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Thermal comfort in interior and semi-open spaces of rural folk houses in hot-humid areas

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ABSTRACT

Semi-open spaces are a key element in the climate adaptive design of rural folk houses and are important places where rural residents perform daily activities in hot-humid areas. In this study, a year-long thermal comfort field survey was conducted in rural folk houses in 11 rural areas in the Guangdong Province, the hot-humid area of southern China. The subjective responses of residents were recorded via questionnaires, and all ambient environment parameters were measured. The results show that air speed was greater and relative humidity was lower in the semi-open spaces. The clothing insulation of the survey respondents varied with indoor operative temperatures from 0.27 *clo* to 1.2 *clo* during the non-summer season and remained steady at 0.30 *clo* during the summer season. The thermal neutral, acceptable and preferred indoor operative temperatures were determined for the interior and semi-open spaces in the summer and non-summer. Compared to those of the interior spaces, the thermal neutral temperature was 0.6 - 1.3 °C lower and the upper limit of 80% acceptable temperature was decreased by 0.8 - 4.7 °C in the semi-open spaces. The acceptable temperature in the summer for the rural residents was found to be 0.2 - 1 °C higher than that of the urban residents in the same climate. Psychological factors such as local culture, expectations and perceived control might be the reasons for these differences. This study contributes to a better understanding of the thermal comfort of rural people and to the improvement of rural living conditions.

Keywords: Rural folk house, Thermal comfort, Hot-humid area, Semi-open space, Field study

1 Introduction

Both climatic conditions and economic level have important effects on building's performance and energy consumption. In the economically developed areas, HVAC systems are widely used for maintaining comfortable indoor environment in whatever outdoor climate, and the buildings consume lots of energy and discharged amounts of pollutions. Only some vernacular buildings, where HVAC devices and systems are used very less, retain well the architectural characteristic of climatic adaptability and energy efficient, in which man, building and environment develop harmoniously and sustainably.

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