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COMPARISON BETWEEN FLOW DYNAMICS INSIDE STREET CANYON WITH TWO GEOMETRIES OF ROOF SHAPE

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Flow dynamics above two shapes of roof geometries in urban area are investigated in wind-tunnel experiment. Urban models consist from long series of street canyons with flat or pitched roofs. Different shape of roofs induces different turbulence above the canyon as well as dynamics of intermittent motions.

Character of intermittency is supposed to be linked to a ventilation in the street from combustion or vehicle traffic. Hence, two types of roofs produce dissimilar of ventilating process.

The first part of experiment uses one-point LDA measurement to get steady-state characteristics of turbulence. Moments of higher order like skewness and flatness of velocity point out a locality where extreme wind events

take place. Namely spatial distribution of vertical skewness can show whether the intermittent penetrations rather help to ventilate the street ormore likely cause a vortex breakdown followed by immediate accumulation of pollutants.

Momentum flux is analyzed with quadrant analysis what enables to reveal the regions with statistical dominance of "sweep" or "ejection" events.

Fourier analysis and wavelet analysis are applied at several altitudes inside boundary layer in order to determine typical wavelength of highly energetic patterns.

Preliminary study using PIV is conducted in wind channel with the same models. Attention is focused on area near the obstacle edge where flow structure develops. Vorticity, vortex core and energetic modes using POD method are calculated.

Both geometries generate boundary layer distinct from each other with specific flow structures and ventilating processes. Flat roofs support the ventilation inside the canyon to be more stable, downdrafts are properly localized to make convenient conditions for maintenance of large recirculating vortex in the street. Pitched roofs on the other side provide unfavourable dynamics that disturb the ventilation by hitting the true core of recirculating zone.