COMPUTATIONAL STUDY OF CORRUGATED WING IN UNSTEADY MOTION (MAV APPLICATION)

By

AAMER SHAHZD

(2009-NUST-MS-M&S-01)

A thesis submitted in partial fulfillment of

The requirements of the degree of

Master of Science Computational Science and Engineering

Research Centre for Modeling and Simulation

National University of Sciences and Technology

Islamabad, Pakistan

2011

To My Family for their Prayers without which I would not have been able to carry out my studies

ACKNOWLEDGEMENTS

First of all, I am thankful to Allah Almighty that completion of my thesis has seen the light of the day. *Al Hamdulillah Rabbal al Meen!* Further, I am indebted to Him for providing me strength, courage, skill and will to complete the thesis to my own satisfaction and to the requirements of my organization. It is a strenuous task to name all those individuals who have helped me professionally, technically and spiritually in this long journey of about one year.

As always, I am extremely grateful to my parents for their prayers and support. The excitement defy words to explain the role of my beloved wife, who stood by me in hard times and gave me much needed moral support. My daughter Shemza remained a source of "energizer." After spending a long day in computer lab, I used to feel as fresh as ever, after getting a glimpse of her at home.

I am deeply indebted to my supervisor **Dr. Hossein Raza Hamdani**, Visiting Professor, RCMS, NUST for his relentless guidance. Whenever I was stuck in a problem and my hope began to deteriorate, his one meeting was good enough to revive the zeal and motivation to explore, investigate, and find the solutions. This happened a plethora of times. He was never short of ideas and always has a way to carry the research forward. Working with him as a student, was an experience worth remembering. He has always been a constant example of wonderful human being and it was pleasing to learn from his life time experiences.

A sincere gratitude to my committee members **Dr. Khalid Parvez, Dr. Riaz Ahmed, Dr. Meraj Mustafa and Dr. Salim Uddin Zahir** for their supervision in my academic endeavors. I am grateful to **Mr. Sijal Ahmed** for his

training and help in learning to use FLUENT and GAMBIT and for providing related material.

I would like to thank Principal RCMS **Engg. Sikander Hayat Mirza** for his all out support in providing high specs workstations and UPS and granting permission to work in lab on weekends. The timely completion of simulations is a vivid reminder of those advanced systems specifically procured for my thesis.

I will not forget to acknowledge the role of my seniors Mr. Ammar Mushtaq, Mr. Junaid Ahmed, and Mr. Nabeel Qazi in learning the softwares and discussing various problems that arose during the course of time. I am thankful to my research group of Muhammad Nafees and Muhammad Aqib, with whom, working in a group was a real source of learning. In the end, special thanks are owed to my colleagues Umair Siddique and Usman Rauf who worked with us in the computer lab and made the environment sparkling.