FAST ESTIMATION OF THE MAXIMUM SPEED OF PROPAGATION IN THE RIEMANN PROBLEM FOR THE EULER EQUATIONS

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Abstract. We construct of a fast algorithm for computing the maximum speed of propagation in the Riemann solution for the Euler system of gas dynamics with the co-volume Equation of state, [1]. The novelty in the algorithm is that it stops when a prescribed accuracy on the upper bound on the maximum wave speed is reached. The convergence rate of the algorithm is cubic and the bound on the maximum wave speed is guaranteed for gasses with co-volume equation of state and heat capacity ratio $1 < \gamma \leq 5/3$. The method is illustrated numerically on a novel explicit continuous finite element technique that is guaranteed to be invariant domain preserving, [2].

Keywords: Euler system of gas dynamics, co-volume equation of state, maximum speed of propagation, Riemann problem

Mathematics Subject Classifications (2010): 65M60, 65M10, 65M15, 35L65

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