Study on prediction of heat and moisture transfer in human-clothing system and thermal and dryness sensations in non-steady state

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For a contribution to develop a novel method of designing and controlling indoor environment satisfying the needs for health, comfort and energy-saving, the mechanism of the transient response of thermal and dryness sensations of human to the change in environmental conditions (air temperature, humidity, wind velocity, etc.) was clarified for the expressions in equations or functions. First, the thermal sensation in transient state was found to be expressed by a function of skin temperature and its time derivative. Secondly, the model of temperature regulation system of human body and clothing system considering simultaneous heat and moisture transfer was developed as an input to the thermal sensation model. In addition, based on the transient heat and moisture transfer model for human-clothing system, a model to predict the moisture evaporation from skin, eye and airway was developed based on subject experiments, for clarifying the lower limit of humidity to be kept to form an indoor environment where the occupants do not feel discomfort due to dryness. As well as the modeling the drying process of moisture from skin, eye, and airway, surveys on the arousal of dryness sensation in daily situations were conducted through a questionnaire and subject experiments.