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A BOUNDARY-CONFORMING MESH-UPDATE METHOD FOR FLOW PROBLEMS WITH TOPOLOGY CHANGES

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In the present work, a boundary-conforming mesh-update method for flow problems with topology changes is introduced. The moving domain is discretized by a stabilized space-time finite element formulation. To ensure boundary conformity, the moving boundary is reconstructed by locally changing the connectivity of the boundary elements. The new connectivity is computed by the Constrained Delaunay Triangulation.

This approach reuses the concept of activated domain, previously introduced in [1]. The domain division into an activated and a deactivated part enhances the computational efficiency, as the governing equations are solely solved on the activated domain. Furthermore, elements of the deactivated domain are used to reconstruct the moving boundary, keeping the element number unchanged during the simulation. In particular, large displacements of curved boundaries can be handled without any global remeshing.

The applicability of the proposed method is demonstrated in the simulation of the flow through a diaphragm valve. The results of the 3D model of the opening and closing of the valve will be shown.

REFERENCES

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