数学与系统科学研究院

计算数学所学术报告

(定期学术报告)

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报告题目：

Gaussian beam approach for the boundary value problem of high frequency Helmholtz equation

邀请人：　许学军研究员

报告时间：　2009 年 12 月 10 日(周四)

　　　　　下午 4:00—5:00

报告地点：　科技综合楼三层 311

　　　　　计算数学所报告厅

Abstract:

We propose an asymptotic numerical method called Gaussian beam approach for the boundary value problem of high frequency Helmholtz equation. The basic idea is to approximate the traveling waves with a summation of Gaussian beams by the least squares algorithm. Gaussian beams are asymptotic solutions of linear wave equations in the high frequency regime. We deduce the ODE systems satisfied by the Gaussian beams up to the third order. The key ingredient of the proposed method is the constructing of a finite–dimensional beam space which has good approximating property.

If the exact solutions of boundary value problems contain some strongly evanescent wave modes, the Gaussian beam approach might   the domain decomposition technique to separate the definition domain into a boundary layer region and its complementary interior region. The former is handled by a domain-based discretization method, and the latter by the Gaussian beam approach. Schwarz iterations then be performed based on suitable transmission boundary conditions at the interface of two regions. Numerical tests demonstrate that the proposed method is very promising.

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