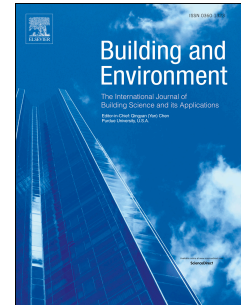


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Improvement of the momentum method as the diffuser boundary condition in CFD simulation of indoor airflow: Discretization viewpoint

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1 Improvement of the Momentum Method as the Diffuser Boundary Condition in CFD
2 Simulation of Indoor Airflow: Discretization Viewpoint

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7 **Abstract:** The momentum method was considered to be not applicable for a fine grid
8 adjacent to the diffuser. However, the reason underlying this phenomenon has not
9 been clarified until now. This paper explains this issue from the viewpoint of
10 discretization. The momentum equation is integrated in the first cell adjacent to the
11 diffuser and is expressed as the diffuser-related term and the diffuser nonrelated term.
12 The direct momentum method and the convective-flux momentum method use
13 different diffuser-related terms. A large error may be introduced for the
14 convective-flux momentum method when the first grid interval adjacent to the
15 diffuser is very small. The total-flux momentum method is presented to include both
16 the convective flux and the diffusion flux in the momentum source. Good agreement
17 between the total-flux momentum method and experiment is obtained. The total-flux
18 momentum method helps to minimize the computational error and facilitates the
19 determination of an optimal grid.

20 **Keywords:** diffuser boundary condition; CFD; momentum source; diffusion flux.

21 1. Introduction

22 Diffusers introduce fresh air into the indoor environment. It is crucial to describe

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