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Study on Characteristics of Wind-Induced Inflow and Outflow through a Single Opening in a building using LES & DES TAKAMASA HASAMA, Department of Architecture, The University of Tokyo, SHINSUKE KATO, RYOZO OOKA, Institute of Industrial Science, The University of Tokyo — In order to investigate wind-induced flow properties through a single opening, large-eddy simulations (LES) are performed on ventilated air through the single opening of a room. In this flowfield, the outdoor air flows parallel to the wall and to the opening, and the room airflow is induced by the outdoor flow through the opening. Both the outdoor and indoor airflows are simultaneously simulated. Firstly, the dependency of the induced room airflow to the shape of the opening is investigated (by changing the shape of the opening). Secondly, the distributions of mean and turbulent variables at the boundary plane of the opening are investigated. And thirdly, Detached-eddy simulations (DES) are performed on the same flowfield to examine the applicability of DES to building ventilation analysis. It is clarified that the shape of the opening and the resultant mixing layer thickness developed along the opening boundary plane affect the characteristics of the air exchange rate and the feature of the room's airflow. In the case of a longer opening, the change in air exchange characteristics is apparent. And, DES over-estimates the sub-grid scale (SGS) viscosity in the LES region, but the difference in room mean property between both cases is low.

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