

**Development of an efficient and robust
air quality prediction system for ground-level
ozone in Macau**

by

CHAO Ka Man



Master of Science in Civil Engineering

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

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

Master of Science in Civil Engineering

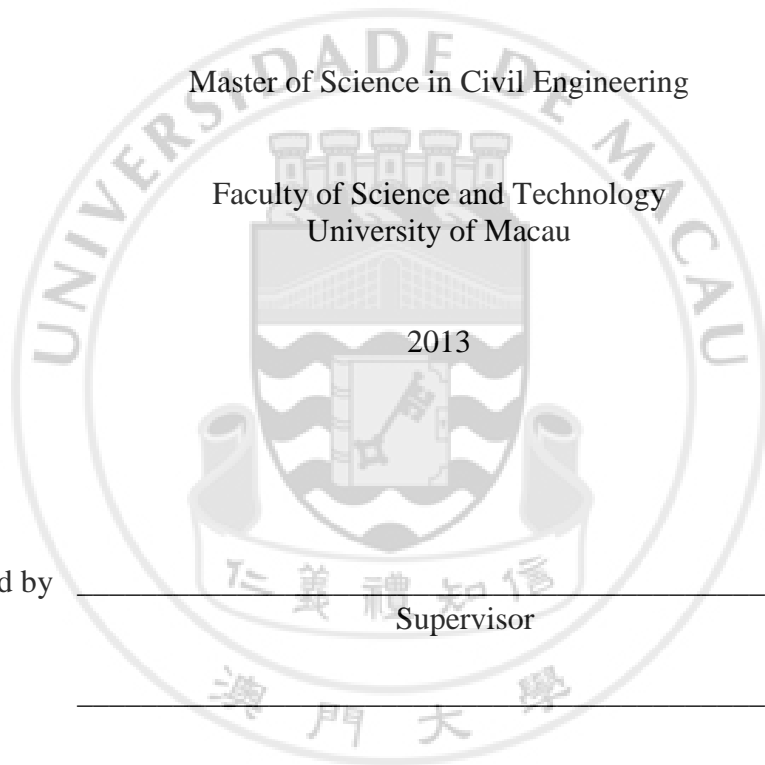
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Abstract

DEVELOPMENT OF AN EFFICIENT AND ROBUST AIR
QUALITY PREDICTION SYSTEM FOR GROUND-LEVEL
OZONE IN MACAU

by Chao Ka Man

Thesis Supervisor: Prof. MOK, Kai Meng and Prof. YUEN, Ka Veng
Master of Science in Civil Engineering

An efficient and robust air quality prediction system for describing and forecasting the daily maximum of the 8-hr averaged ground-level ozone concentration in Macau is developed in the present study. When the ozone concentration is modeled statistically, it is common to use one selected model for all seasons, which may not deliberate the effect of the seasonal variations. In this study, seasonal Kalman filter based models, namely the $M_{non-episode}$ model, the $M_{episode}$ model and the $M_{transition}$ model were proposed by using the Bayesian information criterion. Then, the Bayesian model averaging approach was implemented to enhance the efficiency and robustness of the developed models by incorporating the air quality models for different seasons into one merged model M_{system} . The method was found to be efficient and the M_{system} was proved to be the most plausible one after comparing its performance with other models constructed in this study.

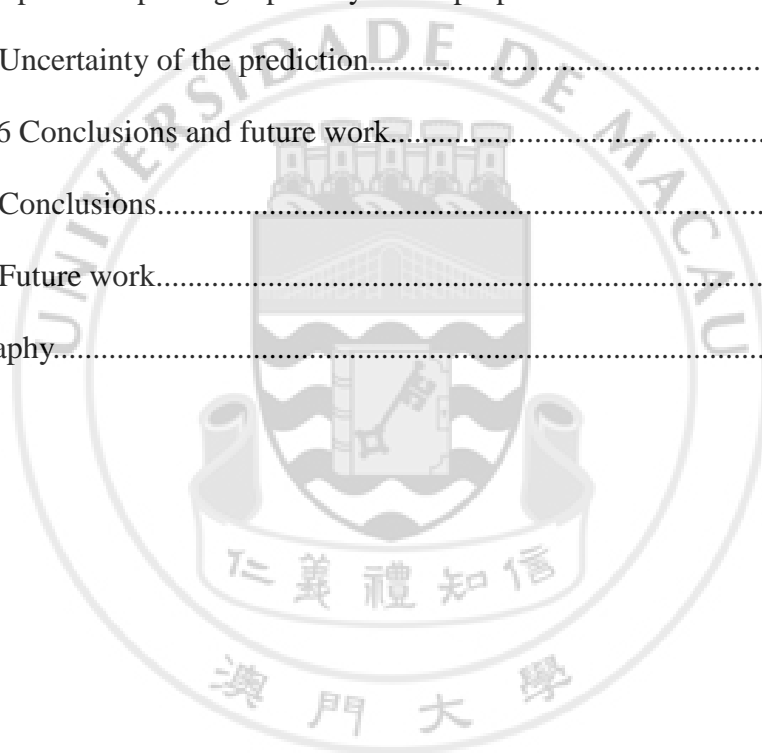
The model M_{system} is the first of its kind that assembles air quality models of different seasons together to provide adaptive estimation of ozone concentration for all seasons.

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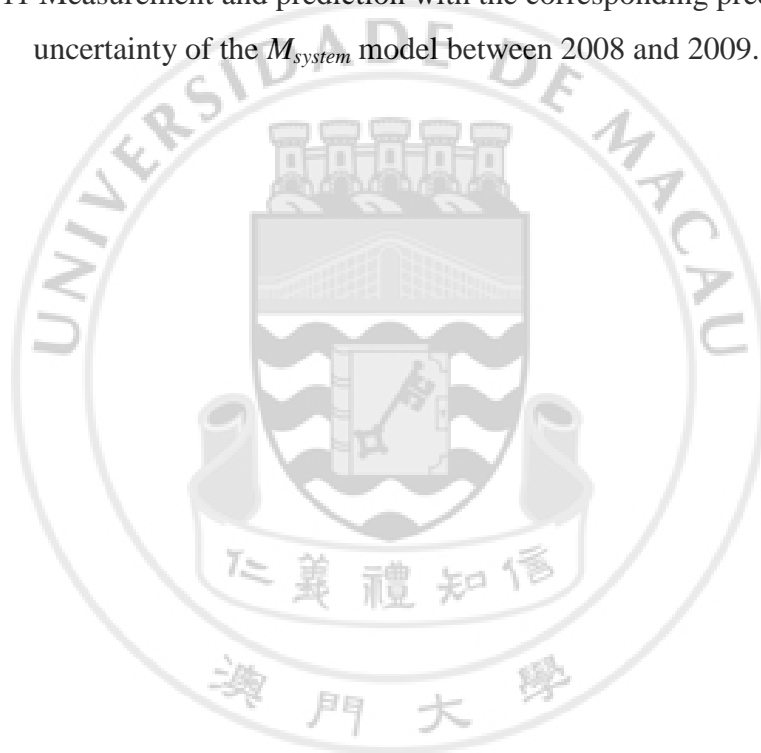
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DEDICATION

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