Title:

Speeding up numerical simulators with emulators

Abstract:

As societies become increasingly connected, the amount of monitoring data grows beyond our capacity to make sensible use of it.
This scenario calls for good computer models to harvest the data and support decision making, which leads scientists and practitioners to apply nonlinear, highly parameterized complex models to their problems.
Unfortunately, this complexity brings about long computation times, which prohibits rigorous sensitivity analysis, optimization, statistical inference, and also real-time control.
The direct consequence of time consuming simulators is less efficient work and the fragility of the results

There are four approaches to address the issue: i) discard systems analysis and intelligent control strategies, ii) work only with utterly simplified models, iii) use high-performance computing, and iv) construct fast surrogate models.
In this talk I will introduce the latter approach, describe its relation to model order reduction, comment on the general-purpose vs.
specific trade off in terms of efficiency of computation, and present some recent advances in emulation methodologies.