

Author's Accepted Manuscript

Predication of skin temperature and thermal comfort under two-way transient environments

Xin Zhou, Jing Xiong, Zhiwei Lian



PII: S0306-4565(16)30436-3
DOI: <http://dx.doi.org/10.1016/j.jtherbio.2017.08.001>
Reference: TB1970

To appear in: *Journal of Thermal Biology*

Received date: 16 January 2017
Revised date: 1 August 2017
Accepted date: 1 August 2017

Cite this article as: Xin Zhou, Jing Xiong and Zhiwei Lian, Predication of skin temperature and thermal comfort under two-way transient environments, *Journal of Thermal Biology*, <http://dx.doi.org/10.1016/j.jtherbio.2017.08.001>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Predication of skin temperature and thermal comfort under two-way transient environments

Xin Zhou^{a,b}, Jing Xiong^a, Zhiwei Lian^{a*}

^a Department of Architecture, School of Naval Architecture, Ocean & Civil Engineering, Shanghai Jiao Tong University, Shanghai 200240, China

^b Shanghai Research Institute of Building Sciences Group, Shanghai 200032, China

Abstract

In this study, three transient environmental conditions consisting of one high-temperature phase within two low-temperature phases were developed, thus creating a temperature rise followed by a temperature fall. Twenty-four subjects (including 12 males and 12 females) were recruited and they underwent all three test scenarios. Skin temperature on seven body parts were measured during the whole period of the experiment. Besides, thermal sensation was investigated at specific moments by questionnaires. Thermal sensation models including PMV model, Fiala model and the Chinese model were applied to predict subjects' thermal sensation with comparisons carried out among them. Results show that most predicated thermal sensation by Chinese model lies within the range of 0.5 scale of the observed sensation vote, and it agrees best with the observed thermal sensation in transient thermal environment than PMV and Fiala model. Further studies should be carried out to improve performance of Chinese model for temperature alterations between “very hot” to “hot” environment, for prediction error in the temperature-fall situation of C5 (37°C to 32°C) was over 0.5 scale.

Keywords: thermal sensation; transient environment; Chinese model

1. Introduction

In hot summertime, people may frequently encounter sudden temperature changes between hot and air conditioning environments, such as transference between buildings, going outdoors for lunch or other activities. Sometimes the change in air temperature is both instant and at a substantial level. Exposure to such temperature steps may not only cause thermal discomfort, but also impose considerable burden to the thermoregulation system. In addition, step-changes may even throw some

Download English Version:

<https://daneshyari.com/en/article/8650183>

Download Persian Version:

<https://daneshyari.com/article/8650183>

[Daneshyari.com](https://daneshyari.com)