

Convergent finite difference scheme for the compressible viscous isentropic flow

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Abstract

We construct a numerical method based on finite differences for the flow of a viscous isentropic gas. A standard upwind discretization is used for both continuity and momentum equations, bringing some properties of finite volume method into the scheme. The main goal is the rigorous proof of weak convergence of the (subsequence of) numerical solutions to a weak solution of compressible Navier–Stokes system. The theoretical part is complemented by computational results that are performed in two spatial dimensions with periodic boundary conditions.

Keywords: convergence, compressible Navier-Stokes, finite difference.