Compressibility effects for the AGARD-B model

S. Tuling
stuling@csir.co.za
B. Vallabh and M.F. Morelli
CSIR
Pretoria
South Africa

ABSTRACT

A numerical study of the flow topologies over the 60° delta wing of the AGARD-B model at Mach 0·80 has revealed that vortex bursting occurs between 13°-15° angle-of-attack, while vortex separation occurs above 18°. These aerodynamic features have been identified as additional comparison criteria which need to be replicated for facilities using the model for calibration or inter-tunnel comparison purposes. The numerical simulations were performed using ANSYS Fluent V13, a structured mesh with near wall treatment and the Spalart-Allmaras and κ-ω SST turbulence models, and validated experimentally in a 5' × 5' transonic facility. Other aspects not previously identified or studied are firstly a recovery shock between the primary and secondary vortex that exists only when vortex bursting occurs, and secondly the lack of a shock between the wing and vortex when the flow topology corresponds to the centreline shock region as observed in other studies.

Paper No. Manuscript received 14 February 2014, accepted 15 September 2014