

Airflow Characteristics and Thermal Comfort of Air Diffusers: A Case Study

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Abstract : The quality of the indoor environment is significant to occupants' health, comfort, and productivity, as Covid-19 spread throughout the world, people started spending most of their time indoors. Since buildings are getting bigger, mechanical ventilation systems are widely used where natural ventilation is insufficient. Four primary tasks of a ventilation system have been identified indoor air quality, comfort, contamination control, and energy performance. To fulfill such requirements, air diffusers, which are a part of the ventilation system, have begun to enter our lives in different airflow distribution systems. Detailed observations are needed to assure that such devices provide high levels of comfort effectiveness and energy efficiency. This study addresses these needs. The objective of this article is to observe air characterizations of different air diffusers at different angles and their effect on people by the thermal comfort model in CFD simulation and to validate the outputs with the help of data results based on a simulated office room. Office room created to provide validation; Equipped with many thermal sensors, including head height, tabletop, and foot level. In addition, CFD simulations were carried out by measuring the temperature and velocity of the air coming out of the supply diffuser. The results considering the flow interaction between diffusers and surroundings showed good visual illustration.

Keywords : computational fluid dynamics, fanger's model, predicted mean vote, thermal comfort

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