New thermal comfort indices based on iso-comfort arrays

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Due to the increasing demands for thermal comfort in the world, there is an increase in energy consumption by heating, ventilation and air conditioning (HVAC) systems. Therefore, an urgent task is to find such combinations of microclimate parameters that lead to the minimum energy consumption of HVAC systems.

The ISO 7730 standard proposes PMV-PPD indices for assessing thermal comfort. On the basis of this standard, we have developed the iso-comfort parameters arrays, which are tables of the comfortable room air temperature as a function of the average radiation temperature and air velocity. The arrays are designed for rooms of various comfort classes, metabolic levels and thermal resistance of clothing.

On the basis of the iso-comfort parameters arrays and the empirical expression for an equivalent temperature corresponding to the same heat sensations, we have proposed a new thermal comfort index "equivalent comfortable temperature". This index is approximated as a function of metabolism and thermal resistance of clothing for rooms of three comfort classes (patent RU 2 682 872).

On the basis of the iso-comfort parameters arrays the weight coefficients have been adjusted to calculate the operating room temperature as a function of the air temperature and the average radiation temperature. The functional dependences are obtained for calculating the operational temperature with a higher accuracy than according to the methodology given in GOST 30494 and ANSI/ASHRAE Standard.

Calculations of the energy indicators of HVAC systems using the proposed indices confirmed the possibility of increasing efficiency the systems and, at the same time, increasing thermal comfort.

**References**

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