A 3D second-order cell-centered Lagrangian scheme based on a multi-dimensional minmod limiter.

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The gas dynamic equations under the Lagrangian formalism are well adapted to the simulation of multi-material compressible fluid flows such as those encountered in the domain of Inertial Confinement Fusion (ICF). Different cell-centered finite volume schemes have been developed for solving these equations [1, 2]. In these schemes, the node velocity is computed by imposing a momentum balance conservation condition around each node. The scheme presented here is based on the multi-dimensional extension for unstructured hexahedral meshes [3]. It satisfies a semi-discrete entropy inequality and conserves globally the momentum and the total energy. The second order extension is based on a piecewise linear reconstruction of the pressure and velocity fields obtained via a least square procedure. A new slope limiter method based on a multi-dimensional minmod extension is developed to ensure the monotonicity. Several academic test cases are studied in order to prove the robustness and accuracy of the scheme.

Références

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