

A RECONSTRUCTION OF THE VELOCITY VECTOR IN GODUNOV EULER SCHEMES ON THREE-DIMENSIONAL UNSTRUCTURED MESH

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The paper proposes a generalization of the velocity vector reconstruction method from [1] to 3D Eulerian schemes of Godunov type on arbitrary unstructured meshes. The idea of the method consists in the componentwise reconstruction of the velocity vector in the local basis of each cell in such a way that one of the basis vectors is co-directed with the velocity vector at the center of the cell. Thus, independence of the reconstruction of the velocity vector from the flow direction with respect to the global coordinate system is achieved. The efficiency of the proposed algorithm is demonstrated on a spherical Riemann problem with a spherically symmetric flow. The algorithm provided a much better preservation of symmetry in comparison with the componentwise reconstruction in the global basis (see Fig. 1).

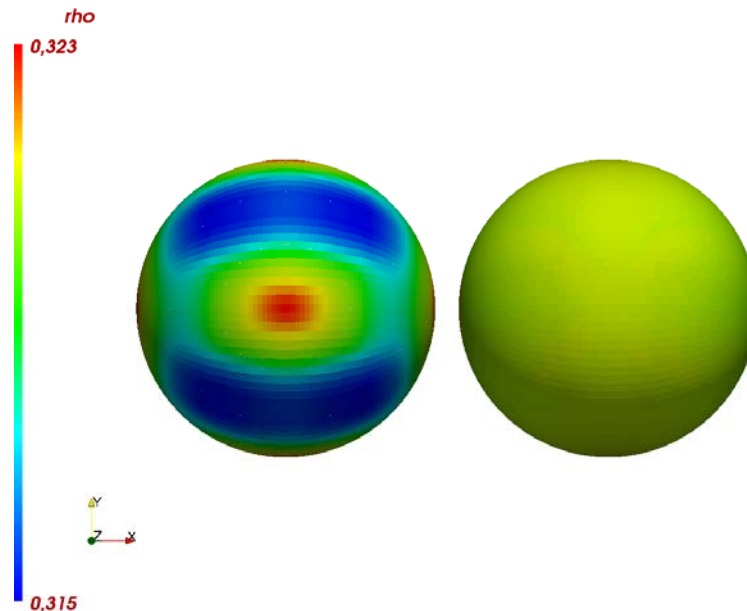


Fig. 1. Spherical Riemann problem. Density distribution on the sphere.
Left: component-wise reconstruction in the global basis;
on the right: proposed in the work

References

- [1] Pierre-Henri Maire, Raphael Loubere, and Pavel Vachal. Staggered Lagrangian discretization based on cell-centered Riemann solver and associated hydrodynamics scheme. *Comput. Phys. Commun.*, 10(4):940–978, 2011.