

UNIVERSITI TEKNOLOGI MARA

**3D SIMULATION OF URBAN
MICROCLIMATE USING ENVI-MET**

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Dissertation submitted in partial fulfillment
of the requirements for the degree of
Master of Science
(Geographical Information Science)

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AUTHOR'S DECLARATION

I declare that the work in this dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

One of the environmental impacts of rapid urbanization is the Urban Heat Island (UHI). This climatic phenomenon can directly affect urban dwelling discomfort and indirectly related to climate change due to their contribution to the greenhouse effect and hence leads to global warming. This research aims to study the effects of built and natural environment on the air temperature distribution within a small urban setting. The examined scenarios were investigated using micro scale numerical model, ENVI-Met Ver. 4.3. The accuracy of base model is validated by field measurements. The analysis revealed an important reduction of air temperature through shading effect of trees and leaves' evapotranspiration. The influence of greenspace and waterbodies on urban microclimate were significantly important to reduce ambient temperature in urbanized areas. The study has found that the replacement of asphalt road pavement with cool materials and increasing albedo can significantly reduce the daytime high temperature particularly in afternoon. There is an association between the building orientation and microclimate conditions. However, the effects of the building orientation on air temperature is less significant due to the form and arrangement of the buildings. This study provides evidence that the microclimate and outdoor thermal conditions in Section 7, Shah Alam city are greatly affected by different urban surface properties. The outcome of the study provide valuable insight for urban designers and planners making a right decision during the designing process through assessment and visualization the relevant impact of these phenomena on the urban environment for mitigating urban heat island effect. The results of the study also provide understanding on the possibilities for the transformation of existing urban spaces towards a more liveable and sustainable future.

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