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Inviting you to review for Journal of Building Engineering

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To: Guillermo Barrios del Valle <gbv@ier.unam.mx>

Fri, Sep 29, 2023 at 1:57 AM

Manuscript Number: JBE-D-23-08020

An integrated thermophysiological model for predicting thermal response of medical staff wearing medical protective clothing in summer

Guozhong Zheng; Xuhui Yue; Kang Li; Yuqin Zhang

Dear Dr Barrios del Valle,

I would like to invite you to review the above referenced manuscript submitted by Dr Guozhong Zheng. I believe your expertise is a great fit for this manuscript and I would value your input. You can read the manuscript abstract at the bottom of this email.

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Peer review - and reviewers - are at the heart of the academic publishing process and so I thank you in advance for your contribution and time.

Kind regards,

Runming Yao

Editor-In-Chief

Journal of Building Engineering

Abstract:

Medical staff wearing medical protective clothing in summer are more likely to suffer physiological stress. To accurately obtain their thermophysiological state, this study aims to establish a multi-node thermophysiological prediction model. Firstly, based on the two-node model, Fiala model, Pennes equation and personalized equations, a thermophysiological model is established. Secondly, based on the theories of heat and moisture transfer and the Crank-Nicolson method, an air layer-medical protective clothing-external environment model is established. It can predict the distribution of temperature and humidity fields of the air layer in medical protective clothing. Finally, the thermophysiological model and clothing model are validated by model comparison analysis and prediction error analysis. The results show that: (1) The prediction curves of physiological parameters and clothing air layer parameters are consistent with the experimental curves, and the different stages of the parameter changes can be accurately simulated by this model. (2) The average prediction mean square errors (MSE) for eardrum temperature, mean skin temperature, clothing air layer temperature and clothing air layer relative humidity are 0.22°C, 0.34°C, 0.65°C and 4.25%, respectively, and the average prediction MSE for head, chest, abdomen, back, upper arm, forearm, thigh and calf temperature are 0.46°C, 0.53°C, 0.59°C, 0.58°C, 0.57°C, 0.66°C, 0.72°C and 0.36°C, respectively. (3) The overall prediction accuracy of this model is better than that of two-node model. And this model can be served as a useful tool in providing thermal safety protection for the medical staff wearing medical protective clothing in summer.

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