

Toro, E. F.; Billett, S. J.

A unified Riemann-problem-based extension of the Warming-Beam and Lax-Wendroff schemes. (English) [Zbl 0872.65082](#)

IMA J. Numer. Anal. 17, No. 1, 61-102 (1997).

The authors present a TVD Riemann-problem-based numerical method for solving systems of hyperbolic conservation laws in one space dimension. It is a single Godunov-type method based on a generalization of the weighted average flux obtained via a space-time integral of solutions of local Riemann problems. In fact, the scheme is an extension of the method of *R. F. Warming* and *R. M. Beam* [AIAA J. 14, 1241-1249 (1976; [Zbl 0364.76047](#))] if the CFL number lies between 1 and 2, and of the Lax-Wendroff method if it lies between 0 and 1. The local wave structure dictates switching between schemes automatically with no need for special conservative switching operator. The method is one-dimensional, but can be extended to the multi-dimensional scheme via space operator splitting. Numerical experiments confirm reliability and robustness of the proposed scheme.

Reviewer: M.Lukáčová (Brno)

MSC:

[65M06](#) Finite difference methods for initial value and initial-boundary value problems involving PDEs Cited in 2 Documents
[35L65](#) Hyperbolic conservation laws

Keywords:

computational fluid dynamics; conservation laws; Godunov-type-method; weighted average flux; Lax-Wendroff method; numerical experiments; Riemann problems

Full Text: [DOI](#)