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Improving convergence to steady state of implicit SUPG solution of Euler equations. (English) Zbl 1001.76053

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Summary: We present a procedure to improve the convergence towards steady state in inviscid flow simulations. This procedure detects convergence stagnation as solution progresses, and freezes the shock-capturing term of an implicit, semi-discrete SUPG finite element formulation in conservation variables with local time-stepping. Numerical experiments show that machine zero solutions can be obtained with a small number of time steps, without loss of accuracy.

MSC:

76M10	Finite element methods applied to problems in fluid mechanics
76N15	Gas dynamics (general theory)
65M12	Stability and convergence of numerical methods for initial value and initial-boundary value problems involving PDEs
65M60	Finite element, Rayleigh-Ritz and Galerkin methods for initial value and initial-boundary value problems involving PDEs

Keywords:

convergence acceleration; inviscid compressible Euler equations; implicit semi-discrete SUPG finite element formulation; shock-capturing term; conservation variables; local time-stepping

Full Text: DOI

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