UNIVERSITI TEKNOLOGI MARA

FLIGHT DYNAMIC STABILITY PERFORMANCE OF THE BASELINE-IX BLENDED-WING-BODY UNMANNED AERIAL SYSTEM USING FLIGHT SIMULATOR

SHAHREAN BIN ZAINURIN

MSc

August 2020

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 acknowledge or referenced work. This thesis has net 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.

Name of Student	:	Shahrean Bin Zainurin
Student I.D. No.	:	2019317117
Programme	:	Master of Science (Mechanical Engineering) - EM703
Faculty	:	Mechanical Engineering
Dissertation Title	:	Flight Dynamic Stability Performance of the Baseline-IX Blended-Wing-Body Unmanned Aerial System Using Flight Simulator
Signature of Student	:	…….
Date	:	August 2020

ABSTRACT

The flight quality or behaviour of a blended-wing-body (BWB) unmanned aerial system (UAS) could be gathered and evaluated through virtual simulation or software-in-the-loop (SITL) simulation. This is done through a specific setup between a ground control station (GCS) software, Mission Planner and a flight simulation software, X-Plane 11. BWB UAS flight dynamics, unlike conventional aircraft, can be unstable or have poor flying quality. Performing real flight testing can be very costly in the long run. The best solution to counter these drawbacks is to simulate flying behaviour virtually, before the first prototype is developed and before actual flight test is conducted. A specific and suitable simulation and testing is chosen to determine and improve the flight dynamics and behaviour of the BWB aircraft. Throughout this experiment, Baseline-IX BWB UAS, developed by Flight Technology & Test Center, Universiti Teknologi MARA (UiTM) was used as the model in the simulation software, which also provides the environment model, for example, wind, turbulence, time of day. A flight simulation was configured as per real flight and connected to the simulation computer, rather than the physical UAS.

ACKNOWLEDGEMENT

First and foremost, Alhamdulillah, thank you Allah SWT for giving me the strength and opportunity to embark on my master degree and for completing this challenging journey successfully. My gratitude and thank you goes to my supervisor, Dr Rizal Effendy bin M. Nasir for all his support and guidance through this knowledgeable journey.

My appreciation goes to the UiTM staff who provided the facilities and assistance during the development stage of this research. Special thanks to my colleagues and friends for helping me with this project.

Finally, this thesis is dedicated to my wife, Sabrina, who has been my backbone since day one. My parents, Mummy and Papa for their never-ending support and I am forever grateful for you two. Thank you, to my in laws, Mama and Baba and the rest of my family members for the support and always keeping me in your du'a. this piece of victory is dedicated to all of you.

To my two girls, Aleesya and Iman, hopefully this will be an inspiration to both of you when you grow older. Nothing is impossible in this world if you work hard towards it.

TABLE OF CONTENTS