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Dynamic mesh adaptation for front evolution using discontinuous Galerkin based weighted condition number relaxation[1] PATRICK GREENE, SAM SCHOFIELD, ROBERT NOURGALIEV, Lawrence Livermore National Laboratory — A new mesh smoothing method designed to cluster cells near a dynamically evolving interface is presented. The method is based on weighted condition number mesh relaxation with the weight function being computed from a level set representation of the interface. The weight function is expressed as a Taylor series based discontinuous Galerkin (DG) projection, which makes the computation of the derivatives of the weight function needed during the condition number optimization process a trivial matter. For cases when a level set is not available, a fast method for generating a low-order level set from discrete cell-centered fields, such as a volume fraction or index function, is provided. Results show that the low-order level set works equally well for the weight function as the actual level set. The method retains the excellent smoothing capabilities of condition number relaxation, while providing a method for clustering mesh cells near regions of interest. Dynamic cases for moving interfaces are presented to demonstrate the method's potential usefulness as a mesh relaxer for arbitrary Lagrangian Eulerian (ALE) methods.

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