# 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：

**Fast multipole method in Layered media**

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上午 **10:30-11:30**

报告地点：　数学院南楼九层

**902** 教室

# Abstract:

**A fast multipole method (FMM) is proposed to compute long-range interactions of wave sources embedded in 3-D layered media. The layered media Green's function for the Helmholtz equation, which satisfies the transmission conditions at material interfaces, is decomposed into a free space component and four types of reaction field component from wave reflections and transmissions through the layered media. The proposed algorithm is a combination of the classic FMM for the free space component and FMMs specifically designed for the four types reaction component, made possible by new multipole expansions (MEs) and local expansions (LEs) as well as the multipole-to-local translation (M2L) operators for the reaction field com-ponents. The FMMs for the reaction components, which are implemented with the target particles and equivalent polarization sources associated with the reaction field components, are found to be much more efficient than that for the free space component due to the fact that the equivalent polarization sources and the target particles are always separated by a material interface. As a result, the FMM algorithm developed for layered media has a similar com-putational cost as that for the free space. Numerical results validate the fast convergence of the MEs and the O(N) complexity of the FMM for interaction of wave sources at low wave number in 3-D layered media.**


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