数学与系统科学研究院

计算数学所学术报告

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报告题目：

A Two-Scale Multiple Scattering Problem

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上午 **10：00～11：00**

报告地点：　科技综合楼三层 **311**

计算数学所报告厅

Abstract:

Scattering problems play an essential role in many scientific areas such as radar and sonar (e.g., stealth aircraft design and submarine detection), geophysical exploration (e.g., oil and gas exploration), medical imaging (e.g., breast cancer detection), and near-field optical microscopy (e.g., imaging of small scale biological samples). In this talk, we consider the scattering problem of a time-harmonic plane wave incident on a heterogeneous medium consisting of isotropic point (small scale) scatterers and an extended (wavelength comparable) obstacle scatterer in three dimensional space. The motivation arises from the near-field imaging, which is a vigorously developed research field because it provides an effective approach to break the diffraction limit and obtain images with subwavelength resolution.

The classical Foldy-Lax method provides an efficient approach to compute the scattered field from the interaction between the incident wave and the point scatterers; while boundary integral equation methods have been well studied for solving the scattering problem solely involving extended obstacle scatterers. It is a challenging two-scale multiple

scattering problem when both the point scatterers and the extended obstacles are present. We developed a generalized Foldy-Lax method to fully take account of the multiple scattering in the heterogeneous medium. Two different but consistent formulations will be introduced: a series solution formulation and an integral equation formulation. The series solution formulation will be shown as an efficient iterative scheme to the integral equation formulation. The convergence of the scattered fields and the far-field patterns from the series solution formulation will be characterized in terms of scattering coefficients. Numerical experiments will be presented to show the agreement and the effectiveness of the proposed two approaches.

This is joint work with Kai Huang at Florida International University.

欢迎大家参加！