THE UNIVERSITY OF HONG KONG

DEPARTMENT OF MECHANICAL ENGINEERING

SEMINAR

Online

Title: **Large-Eddy Simulation of Urban Boundary Layer Flow over Real Urban Surfaces**

Speaker: **Miss YAO Lan (PhD candidate)**
Department of Mechanical Engineering
The University of Hong Kong
Hong Kong

Date: **23 March, 2021 (Tuesday)**

Time: **11:30 a.m.**

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

https://hku.zoom.us/j/93462755737?pwd=ZXJLRk9IeWtvSXVtVjI5USs4Q1B2dz09

2) Meeting ID: 934 6275 5737

3) Password: 192286

Abstract:
Air pollution (particulate matter) cuts global life expectancy short most (by 1.8 years/person) than other issues (the second factor - smoking by 1.6 years/person). It is estimated that nowadays the global population would lose nearly 13 billion years of life under the current particulate matter (PM) levels. With the worldwide urbanization and the global pandemic, air quality has aroused unprecedented attention. Urban boundary layer (UBL) flow over build environment plays a crucial role in PM transport and aged air removal, especially for megacities (over 10 million population). To investigate the flows over real urban surfaces,

large-eddy simulations (LES) were conducted for a representative metropolitan, Hong Kong. Full-scale digital building models from Tsim Sha Tsui to Sham Shui Po, Kowloon Peninsula, were constructed. Apart from validation against reduced-scale wind tunnel experiments, the turbulence statistics extracted from three selected subdomains in Mong Kok neighborhood were analyzed. In this seminar, the LES setup, urban morphology, wind profile parameterization, turbulence characteristics (including quadrant analysis, probability density functions, conditional sampling) together with flow visualizations will be reported. The LES results showed that there exist tiny, accelerating (fast) but descending flows together with massive, decelerating (slow) but ascending flows. Hence, it is suggested that fresh air is entrained by fast flows (in roughness sublayers; RSL) while the aged air is carried upward by large slow air puffs (in inertial sublayers; ISL). These coherent flows collectively formulate the basic mechanism of air exchange over a dense city. Moreover, they arouse the need for considering intermittency in land-surface parameterizations for urban planning.

ALL INTERESTED ARE WELCOME

For further information, please contact Dr. C.H. Liu at 3917 7901.

Research area: Natural & Built Environment