

**Numerical Simulation of Urban Heat Island Effect of
Macau by ARPS Program**

by

Bin Liu

**A thesis submitted for partial fulfillment of the requirements for
the degree of**

Master of Science in Civil Engineering

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**Faculty of Science and Technology
University of Macau**

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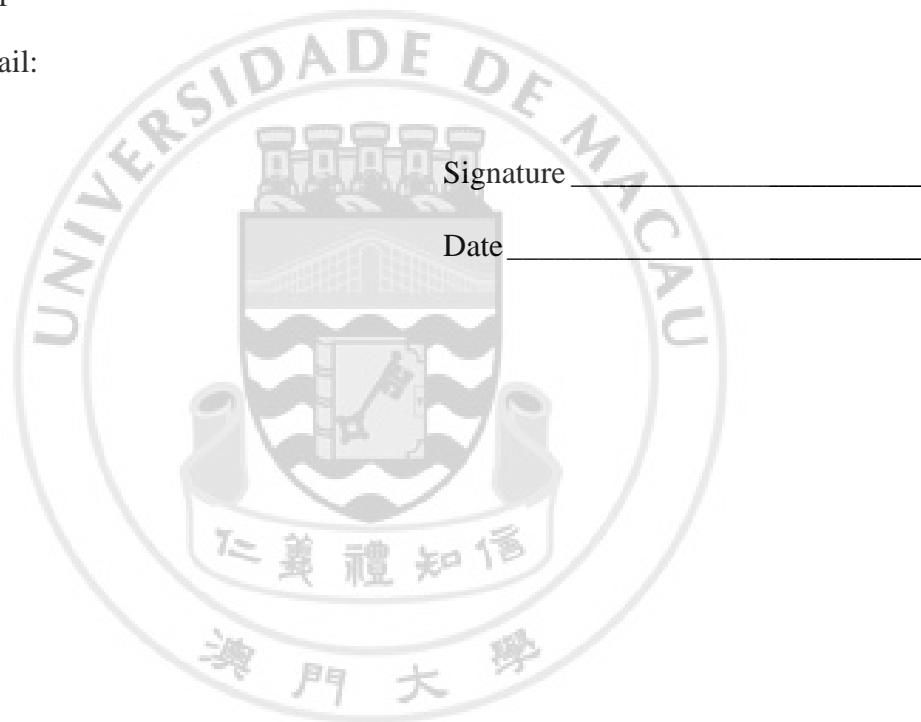


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Abstract

NUMERICAL SIMULATION OF URBAN HEAT ISLAND
EFFECT OF MACAU BY ARPS PROGRAM

by Bin Liu

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With the rapid development of tourist and other industries of Macau, urban heat island (UHI) effect in this area is increasingly serious and drawing more attention. There are three major methods of researching UHI problems: weather station monitoring, computing simulation and remote sensing. ARPS model is an effective computer program to study UHI as a numerical simulation tool and it is chosen to be used in this thesis.

Five typical days in 2005 winter are selected to be simulated to study UHI effect in winter Macau under different weather condition. The simulation results agree well with the observation data from the Macau Meteorological and Geophysical Bureau. UHI effect is simulated obviously in Macau and is distributed at Macau Peninsula, Taipa downtown and Cotai reclamation area. UHI intensity reaches its summit at around 14:00 in the afternoon, and becomes weak in nighttime.

Two of the most important factors promoting UHI effect are the abnormal of albedo and humidity from rural areas. Albedo affects the process of radiation; albedo value of structure is lower than that of greenbelt in rural area. Humidity changes the original latent heat flux; with high humidity more heat can be stored in the form of latent heat which not results in increasing the air temperature. UHI effect can be mitigated by selecting covering materials of construction with higher albedo, and by increasing greenbelt or vegetation to raising the air relative humidity.

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