

**DEPARTMENT OF MECHANICAL ENGINEERING****SEMINAR****Online**

Title: The effect of unstable stratification on turbulent flows over an idealized urban surface: A numerical study

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Date: 20 April, 2021 (Tuesday)

Time: 11:30 a.m.

Zoom Link: 1) Link to join the meeting:

<https://hku.zoom.us/j/93446339335?pwd=QmF2c1hWeGVzWi9zTDdsWG9QVWlQQT09>

2) Meeting ID: 934 4633 9335

3) Password: 646922

Abstract:

Nowadays more than half of the world population resides in urban regions. Air ventilation, thermal comfort and concentration of airborne pollutants are pivotal to the quality of life in cities. Micrometeorological conditions in urban areas are strongly influenced by the ground-level heating that induces stratifications, altering the dynamics of wind flows. Here we numerically investigate how different levels of unstable stratification affect the turbulent flows over an idealized urban area, with a focus on the transport processes within and above the canopy layer. In this study, aligned cubical roughness elements are explicitly resolved with a plan area fraction of 0.25 while four Richardson numbers are

evaluated to systematically analyze the dynamical responses. It is shown that the formation of large-scale convective rolls modifies the canopy flows. As the stratification increases, skewness and kurtosis of streamwise and vertical velocities are enhanced, implying a modulation of thermal stratifications to the turbulent organized structures above the building arrays. Quadrant analysis reveals that ejection events are the most sensitive components to unstable stratification, whose fractional occurrence and contribution together with the average strength are intensified.

ALL INTERESTED ARE WELCOME

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

Research area: Natural & Built Environment