Master's Thesis Defense Announcement
Mechanical and Aerospace Engineering Department
University of Texas at Arlington

COMPUTATIONAL ANALYSIS OF CANARD WING TO UNDERSTAND BETTER SPAN SIZE & POSITION FOR CANARD AT TRANSONIC SPEEDS

By: Venkata Sai Bhanudeep Gandla

Thesis Advisor: Dr. Brian H Dennis

10 AM, Monday, May 19, 2025

Woolf Hall, Room WH200

Abstract

A computational study was conducted to investigate the effect of vertical & horizontal canard locations from the fuselage reference line (FRL) on the formation of boundary layers over the sweepback and tapered wing of a typical canard aircraft model due to variation of span ratio. A model aircraft was replicated and developed in CAD based on NASA experimental research on canards. Three vertical canard locations—mounted at + 0.185, 0, and -0.185 concerning the fuselage reference line are a possibility to study the canard effect on the wing & as the –0.185 configuration showed negligible aerodynamic impact, this paper focuses exclusively on the + 0.185 (high) and 0 (mid) positions. In this thesis, a study is performed to see how aircraft performance is enhanced by varying the canard span. Most specifically, the study investigates the interrelationship between the canard span ratio and the wing.

The boundary layers observation is of high priority in this computational analysis by changing the canard span, hence seven span-wise stations are selected to observe the flow characteristics on the wing in the presence of the canard & various canard spans. Therefore, 25%, 30%, 50%, 60%, 75%, 90% & 100% of the wing semi span are sliced with the help of post processing to observe changes in flow. The flow characteristics were studied at various angles of attack varying between -7 ° and 22° for Mach numbers of transonic speeds of 0.7, 0.95 & 1.2 to their Reynolds number.