MSE SEMINAR

March 3, 2017
113 McBryde Hall
3:30 – 4:30 PM
Refreshments at 3:00 PM

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"Enabling Component-scale Prediction in Additive Manufacturing by Integration of Physics-based and Data-driven Modeling"

Abstract

This research aims to achieve the layer to layer temperature monitoring and consequently predict the temperature distribution for any new freeform geometry. An engineering statistical synergistic model is proposed to integrate the pure statistical and finite element analysis (FEA) simulation models, which is physically meaningful as well as accurate for temperature prediction. Besides, this proposed synergistic model contains geometry information, which can be applied to any freeform geometry. This research serves to enable a holistic cyber physical systems-based approach for the additive manufacturing (AM) not only restricted in FDM process but also can be extended to powder-based process like laser engineered net shaping (LENS) and selective laser sintering (SLS). This research as well as the scheduled future works will make affordable customized AM (customized geometries and materials) possible, which will greatly accelerate the transition from rapid prototyping to rapid manufacturing. This research demonstrates a first evaluation of engineering statistical synergistic model in AM technology, which gives a perspective on future researches about online quality monitoring and control of AM based on data fusion principles.

Biosketch

Jingran Li is a PhD student in Grado Department of Industrial and Systems Engineering, who is simultaneously pursing her M.S. degree in Material Science and Engineering under the guidance of Prof. Hang Yu. She received her B.S. degree in Astronautics Engineering in Beihang University, China in May 2015. Her research is mainly focused on finite element analysis of additive manufacturing parts and Bayesian calibration of engineering model.