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Państwowa Wyższa Szkoła Zawodowa w Chełmie

Godunov methods of numerical solutions of hyperbolic wave equations

This paper is primarily concerned with the numerical solutions to the advection equation which is the simplest hyperbolic equation. Mathematically the most interesting feature of a hyperbolic equation is that they admit a shock solution. Godunov's method was devised to resolve accurately shocks and other steep wave profiles. This method is based on solving Riemann problems at cell interfaces. As Godunov's method is first-order accurate it gives very smeared approximations to shock waves. Higher-order algorithms can be developed with an application of limiter functions which result from Riemann problems. We perform a number of tests with these methods to show their high performance.