

The Effects of Street Canyon Configuration on Outdoor Thermal Environment and Flow Field

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Abstract

The UHI effect arises from the abundance of artificial surfaces, including buildings and ground, which are heated by solar radiation and generate a strong buoyancy flow. Wind flow field is strongly influenced by building configurations, building surface and canyon aspect ratio H/W in urban area, so we intend to use scale models in wind tunnel to systematically investigate the influence of building orientation and surface heating on flow field.

This study includes two parts. The first part is using LDV to figure out the possibility of applying real materials and radiation in wind tunnel, clarify the influence of insulated coatings on flow field. Halogen lamp was used to simulate solar radiation. Using radiation appropriately in wind tunnel can help better representing the different solar angle and shading effects, and understanding the UHI phenomenon. The second part is using PIV to figure out how different directions of approaching wind influence the flow field in street canyon, with different surface heating conditions, clarify the impact on pollutant and heat diffusion and human comfort in canopy. The effects of different aspect ratio and were the effects of surface heating on different approaching wind conditions discussed.

This study challenged a new method in wind tunnel, and would expand the field of experimental research. The main findings of this study would provide guidance in urban design, especially on the design of canyon configuration.