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## **SEMINAR OF NUMERICAL ANALYSIS**

➤ **THURSDAY 31 MARCH 2016 - ROOM MA A1 10 - 16h15**

**Dr. Marta D'ELIA** (SANDIA National Laboratories, USA) will present a seminar entitled:

### **“Ensemble grouping strategies for embedded stochastic collocation methods applied to anisotropic diffusion problems”**

Abstract:

It is well known that quantifying uncertainties in computational simulations has become a foundational component of modern, predictive simulation. Accordingly, numerous uncertainty quantification methods have been developed and studied in the literature, including sampling-based methods. However, even with continued progress in this area, that fact remains that applying these methodologies to large-scale scientific computing problems is often prohibitively expensive due to the very large computational cost associated with each sample evaluation. Previous work has demonstrated that propagating groups of samples, called ensembles, together through forward simulations can dramatically reduce the aggregate cost of sampling-based uncertainty propagation methods. Critical to the success of this approach when applied to challenging problems of scientific interest is the grouping of samples into ensembles to minimize the total computational work. For example, the total number of linear solver iterations for ensemble systems may be strongly influenced by which samples comprise the ensemble when applying iterative linear solver methods to parameterized and stochastic linear systems. In this talk we explore sample grouping strategies for local adaptive stochastic collocation methods applied to PDEs with uncertain input data, in particular anisotropic diffusion problems where the diffusion coefficient is modeled by truncated Karhunen-Loeve expansions. We demonstrate that a measure of the total anisotropy of the diffusion coefficient is a good surrogate for the number of linear solver iterations for each sample, and therefore provides a simple and effective metric for grouping samples.

Lausanne, 3 March 2016/FN/cr