Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Detached-Eddy Simulation of Wind-Induced Ventilation to Control Indoor Thermal Environments TAKAMASA HASAMA, University of Tokyo, SHINSUKE KATO, RYOZO OOKA, Institute of Industrial Science, University of Tokyo — There are numerous examples of computational fluid dynamics (CFD) being used to analyze wind-induced ventilation in buildings. Ventilation properties are affected not only by the mean flow but also turbulent flow characteristics, resulting in complicated flowfields around building openings. We therefore have to use a CFD method that is able to precisely simulate the turbulence phenomena. Detached-eddy simulations (DES) are remarkable in terms of computing cost performance, and their application is expected to building environmental analysis. In this paper, to examine the applicability of DES to building ventilation analysis, DES and large-eddy simulations (LES) were performed on a flow around a building having a single-sided opening. We also examined the applicability of DES to indoor thermal environmental analysis and made simulations of an anisothermal flowfield with a heat source on the same analysis model. Three types of calculation cases, namely; 1) Reference LES calculation with fine grid, 2) LES calculation with coarse grid, and 3) DES calculation with coarse grid, were performed. We clarified the wind and temperature fluctuation characteristics and heat flux around the opening, and also analyzed DES characteristics of the anisothermal flowfield.

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Date submitted: 11 Aug 2005 Electronic form version 1.4