Compressibility effects for the AGARD-B model

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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.