

UNTANGLING OF MESHES IN ALE SIMULATIONS

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A procedure is presented to untangle unstructured 2D meshes containing inverted elements by node repositioning. The inverted elements may result from node movement in flow simulations and in large deformation problems such as metal forming. Meshes with inverted elements may also be created due to the limitations of mesh generation algorithms particularly for non-simplicial mesh generation. The untangling procedure uses a combination of direct node placement based on geometric computation of the “feasible set” and node repositioning driven by numerical optimization of an element area based objective function. It is shown that a combination of the feasible set based method and the optimization method achieves the best results in untangling the mesh. Results are presented for triangular and quadrilateral meshes. Preliminary results are also presented for untangling of 3D unstructured meshes by the same approach.

Keywords: mesh generation, untangling, inverted elements, triangles, quadrilaterals