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A family of stable numerical solvers for the shallow water equations with source terms.
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Summary: We introduce a multiparametric family of stable and accurate numerical schemes for 1D shallow water equations. These schemes are based upon the splitting of the discretization of the source term into centered and decentered parts. These schemes are specifically designed to fulfill the enhanced consistency condition of Bermúdez and Vázquez, necessary to obtain accurate solutions when source terms arise. Our general family of schemes contains as particular cases the extensions already known of Roe and Van Leer schemes, and as new contributions, extensions of Steger-Warming, Vijayasundaram, Lax-Friedrichs and Lax-Wendroff schemes with and without flux-limiters. We include some meaningful numerical tests, which show the good stability and consistency properties of several of the new methods proposed. We also include a linear stability analysis that sets natural sufficient conditions of stability for our general methods.

MSC:

76M12 Finite volume methods applied to problems in fluid mechanics
76B15 Water waves, gravity waves; dispersion and scattering, nonlinear interaction

Cited in **33** Documents

Keywords:

Finite volume method; Upwinding; linear stability analysis

Software:

HE-E1GODF

Full Text: [DOI](#)

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