Qiang Huang, Professor, Fellow of IISE and ASME

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Los Angeles

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Location: Melcher Hall 180

Engineering-Informed Machine Learning for Additive Manufacturing Accuracy Control

Abstract: As a trend of future manufacturing (FM), consumer demand increasingly shifts to personalization and customization. One key technological barrier is to ensure quality and reduce costs for low-volume production of a huge variety of products. Transforming experience-driven quality control (QC) into fabrication-aware, computation-driven QC is at the forefront of technological competition in FM. Physical modeling and simulation of AM is still computationally prohibitive for timely QC. Applying popular AI techniques to automate QC not only demands large amounts of costly AM data, but also falls short of gaining engineering insights for knowledge generalization and adaptation. This talk presents engineering-informed machine learning research for AM. Topics include domain-informed convolution modeling and learning of layer-by-layer fabrication for shape accuracy prediction; optimal compensation of 3D shape deviation; and engineering-informed transfer learning based on effect equivalence.

Biography: Dr. Qiang Huang is currently a Professor at the Daniel J. Epstein Department of Industrial and Systems Engineering, University of Southern California (USC), Los Angeles. His research focuses on AI and Machine Learning for Manufacturing, in particular, Machine Learning for Additive Manufacturing (ML4AM). He was the holder of Gordon S. Marshall Early Career Chair in Engineering at USC from 2012 to 2016. He received IISE Fellow and ASME Awards, NSF CAREER award, and 2021 IEEE CASE Best Conference Paper Award, 2013 IEEE Transactions on Automation Science and Engineering Best Paper Award, among others. He has five patents on ML4AM. He is a Department Editor for IISE Transactions and an Associate Editor for ASME Transactions, Journal of Manufacturing Science and Engineering.