



復旦大學
FUDAN UNIVERSITY

Applied Math
Ph.D. Seminar

On multilevel Monte Carlo methods for deterministic and uncertain hyperbolic systems

Speaker: Junpeng Hu (Shanghai Jiao Tong University)

Time: 2023-04-27, 16:10 to 17:00

Location: Rm 1801, Guanghua East Tower

Advisor: Shi Jin

Abstract: This talk reports on the performance of MLMC for deterministic and uncertain hyperbolic systems, where randomness is introduced either in the modeling parameters or in the approximation algorithms. MLMC is a well known variance reduction method widely used to accelerate Monte Carlo (MC) sampling. However, we demonstrate that for hyperbolic systems, whether MLMC can achieve a real boost turns out to be delicate. The computational costs of MLMC and MC depend on the interplay among the accuracy (bias) and the computational cost of the numerical method for a single sample, as well as the variances of the sampled MLMC corrections or MC solutions. We characterize three regimes for the MLMC and MC performances using those parameters, and show that MLMC may not accelerate MC and can even have a higher cost when the variances of MC solutions and MLMC corrections are of the same order.