

**Seminar:**10/30/2023

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**Title:** Two recent advances in UQ with Gaussian process models

**Abstract:** Gaussian processes (GPs) are an effective and widely used tools to emulate computer simulations of physical process models for uncertainty quantification (UQ). Over the last 10-15 years, GP modeling of computer simulations has advanced tremendously to handle challenges posed by complex and realistic simulators. We will discuss two recent challenges.

The first challenge is the "zero-problem" -- simulations that result in positive, real-valued output or zero. Such zero-censored data poses a significant obstacle to GP emulators because of both the inherent non-stationary and because GPs have full support. The second challenge we will explore is emulating high-dimensional multi-physics simulations. Here we will combine two recent GP approaches: linked GP emulation (for coupled physical simulations) and parallel partial emulators (PPEs) for emulating simulators with high-dimensional output. The resulting parallel partial linked GP emulator (PPLE) proves an efficient approach to emulate high-dimensional multi-physics simulators.