Immersogeometric Analysis for Compressible Flows

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ABSTRACT

Immersogeometric analysis is a geometrically flexible technique for solving computational fluid–structure interaction (FSI) problems involving large, complex structural deformations. This method was further investigated in the context of a tetrahedral finite cell approach for the simulation of incompressible flow (both laminar and turbulent) around geometrically complex objects. In immersogeometric analysis, a surface representation of a solid object is immersed into a non-boundary-fitted discretization of the background fluid domain. This background discretization is then used for solving the flow physics using finite-element-based computational fluid dynamics (CFD). The main motivation behind the immersogeometric method is to alleviate the difficulties associated with mesh generation around complex geometries, eliminate labor-intensive mesh generation procedures from the CFD simulation pipeline, and maintain high accuracy of the simulation results. In this work, we present the new developments of the immersogeometric methods for compressible flow problems.