

Elisabeth Ullmann

Technical University of Munich, Germany

elisabeth.ullmann@tum.de

The estimation of the probability of rare events is an important task in reliability and risk assessment of critical societal systems, for example, groundwater flow and transport, and engineering structures. In this talk we consider rare events that are expressed in terms of a limit state function which depends on the solution of a partial differential equation (PDE). We present two novel estimators for the rare event probability based on (1) the Ensemble Kalman filter for inverse problems, and (2) a consensus-building mechanism. Both approaches use particles which follow a suitable stochastic dynamics to reach the failure states. The particle methods have historically been used for Bayesian inverse problems. We connect them to rare event estimation.

Joint work with Konstantin Althaus, Fabian Wagner and Iason Papaioannou (TUM).