in aerospace, automotive, biomedical, and other industries. Despite this progress, widespread adoption remains limited by persistent challenges in process stability, quality control, and material property optimization. In this talk, I will present my research on advancing the process development of metal AM through three key areas. First, I will discuss a simulation-guided approach for site-specific optimization of process parameters, enhancing precision and consistency in AM processes. Second, I will introduce a physics-informed machine learning framework that integrates fundamental physics with experimental data to achieve efficient and accurate process modeling. Finally, I will present the development of a novel hybrid additive manufacturing technique that enables 3D compositional grading, unlocking new possibilities for fabricating multi-material components with tailored properties.

About the Speaker

Shuheng Liao is a postdoctoral associate in the Department of Mechanical Engineering at the Massachusetts Institute of Technology, working with Prof. John Hart. He earned his B.S. in Mechanical Engineering from Shanghai Jiao Tong University in 2018 and completed his Ph.D. in Mechanical Engineering at Northwestern University in 2023 under the guidance of Prof. Jian Cao. His research focuses on developing pioneering solutions to enhance the process capability and controllability of metal additive manufacturing. His expertise spans computational modeling, physics-informed machine learning, and in-situ process control for additive manufacturing processes.

Enquiry: 3442 8422 | All are welcome