Efficient error estimation criteria to capture vortical structures in octree meshes CANSU OZHAN, DANIEL FUSTER, PATRICK DA COSTA, CNRS (UMR 7190), Universite Pierre et Marie Curie, Institut Jean le Rond d'Alembert, France — This paper aims at finding optimal adaptive mesh refinement strategies to capture vortical structures. Due to their efficiency, we focus on a-posteriori mesh refinement methods. In particular, we derive a Hessian error estimator for the h-refinement scheme and a residual-based error estimator for finite volume methods and octree grids. The methods are validated for a classical test for the solution of the advection-diffusion-reaction equation and tested against three different test cases where vortical structures are present. In particular we test the temporal evolution of the Lamb-Oseen vortex, the linear growth-rate of small perturbations in a shear viscous layer and the energy evolution in the isotropic turbulence case. The performance of the proposed estimators and the choice of the optimal quantity of interest is discussed for different test cases.

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