

Department of Applied Mathematics Seminar

Prof. Jiwei ZHANG

Wuhan University, China

Topic

An approximate-ball-based FEM for nonlocal problems and its matrix-free parallel computation in GPU

Date| Time

18 July 2025 (Friday) | 11:00am – 12:00nn (HK Time)

Venue

TU817

Abstract:

The nonlocal model is a mathematical and physical model established based on nonlocal effects, with peridynamics being a typical example. Peridynamics consistently has been an important research direction in the field of computational mathematics. The finite element implementation of fully three-dimensional nonlocal models involves high-dimensional integrals, enormous computational and storage requirements, thus posing significant computational challenges in various aspects, including algorithm design, mesh generation, data structure optimization, and algorithm architecture for parallel platforms on CPUs and GPUs. This report will briefly introduce our efforts and attempts in developing high-precision finite element algorithms based on the approximation-ball strategy for peridynamics, adaptive mesh algorithms, matrix-free solution algorithms, and their high-performance implementations. Furthermore, these high-performance finite element algorithms will be applied to material fracture simulations based on peridynamics.

ALL ARE WELCOME