

Abstract Submitted
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LES of turbulent boundary layer flow over urban-like roughness elements TETSURO TAMURA, Tokyo Institute of Technology, MAKOTO TSUBOKURA, RIKEN, TSUYOSHI NOZU, Shimizu Corporation, KEIJI ONISHI, RIKEN — LES of turbulent boundary layer flow over urban-like roughness elements has been performed. Final goal of this paper is to elucidate the availability of LES on the wind flow within the canopy among buildings in cities. Firstly rectangular blocks, definitely larger than those on conventional rough wall such as grain or sand, are homogeneously arrayed and above-region equilibrium profiles of mean velocity and turbulent statistics are investigated. Also, in order to predict the fluctuating velocity characteristics of urban boundary layer, actual complicated-shaped buildings are used for reproducing the surface shape in cities. For numerical modeling, this study employs the unstructured-grid system where grid lines correctly fit to the building shape and BCM (Building Cube Method) which is formulated on very fine Cartesian mesh system. Based on the GIS data, BCM employs the external forcing technique named IBM (Immersed Boundary Method). Also, in BCM, computational process is so simple that the parallel algorithm and the memory access obtain the perfect efficiency. Using both the LES results, turbulence structures in the urban canopy are discussed. Appropriate 3D vortical structures can be recognized at inflow, along the street and among a pack of tall buildings.

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