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Large Eddy Simulation of Flow Over Surface-Mounted Cube Using a Spectral Element Method SRIHARSHA KANDALA, DIETMAR REMPFER, IIT, Chicago — Unsteady three dimensional flow over a surface-mounted cube, with its rich set of features like flow turbulence, upstream boundary layer separation, curved mixing layer, unsteady three dimensional wake, etc., provides an excellent test case for evaluating the performance of CFD codes. We are developing a parallel spectral element code, SpecSolve, with the objective of modeling incompressible flows in complex geometries. The code is based on the fractional step method and uses the operator-integrating factor splitting scheme for temporal integration. In this talk, we provide a brief overview of the algorithm and implementation details. We present results from large-eddy simulations of flow over a surface-mounted cube using SpecSolve. The Reynolds number, based on bulk flow velocity and height of the cube, is 40,000. The dynamic Smagorinsky model is used for modeling turbulence. These results are compared with experimental data of Martinuzzi and Tropea, LES results of Shah and Ferziger and our FLUENT LES simulations.

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