

3 Expression of effect of thermal environmental parameters upon the human body based on heat balance equation

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The purpose of this paper is to introduce indices, which indicate the effect of each environmental factor on the human skin temperature and thermal sensation, based on the humid operative temperature, i.e., heat balance equation between the human body and its surroundings. Two new kinds of environmental indices concerning the effects of air movement and humidity were introduced by the development of the heat balance equation in the same manner of the development of the effective radiation field from the operative temperature: an index for air movement was provisionally called "thermal velocity field TVF" and another one for humidity was "reduced-effective humid field RHF". The former represents an energy field related to the independent influence of air velocity except evaporation and the latter indicates an energy field of the effect of humidity. Then experiments for confirming the indices were carried out so that two indices could fairly express the effect of each parameter on mean skin temperatures and thermal sensation vote. As for an index on the total effect of thermal conditions the Corrected Humid Operative Temperature HOTV was developed. Its index is considered as the humid operative temperature corrected by air velocity and is formulated in the total sum of air temperature and effective temperature changes caused by thermal velocity field, effective radiant field and reduced-effective humid field. Although there was significant difference between two velocity levels less than 0.2 m/s and 0.8 m/s in relation between mean skin temperature and the humid operative temperature, there was no significant difference between them by the use of the corrected humid operative temperature instead of the humid operative temperature,