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Abstract

Room air distributions are intended to achieve the required thermal comfort and ventilation for space occupants and processes. The type of air supply diffuser , the type and situation of return grille in the room may affect in the room air distribution and human thermal comfort. In this study three types of air supply diffusers (three direction-square air supply diffuser, one direction-square air supply diffuser and semi-circle air supply diffuser) were used separately as a supply air terminal with one return air grille.

The control on the behavior of the air distribution in the enclosed space was very complex. One approach to achieve an optimal control was done by modeling the distribution of air. The tested room was built and meshes by Ansys Fluent14Users guide program. Realizable, k-ε turbulence model was evaluated in predicting the airflow pattern and thermal behavior of DV devices in an office room according to different geometries of displacement ventilation devices. A comparison between both results obtained from experimental work and data of numerical analysis indicated a good agreement between these results due to Iraqi cooling code and ASHRAE standards and

according to values of Air Diffusion Performance Index (ADPI) and Effectiveness temperature (ϵt). The three direction-square diffuser was the best type compared with the others two types since it gives (66.76 %) and (1.82) respectively, and the semi-circle type gives (62.3) % and (1.55) respectively. Also the measured of relative humidity gives approximated converged values between all the three devices.

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Index Terms

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Keywords

Displacement ventilation ;Air supply diffuser; return air grille; CFD; air distribution; relative humidity.