Acknowledgements

First, I would like to express my deepest gratitude to my advisor, Dr. Tzu-Chieh Tsai, for his constant support and expert guidance. He showed me different logical thinking to approach a research problem and the need to be persistent to accomplish any goal. During these two years, he has been a friend and mentor to encourage me to face the challenges, and has confidence in me when I doubted myself. More important, I appreciate his guidance from my mathematic analysis in this study that enriches my knowledge and concepts. Without his encouragement and assistance, I could not have finished this thesis.

A special thanks goes to my committees: Dr. Hsiao-Kuang Wu, Dr. Chen-Fu Chou, and Dr. Yea-Li Sun for offering their insightful comments on this work. They asked me good questions to help me think through my problems. Besides, constructive suggestions were provided to make this study more complete.

I am also greatly indebted to my lab members, Chuan-Yin Wang and Chian-Chi Lin. We had many discussions together for my coding, numerical analysis and experimental statistics, even burned many nights in the lab. Zheng-Lin Li and Sol-Han Chang, thank you for sharing the experience and spirit in our research. The encouragement and supports of other friends in National Chengchi University are also gratefully acknowledged with special thanks to Lu-Te Chien, Chih-Hua Chang, Ying-Sheng Kuo, Yao-Hsien Wu,

Che-Kang Lu, and Cheng-Chang Tsai. I would like to express my special thanks to the friendship of Lee Hsu, thank you for your comments on the thesis writing.

Last, but not least, I would like to express my warmest gratitude and love to my father and mother, for everlasting patience, for educating me with constant unconditional support, for standing by me to pursue my future ideal. Yan-Ren and Ting thank for your many ideas of resolving the technical problems, for your listening to my complaints and frustrations, for giving me more self-confidence, and for believing in me. I have also benefited from discussions with you on various subject matters.

Above all of these, I would like to dedicate this thesis to my father and mother. I thank God for all this; I must confess that I am not the one who finishes this thesis. It is Him who works in me.

致謝

首先,請讓我對我的指導教授表達最深的感激,蔡子傑博士,他始終不斷地支持及非常專業地指導我。他告訴我要以不同角度的邏輯思考來解決研究過程遇到的問題,並希望我耐性地完成自己的目標。在這兩年中,他已成吾之良師益友,鼓勵我要面對挑戰,即使在我迷失自我時亦對我充滿信心。更重要地,在研究過程中,我感謝他在我數學分析方面的指導,豐富我許多知識與觀念。若沒有教授的鼓勵和協助,我無法完成這論文。

特別感謝我的口試委員: 吳曉光博士, 周承復博士, 孫雅麗博士, 深具洞察力地對這研究提供他們的見解。他們問我很多非常好的問題, 促進我對這些問題更深入地思考。此外亦提供非常建設性的建議讓這研究更為完整。

我也深深受惠實驗室同學王川耘及林建祈的許多幫忙。儘管無日無夜地待在實驗室熬夜,我們仍是一起討論程式的撰寫,數值的分析及實驗統計。李政霖和張碩漢,謝謝你們在研究時分享了你們的經驗和想法。 也謝謝政大其他朋友的鼓勵和協助,特別是簡盧德,張志華,郭穎生,吳 耀先,呂哲康和蔡承璋。我更要對許為義表達我的感謝,謝謝他在我論文 撰寫方面提供寶貴的意見。 最後但並非最不重要,我要對我父親及母親表示最溫暖的愛和感激之情,他們無怨無悔的耐心,無條件地讓我接受良好的教育,依傍在側支持我追求自己的未來。彦任和婷婷,謝謝你們在技術問題上提供的好點子,傾聽我抱怨和挫折,給我自信,永遠地信任我。在跟你們的每次討論中,我真的受惠良多。

最重要的,我要將這論文獻給自己的父親、母親。我也要感謝上 天;我必須坦承我絕非完成這論文的人,而是有上天協助我。