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Massively parallel LES of flow over a disc-golf frisbee JOSHUA CAMP, Texas A&M University, YUVAL DORON, Exosent Engineering, ANDREW DUGGLEBY, Texas A&M University — Achieving industrially-relevant fluid simulations require reducing the total time from computer aided design (CAD) to simulation results. On the back-end, massively-parallel algorithms significantly reduce simulation time. On the front-end, automatic hexahedral meshing algorithms struggle to generate high-quality meshes, especially in near-wall regions where resolving the turbulent boundary layer is crucial to simulation accuracy. In this study, *a posteriori* mesh enhancements via boundary element insertion of an automatic hexahedral mesh is paired with a massively-parallel spectral element solver. This strategy leads to the potential for CAD to high-quality simulation results overnight. The method is tested in solving flow over a spinning disc-golf frisbee, which tests industrially relevant capabilities of a complex geometry under rotation. To solve, two numerical meshes are generated: the first mesh is coaxial with the frisbee where the flow is solved in the rotating frame of reference, and the second is external to the first in a stationary reference frame. The flow is solved using a massively parallel spectral element large eddy simulation algorithm using a high-pass-filtered based eddy viscosity. The near-perfect scaling for the present work provides the capabilities for reducing the total time from CAD to simulation results to under twelve hours, fast enough for Large Eddy Simulation (LES) and DNS to be used in a design-cycle.

Andrew Duggleby
Texas A&M University

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