THE UNIVERSITY OF HONG KONG

DEPARTMENT OF MECHANICAL ENGINEERING

SEMINAR

Online

Title: **Dual challenges of the heatwave and protective facemask-induced thermal stress in Hong Kong**

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Date: **26 April, 2021 (Monday)**

Time: **9:30 a.m.**

Zoom Link: **1) Link to join the meeting:**

https://hku.zoom.us/j/98923897717?pwd=a2ZZY2FSa3JSRW5INXJZby9HaFYxZz09

2) Meeting ID: 989 2389 7717

3) Password: 554869

Abstract:
Abstract: Many of the world's population may face dual detrimental challenges during the COVID-19 pandemic, including the risks of both infection and heat stress in hot summers, particularly during extreme heat events. Although wearing protective facemasks (PFMs) can effectively reduce infection risk, the use of PFMs can amplify heat-related health risks due to impeded heat dissipation through convective and respiratory exchanges. In this article, we studied the amplified heat stress induced by PFM via both field measurements and model simulations over a typical subtropical city, Hong Kong as a case study. First, a hot and humid PFM microenvironment has been clearly observed

with high temperature (34 °C ~35 °C) and high humidity (80%~95%), resulting in an aggravated facial thermal stress with maximal PFM-covered facial heat flux of 450 W/m2 under high-intensity activities, which is more than eight times of that in remaining body surface. Second, to predict the overall heat stress of human body induced by PFM, we develop a new PFM-inclusive human thermal stress model by coupling a new facial thermal load model with an enhanced human energy balance model, so that more realistic human-environment interactions with and without the intervention of PFM can be resolved. The model is then applied to predict spatiotemporal variations of physiological subjective temperature (PST) and corresponding heat stress levels with and without PFM wearing during a typical heat wave event over Hong Kong. It was found that wearing PFM can significantly aggravate human thermal stress over the whole Hong Kong with a spatially average PST increment of 4.9 oC and an additional 158.4% of spatial area exposed to the severest heat risks. Particularly, a nonlinear increasing rate of PFM-inclusive PST due to increased activity levels has been found upon increased activity. Furthermore, urban residents are found to have higher heat risks than rural residents, especially at nighttime due to the synergistic effects of urban heat and moisture islands. This study can offer significant implications for the government and people to be better prepared for the dual detrimental challenges.

ALL INTERESTED ARE WELCOME

For further information, please contact Dr. J. Song at 3917 2622.

Research area: Natural & Built Environment