

New Frontier of Education and Research in Wind Engineering

Experimental and computational studies on heat transfer from urban canopy and its dependence on urban parameters

Background & Objective

Sea breeze in summer has the effect of mitigating heat island phenomena in coastal urban areas, so it is essential to establish an urban ventilation path that leads sea breeze into urban canopies.

The non-uniformity in building heights greatly improves ventilation performance and reduces air temperature in urban canopies due to the “vertical ventilation path”, i.e., the effect of vertical advection and vertical turbulent diffusion.

Hence it is essential to study about the profile of sea breeze leading to the urban canopy and the effect of urban parameters like Building coverage ratio, height variation of the building etc on this sea breeze in context with the heat transfer from the Urban canopy. To generalize the urban heat transfer dependency on the urban parameters such as building coverage ratios and variations in building height.

The promising way to clarify sea breeze profile in to the urban canopy is mesoscale numerical simulation with an Urban Canopy Model (UCM).

In most UCMs, the convective heat transfer from the urban canopy to the atmosphere is evaluated by the Monin–Obukhov similarity theory, and the dependence of urban parameters such as building coverage ratio, volume ratio and variations to building height on convective heat transfer is not explicitly modeled. The final goal of this research is to clarify the local convective heat transfer coefficients, which depend on urban parameters and on horizontal distance in the flow direction, and to incorporate the results into the UCM.



Name and Stand
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PhD Student

Hometown
Nagercoil, Chennai, India

Profile Study

I earned M.Tech degree from Anna University ,Chennai in 2007.

Work

Worked as Project Design Engineer in M.N .Dastur & Company Ltd,Chennai,India.

Activities in 2009

1. Wind tunnel experiments were carried out for various cases with different building coverage ratios and variations in building heights.
2. CFD simulation with Low Re-number turbulence model were performed for all the experimental cases and validated against the experimental results.
3. Parametric studies (with different building coverage ratios and variations in building heights) in CFD were performed.

Conference Participation

1. Sivaraja Subramania Pillai , Ryuchiro Yoshie , J.Y.Chung , Experimental and computational studies of heat transfer from urban Canopy and its dependency on urban parameters, The fifth International Symposium on Computational Wind Engineering ,CWE 2010 (e-Proceeding).

Contact

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Message

It gives me immense pleasure in being part of many kinds of research topics especially related to environmental engineering and CFD applications. Happy to work in different environments and enlarged number of friends and colleagues.

Once again, I am very happy to be a part of Global COE in TPU as PhD student !!