1077-65-1344 **Sirui Tan*** (sirui_tan@brown.edu), Division of Applied Mathematics, Brown University, Providence, RI 02912, and **Chi-Wang Shu** (shu@dam.brown.edu), Division of Applied Mathematics, Brown University, Providence, RI 02912. *Inverse Lax-Wendroff procedure for numerical boundary conditions of hyperbolic equations.*

We develop a high order accurate numerical boundary condition based on finite difference methods for solving hyperbolic equations on Cartesian grids, while the physical domain can be arbitrarily shaped. The challenges are the wide stencil for the high order scheme and the fact that the physical boundary does not usually coincide with grid lines. Our method is based on an inverse Lax-Wendroff procedure for the inflow boundary conditions. We repeatedly use the partial differential equations to write the normal derivatives to the inflow boundary in terms of the tangential derivatives and the time derivatives of the given boundary condition. With these normal derivatives, we can impose accurate values of ghost points near the boundary by a Taylor expansion. At the outflow boundaries, we use a high order weighted essentially non-oscillatory (WENO) type extrapolation. Our method is high order accurate, stable under the standard CFL conditions determined by the interior schemes, and easy to implement. We show applications in simulating interactions between compressible inviscid flows and rigid (static or moving) boundaries. (Received September 19, 2011)