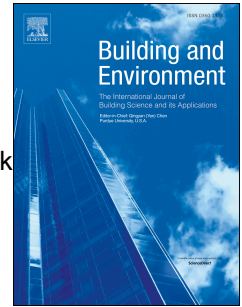


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Numerical investigation of height impact of local exhaust combined with an office work station on energy saving and indoor environment

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Abstract:

A healthy and comfortable working environment is very important for improving its occupants' productivity. In this study, the evaluation of the height impact for the proposed local exhaust ventilation system on the indoor thermal comfort, inhaled air quality and energy savings was explored numerically. In the proposed system, the exhaust opening was combined with the office workstation in a single unit. The intention was to help extract the warmed and contaminated air locally before it disperses across the room. The performance of the new system at three different heights of the combined system (1.4 m, 1.6 m and 2.0 m) above floor level was investigated numerically with a validated CFD model in a room with and without inclusion of the novel local exhaust ventilation system. The performance of using this system was evaluated using the main evaluation indices for any ventilation system such as energy saving, occupant thermal comfort, draught risk and the quality of the indoor air. The results showed that by selecting a suitable height for the combined system, a significant improvement on energy savings (up to 22.56%) and inhaled air quality can be realised with an acceptable level of the indoor thermal comfort. It was found that in comparison to cases 2 (1.4 m) and 4 (2.0 m), case 3 (1.6 m) was considered to be the best height at which optimal performance could be achieved from the LEVO system.

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