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：

The Unbounded Rough Surface Scattering Problems

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上午 10：00

报告地点： 科技综合楼三层 **311**

计算数学所报告厅

Abstract：

This talk is concerned with the mathematical analysis of the solution for the wave propagation from the scattering by an infinite or unbounded rough surfaces. An unbounded rough surface is referred to as a surface which is a non-local perturbation of an infinite plane surface such that the whole surface lies within a finite distance of the original plane. The unbounded rough surface scattering problems arise from various applications such as modeling acoustic or electromagnetic wave propagation over ground or sea surfaces, optical scattering from the surface of materials in diffractive, near-field, or nano-optics, detection of underground or underwater mines or oil.

The talk consists of two parts. The first part is to consider a time-harmonic electromagnetic field generated by either a magnetic dipole of an electric dipole incident on an infinite rough surface. The scattering problem is modeled as a boundary value problem governed by the Maxwell equations with transparent boundary conditions poposed on plane surfaces with the inhomogeneity in between. The existence and uniqueness of the weak solution will be addressed using a variational approach. The perfectly matched layer (PML) method is investigated to truncated the unbounded domain in the direction away from the rough surfaces. The truncated PML problem will be shown to attain a uniqe solution, which converges exponentially to the original scattering problem. The second part is focused on the case when the scattering surface is a sufficiently small and smooth deformation of a plane surface. Under this assumption, the problem will be equivalently formulated into a set of two-point boundary value problems in the frequency domain. The analytical solution will be deduced by using a boundary perturbation method combined with the transformed field expansion approach.

欢迎大家参加！