MSE SEMINAR
March 16, 2018
113 McBryde Hall
3:30 – 4:30 PM
Refreshments at 3:00 PM

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"Bayesian Calibration for Mesoscale Materials Design"

Abstract

Mesoscale design refers to the variation in material composition or property at the scale range of 0.1-1mm. While some previous efforts in mesoscale design focuses on statistically homogeneous material systems, another point of interest is controlling the distribution of material pattern to create macroscopically heterogeneous properties. With the aid of multi-material additive manufacturing, control of material distribution at a voxel is allowed. Given this capability, we can try to answer the question of designing a mesostructured material system. We have developed a framework integrating simulations enabled by finite element analysis, observations drawn from digital image correlation, and statistical methods of Bayesian inference. The initial task of consists of formulating accurate predictions of the mechanical response of the mesostructure. Since finite element analysis is insufficient in its prediction abilities, we employed a Bayesian calibration technique. Currently we have formulated the emulator model and conducted cross-validation to evaluate the model's predictive capabilities, which will be further improved with the addition of new observation data.

Biosketch

Jee Yun Kim is a master's student in Dr. Hang Yu's research group. He graduated from Virginia Tech with a Bachelors of Science in Material Science & Engineering in 2017.