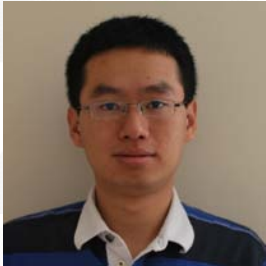


“Bayesian Calibration of Dielectric Charging Model for RF-MEMS Devices”



*You Ling and Joshua Mullins
Sankaran Mahadevan group
Department of Civil & Environmental Engineering
Vanderbilt University*

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Abstract: The Bayesian calibration approach allows for the inclusion of epistemic uncertainty sources (e.g. data and model uncertainty), and it also provides a framework for the aggregation of data of different types that may come from many different sources. Our approach is built upon the Kennedy-O’Hagan calibration framework, which includes a discrepancy term to account for inadequacy in the form of the physics model. The model discrepancy may include both bias and variance corrections, each of which may be either constant or varying with respect to the model inputs. Given that there are many possible choices for this discrepancy, we explore ways of selecting and evaluating among the available options. Our procedure utilizes existing validation metrics (e.g. Bayes factor and the model reliability metric) to inform the decision making process. The overall approach is illustrated using a dielectric charging model described in the previous seminar by Ravi Vedula and Sambit Palit. In particular, this example provides a basis for demonstrating the impact of discrepancy modeling choices.

Speaker Bios:

You Ling is a doctoral student under Prof. Sankaran Mahadevan in the department of civil and environmental engineering at Vanderbilt University. He obtained his bachelor’s degree from Shanghai Jiao Tong University in China and master’s degree from Vanderbilt University. He is currently working on time-dependent reliability analysis of microelectro-mechanical system (MEMS) devices with focus on uncertainty quantification (model calibration, model validation, and uncertainty propagation).

Joshua Mullins is currently a doctoral student under Prof. Sankaran Mahadevan in the department of civil engineering at Vanderbilt University. He has previously received a bachelor’s degree and master’s degree from the same institution. His research interests include calibration, validation, and uncertainty quantification with a particular focus on resource allocation for both physical experiments and computational simulations.