UNIVERSITI TEKNOLOGI MARA

THE DOCTORAL RESEARCH ABSTRACTS

Volume: 8, Issue 8 November 2015

EIGHTH ISSUE

INSTITUTE of GRADUATE STUDIES

IGS Biannual Publication

11

Name :
Zurriati Mohd Ali

Title :
Effects of Canard Configuration on The Aerodynamics of Blended Wing Body at Low Mach Number

Supervisor :
Prof. Dr. Ir. Wahyu Kuntjoro (MS)
Prof. Dr. Wirachman Wisnoe (CS)

The Blended Wing-Body (BWB) aircraft is an unconventional aircraft that offers the aerodynamics performance advantages compared to the conventional aircraft. This type of aircraft has a unique design where the main body is blended together with the wing that gives the additional lift of the aircraft. In contrast to the conventional aircraft, the BWB has a poor stability due to the absence of the tail. A possible solution is by using a horizontal control surface, the canard, to improve the stability of the BWB. For this purpose, a comprehensive investigation of the aerodynamic behavior of the BWB with canard is important. The Computational Fluid Dynamics (CFD) and experimental testing were conducted to obtain the aerodynamics parameters of the BWB; lift, drag and moment coefficient. The BWB with different canard aspect ratio (AR) were compared with the BWB without canard to study the effect of the canard to the BWB and to assess which aspect ratio of the canard is beneficial to the BWB aerodynamics performance. In this study, the canard has a fixed area and the aspect ratio, AR that varies at 2, 4, 6 and 8. The computational analysis was made on a CFD code, NUMECA. The experimental works were performed on a scale model and tested in a low speed wind tunnel. Angles of attack, a varied from -10 to 10 degree, as well as canard setting angles, d. The investigations were carried out at Reynolds Number of 3 x 10_5. The results show that the canard contributes a small lift forces but with the increase of drag to the BWB. On the stability issue, the canard with higher aspect ratio has a significant effect towards the moment coefficient of the aircraft configuration where it improves the trim angle and moment at zero lift. All these results are encouraging enough for the canard to be considered as mechanism for controlling the longitudinal mode of the BWB aircraft