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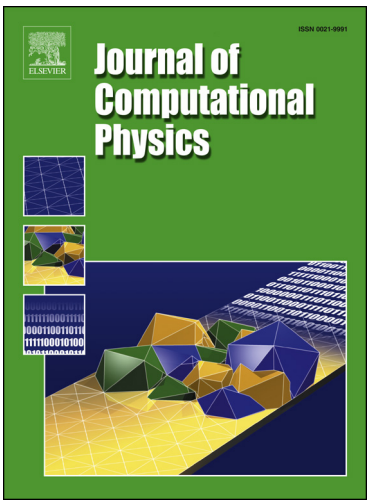

Simple *a posteriori* slope limiter (Post Limiter) for high resolution and efficient flow computations

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Simple *a posteriori* slope limiter (Post Limiter) for high resolution and efficient flow computations

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Abstract

A simple and efficient *a posteriori* slope limiter ("Post Limiter") is proposed for compressible Navier-Stokes and Euler equations, and examined in 1D and 2D. The Post Limiter tries to employ un-limited solutions where and when possible (even at shocks), and blend the un-limited and (1st-order) limited solutions smoothly, leading to equivalently four times resolution in 1D. This idea was inspired by *a posteriori* limiting approaches originally developed by Clain, S., Diot, S., and Loubère, R. [J. Comput. Phys. 230:4028-4050, 2011] for higher-order flow computations, but proposed here is an alternative suitable and simplified for 2nd-order spatial accuracy with improved both solution and convergence. In fact, any iteration processes are no longer required to determine optimal orders of accuracy, since the limited and un-limited values are available at one time at 2nd-order. In 2D, several numerical examples have been dealt with, and both the κ=1/3 MUSCL (in a structured solver) and Green-Gauss (in an unstructured solver) reconstructions demonstrated resolution improvement (nearly 4x4 times), convergence acceleration, and removal of numerical noises. Even on triangular meshes (on which least-squares reconstruction is used), the unstructured solver showed the improved solutions if cell geometries (cell-orientation angles) are properly taken into account. Therefore, the Post Limiter is readily incorporated into existing codes.

Keywords: Post Limiter, Slope Limiter, *a posteriori* limiting procedure, MOOD, Finite Volume Methods

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