THE UNIVERSITY OF HONG KONG

DEPARTMENT OF MECHANICAL ENGINEERING

SEMINAR

Online

Title: **Large-Eddy Simulation of Atmospheric Boundary Layer Flow over Idealized Urban Surface**

Speaker: **Mr. Yixun Liu (PhD candidate)**
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Date: **27 April, 2021 (Tuesday)**

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

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

https://hku.zoom.us/j/99182244124?pwd=cjViWlczUFQvUFlLZWlkbm1jZWtkQT09

2) Meeting ID: 991 8224 4124

3) Password: 650436

Abstract:
Although urban areas comprise a small fraction on Earth surface, over half of the global population lives in urban agglomerations. In cities, especially megacities, poor pedestrian-level ventilation often results in pollutant accumulation in street canyons which is harmful to urban inhabitants. It was reported by World Health Organization (WHO) that air pollution accounts for about 4.2 million deaths per year due to stroke, heart disease, lung cancer, acute and chronic respiratory disease. Atmospheric boundary layer (ABL) flow over urban surface plays a crucial role in pollutant removal and fresh air entrainment. To improve our understanding of the pollutant transport over different urban

surfaces, large-eddy simulations (LESs) were conducted over a series of idealized urban surfaces with a range of aerodynamic resistance.

In this seminar, the turbulent transport properties (analyses of motion scales, quadrant and octant) and momentum-flux budget over different surface configurations will be contrasted. The LES results show that near the roof level, a small portion of intensive, fast downward motion (sweep) dominates the pollutant and momentum transport. Concurrently, above the roof level, a small portion of slow upward motion (ejection) dominates the transport. Further analysis indicates that the turbulent transport term is responsible for the dissimilar behavior between sweep and ejection. Moreover, it is found that the fluctuating pressure gradient is the major resistance to the momentum flux and scalar flux, unveiling the potential transport mechanism in urban roughness sublayers (RSLs).

ALL INTERESTED ARE WELCOME
For further information, please contact Dr. C.H. Liu at 3917 7901.

Research area: Natural & Built Environment