Emerging Scholars in Engineering Lecture

“ADDITIVE MANUFACTURING: UNCERTAINTY QUANTIFICATION & OPTIMIZATION”

DR. PAROMITA NATH

POSTDOCTORAL SCHOLAR
CIVIL & ENVIRONMENTAL ENGINEERING
VANDERBILT UNIVERSITY

ABSTRACT

Additive manufacturing (AM), commonly known as 3D printing, has shown immense potential in several industries. However, significant variability in the product quality currently hinders widespread use of AM. This presentation will focus on uncertainty quantification and optimization in AM to help solve this challenge by integrating physics-model based prediction with experiments for the manufacturing process. Various sources of uncertainty are considered, such as model parameter uncertainty, model discrepancy, and measurement uncertainty. The overall uncertainty in the AM process and the relative contributions of different sources to the overall uncertainty regarding the quality of the AM product are quantified. Uncertainty reduction through model calibration and process optimization is also addressed. Efficient surrogate models are constructed to replace the expensive coupled multi-scale multi-physics simulation models for the uncertainty analysis. Laboratory experiments are conducted to validate the process parameter optimization results.

BIOGRAPHY

Paromita Nath received her B.E. in Civil Engineering from Assam Engineering College, Guwahati, India, and her M.E. in Structural Engineering from BITS Pilani, Hyderabad, India. She completed her Ph.D. in Civil Engineering at Vanderbilt University. Her research interests include uncertainty quantification, model calibration and validation, machine learning, and additive manufacturing. Currently, Dr. Nath is a postdoctoral scholar at Vanderbilt University.

ZOOM INFORMATION:
https://vanderbilt.zoom.us/j/97164630770?pwd=ZVl2amVtNjMzRjYyV3FRUmdEUHRnZz09
Meeting ID: 971 6463 0770
Passcode: 851642