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Projection of Discontinuous Galerkin Variable Distributions During Adaptive Mesh Refinement CARLOS BALLESTEROS, MARCUS HERRMANN, Arizona State University — Adaptive mesh refinement (AMR) methods decrease the computational expense of CFD simulations by increasing the density of solution cells only in areas of the computational domain that are of interest in that particular simulation. In particular, unstructured Cartesian AMR has several advantages over other AMR approaches, as it does not require the creation of numerous guard-cell blocks, neighboring cell lookups become straightforward, and the hexahedral nature of the mesh cells greatly simplifies the refinement and coarsening operations. The h-refinement from this AMR approach can be leveraged by making use of highly-accurate, but computationally costly methods, such as the Discontinuous Galerkin (DG) numerical method. DG methods are capable of high orders of accuracy while retaining stencil locality—a property critical to AMR using unstructured meshes. However, the use of DG methods with AMR requires the use of special flux and projection operators during refinement and coarsening operations in order to retain the high order of accuracy. The flux and projection operators needed for refinement and coarsening of unstructured Cartesian adaptive meshes using Legendre polynomial test functions will be discussed, and their performance will be shown using standard test cases.

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