USCViterbi
Center for Advanced Manufacturing

Advanced Manufacturing Seminar Series
Friday, October 9, 2020
10:00 AM – 11:30 AM (Pacific Time)
Registration link: https://usc.zoom.us/webinar/register/WN_wxCrLd9yTaCOQH81EMMvSA

Engineering-Informed Machine Learning for Shape Distortion Control in Additive Manufacturing

Dr. Qiang Huang

Professor, Daniel J. Epstein Department of Industrial and Systems Engineering
University of Southern California

Abstract: Geometric shape accuracy is an important quality measure for products built by additive manufacturing (AM) processes. With increased availability of AM product data and advances in computing, Machine Learning for AM (ML4AM) has become a viable strategy for enhancing printing performance. We propose a Shape Deviation Generator (SDG) under an engineering-informed convolution formulation to facilitate the learning and prediction of 3D printing accuracy. Shape deviation representation, individual layer input function and transfer function for the convolution formulation are proposed and derived. A deconvolution problem for identifying the convolution kernel is formulated to captures the inter-layer interaction effects in the layer-by-layer fabrication processes. The printed 2D and 3D shapes via a stereolithography (SLA) process are used to demonstrate the proposed modeling framework and derive new process insights for AM processes.

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. He was the holder of Gordon S. Marshall Early Career Chair in Engineering at USC from 2012 to 2016. He received National Science Foundation CAREER award in 2011 and IEEE Transactions on Automation Science and Engineering Best Paper Award from IEEE Robotics and Automation Society in 2014.

He is Department Editor for IISE Transactions, Associate Editor for ASME Transactions, Journal of Manufacturing Science and Engineering, and a member of Editorial Board for Journal of Quality Technology. He also served an Associate Editor for IEEE Transactions on Automation Science and Engineering and for IEEE Robotics and Automation Letters.