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A Method of Adaptive Mesh Refinement on Cartesian Unstructured Meshes CARLOS BALLESTEROS, MARCUS HERRMANN, Arizona State University — A general method for a dynamic meshing library with built-in localized adaptive mesh refinement (AMR) routines for hexahedral meshes is presented. Current block-based AMR methods apply stacked nested finer grids to regions of the computational domain, solve the governing equations of the flow within the fine grid, and then interpolate the fine grid values to the coarse grid. Unlike existing libraries, the proposed method is designed to generate fully unstructured grids that may be refined and coarsened on-the-fly up to an arbitrary level. This approach allows for h-refinement without the memory and computational expense of calculating masked coarse grid cells, as is done in block-based AMR. The hexahedral nature of the meshes simplifies the finite-volume algorithms, reducing the computational expense of refinement when compared with arbitrary tetrahedral-mesh solvers. Complex surfaces can be quickly modeled by successive refinement of control volumes while retaining numerical stability and minimizing the size of the grid.

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