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Implicit SUPG solution of Euler equations using edge-based data structures. (English)

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Summary: We present an implicit, edge-based implementation of semi-discrete SUPG formulation with shock capturing for Euler equations in conservative variables. By disassembling the resulting finite element matrices into their edge contributions, sparse matrix coefficients, residuals and matrix-vector products needed in Krylov-update techniques are computed based on edge data structures. The resulting solution method requires less memory and CPU time than element-based implementations.

MSC:

76M10 Finite element methods applied to problems in fluid mechanics

76N15 Gas dynamics (general theory)

Cited in 11 Documents

Keywords:

implicit edge-based semi-discrete SUPG formulation; Euler equations; compressible flow; finite elements; shock capturing; conservative variables; sparse matrix coefficients; residuals; matrix vector-products; Krylov-update techniques

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