

Abstract Submitted
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A Parallel Hexahedral Unstructured Adaptive Mesh Refinement

Library CARLOS BALLESTEROS, MARCUS HERRMANN, Arizona State University — Adaptive mesh refinement (AMR) libraries can simplify the generation of meshes surrounding complex or moving boundaries, as well as focus computational resources only in the areas of the solution domain that are of interest through the use of recursive cell refinement. By applying AMR within an unstructured hexahedral mesh framework, the resulting mesh retains the favorable numerical properties of hexahedral elements, while possessing characteristics advantageous for usage in high-performance computing. These properties include straightforward refinement and coarsening operations; as well as explicit connectivity between solution cells, which make neighbor-cell lookups, domain decomposition and load balancing simple, especially when compared with tree AMR approaches. The parallel scalability of a unstructured hexahedral AMR library, FARCOM, will be presented, with its ability to generate meshes illustrated with several test cases. Additionally, extensions to convection-diffusion, incompressible flow, and immersed-boundary problems will be discussed.

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