LHD 国际学术报告会 (2011 年 6 月 3 日周五 9:00-11:00)

报告题目：

Inverse Lax-Wendroff Procedure for Numerical Boundary Conditions of Hyperbolic Equations

演讲人：

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时间：2011 年 6 月 3 日（周五）上午 9:00-11:00

地点：力学所 1 号楼 312 会议室

邀请人：姜宗林 研究员

报告摘要：

We develop a high order finite difference numerical boundary condition for solving hyperbolic Hamilton-Jacobi equations and conservation laws on a Cartesian mesh. The challenge results from the wide stencil of the interior high order scheme and the fact that the boundary may not be aligned with the mesh and can intersect the grids in an arbitrary fashion. Our method is based on an inverse Lax-Wendroff procedure for the inflow boundary conditions. We repeatedly use the partial differential equation to write the normal derivatives to the inflow

boundary in terms of the tangential derivatives and the time derivatives (for time dependent equations). With these normal derivatives, we can then impose accurate values of ghost points near the boundary by a Taylor expansion. At the outflow boundaries, we use Lagrange extrapolation or least squares extrapolation if the solution is smooth, or a weighted essentially non-oscillatory (WENO) type extrapolation if a shock is close to the boundary. Extensive numerical examples are provided to illustrate that our method is high order accurate and has good performance when applied to one and two dimensional scalar or system cases with the physical boundary not aligned with the grids and with various boundary conditions including the solid wall boundary condition. This is a joint work with Ling Huang and Mengping Zhang (for the Hamilton-Jacobi equations) and with Sirui Tan (for the time dependent conservation laws).