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：

hp–discontinuous Galerkin Methods for the Helmholtz Equation with Large Wave Number

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计算数学所报告厅

Abstract:

In this paper we develop and analyze some interior penalty hp–discontinuous Galerkin (hp–DG) methods for the Helmholtz equation with first order absorbing boundary condition in two and three dimensions. The proposed hp–DG methods are defined using a sesquilinear form which contains penalty terms which not only penalize the jumps of the function values across the element edges but also the jumps of the first order tangential derivatives as well as jumps of all normal derivatives up to order p. Furthermore, to ensure the stability, the penalty parameters are taken as complex numbers with positive imaginary parts, so essentially and practically no constraint is imposed on the penalty parameters. It is proved that the proposed hp–discontinuous Galerkin methods are stable (hence, well–posed) without any mesh constraint. For each fixed wave number k,

sub−optimal order (with respect to h and p) error estimates in the broken H^1−norm and the L^2−norm are derived without any mesh constraint. The error estimates as well as the stability estimates are improved to optimal order under the mesh condition $k^3h^2p^{−1} \le C_0$ by utilizing these stability and error estimates and using a stability−error iterative procedure, where C_0 is some constant independent of k, h, p, and the penalty parameters.

欢迎大家参加！