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About Multi-Resolution Techniques for Large Eddy Simulation of Reactive Multi-Phase Flows

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Abstract : A numerical technique for mesh refinement in the HeaRT (Heat Release and Transfer) numerical code is presented. In the CFD framework, Large Eddy Simulation (LES) approach is gaining in importance as a tool for simulating turbulent combustion processes, also if this approach has an high computational cost due to the complexity of the turbulent modeling and the high number of grid points necessary to obtain a good numerical solution. In particular, when a numerical simulation of a big domain is performed with a structured grid, the number of grid points can increase so much that the simulation becomes impossible: this problem can be overcame with a mesh refinement technique. Mesh refinement technique developed for HeaRT numerical code (a staggered finite difference code) is based on an high order reconstruction of the variables at the grid interfaces by means of a least square quasi-ENO interpolation: numerical code is written in modern Fortran (2003 standard of newer) and is parallelized using domain decomposition and message passing interface (MPI) standard.

Keywords : LES, multi-resolution, ENO, fortran
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