

Multilevel Monte Carlo Methods with Smoothing

Aretha Teckentrup

University of Edinburgh

`a.teckentrup@ed.ac.uk`

Coauthor(s): Anastasia Istratuca

Parameters in mathematical models are often impossible to determine fully or accurately, and are hence subject to uncertainty. By modelling the input parameters as stochastic processes, it is possible to quantify the uncertainty in the model outputs.

In this talk, we employ the multilevel Monte Carlo (MLMC) method to compute expected values of quantities of interest related to partial differential equations with random coefficients. We make use of the circulant embedding method for sampling from the coefficient, and to further improve the computational complexity of the MLMC estimator, we devise and implement the smoothing technique integrated into the circulant embedding method. This allows to choose the coarsest mesh on the first level of MLMC independently of the correlation length of the covariance function of the random field, leading to considerable savings in computational cost.