

Development of FVM Solver for ABL Flows

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Abstract

Accurate and reliable CFD simulations of atmospheric boundary layer (ABL) flows are necessary for variety of real-world problems, including urban flow and pollution dispersion. Here we present the description of currently developed finite volume solver for such applications.

We describe two approaches to solving ABL flows: First is based on compressible flow formulation, second on incompressible flow formulation. RANS equations are discretized using finite volume method. AUSM+up and central numerical flux are used for compressible and incompressible flow approaches respectively. Implicit BDF2 method is utilized for timestepping. Least squares gradient reconstruction with Venkatakrisnan's limiter is employed to achieve second order accuracy in space.

Results from both approaches are compared with wind tunnel measurements of flow over 2D hill. Computational performance is also compared.

Keywords: Atmospheric Boundary Layer, Finite Volume Method, RANS

References

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