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The appropriate airflow rate for a nozzle in commercial aircraft cabins based on thermal comfort experiments

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Abstract: Personal air supply is important for both thermal comfort and air quality for individuals. However, no appropriate airflow rate for a nozzle in aircraft cabins is included in the existing standards. To study the effect of the nozzle air supply on thermal comfort and optimize the airflow rate for a nozzle, both measurements of the air flow field and a human thermal comfort survey were carried out in an experimental three-row aircraft cabin. The experiments used four airflow rates (0 L/s, 0.67 L/s, 0.96 L/s and 1.45 L/s) for a nozzle and three different cabin temperatures (24°C, 26°C, 28°C). The air velocity distribution was obtained to calculate the air velocity for the nozzle jets at any point. This study provides an understanding of the effect of the nozzle air supply on passengers' thermal comfort and the optimal designs for a nozzle air-supply system. The nozzle airflow rate for thermal comfort was calculated for a personal air supply at different cabin temperatures. The thermal comfort map for a nozzle can be referenced for the design of a personal air supply system in aircraft cabins.

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