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THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON APPLIED MATHEMATICS

Numerical method for random Maxwell's equations

By

Prof. Kai ZHANG

Jilin University

Abstract

A numerical method is developed for efficiently computing the mean field and variance of solutions to three-dimensional Maxwell's equations with random interfaces, utilizing shape calculus and pivoted low-rank approximation. By applying perturbation theory and shape calculus, we describe the statistical moments of these solutions in relation to the perturbation magnitude through a first-order shape-Taylor expansion. To achieve high-resolution oscillation capture near the interface, an adaptive finite element method using Nedelec's third-order edge elements of the first kind is employed, solving the deterministic Maxwell's equations with the mean interface to approximate the expected solutions. For computing the second moment, a low-rank approximation based on the pivoted Cholesky decomposition is introduced to efficiently estimate the two-point correlation function and approximate the variance. Numerical experiments are provided to support our theoretical findings.

Date : 25 November 2024 (Monday)
Time : 11:00a.m. – 12:00noon
Venue : Room 4475 (near Lifts 25/26)

All are Welcome!