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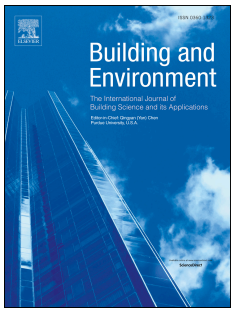

Comfortable air speeds for people lying at rest in the hot-humid area of China in summer

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Comfortable air speeds for people lying at rest in the hot-humid area of China in summer

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Abstract:

It is highly important to determine an appropriate thermal environment for resting and sleeping people from the perspectives of human health, comfort and energy savings. The thermal responses of people lying at rest in various room conditions with self-controlled airflow were studied in the hot-humid area of China. Subjects laid on a bed and were asked to control the fan gear to achieve a certain level of thermal sensation in the tests, during which their subjective responses were collected by a questionnaire.

The results confirmed that human thermal comfort could be maintained at air temperatures of 27–30 °C and humidity of 40%–80% when lying at rest in the hot-humid area of China. The air speeds that were required to maintain various thermal sensations changed linearly with room air temperatures. A higher air speed was needed to maintain the same thermal sensation at a higher air temperature or relative humidity (RH). The air speeds for thermal neutrality were between 0.25 m/s (at 27 °C and 40%–60% RH) and 1.17 m/s (at 30 °C and 60%–80% RH) and between 0.12 m/s and 1.31 m/s to achieve 80% percentages acceptable for thermal, airflow and humidity environments. The neutral air speeds for people lying at rest were 0-0.8 m/s lower than those for people engaged in sedentary activities. The results are beneficial for creating comfortable thermal environments for short rest, pre-sleep and sleep and are applicable for healthy young people living in hot-humid areas.

Key words:

Thermal comfort; air speed; acceptable thermal environment; lying at rest; hot-humid area

1. Introduction

The hot-humid area of China has a large population, a rapidly developed economy and a large number of buildings. The summer is long and hot, the winter is short and temperate, and the relative humidity (RH) is high year-round. In this area, people are fond of airflow for its cooling effect in