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Analytical Study of Double Wedge Airfoil for Supersonic Applications and Shape Modification for Subsonic Applications

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Abstract: *A Double Wedge airfoil is an airfoil for supersonic blades and wings, with a wedge like tapered sharp leading and trailing edges. The shock waves and the expansion waves govern the supersonic characteristics of the double wedge airfoil. The present work is based on the design and aerodynamic analysis of double wedge airfoil at supersonic regime and shape modification of the airfoil for subsonic regime. The flow analysis is carried out using ANSYS Fluent, which is CFD based software. The supersonic analysis is performed for Mach number of 2.0. The airfoil was modified for subsonic applications and the analysis was performed for Mach number 0.7. Blowing technique was incorporated to further improve the aerodynamic performance of the modified double wedge airfoil. From the simulated results, it was found that the co-efficient of drag of double wedge airfoil at Mach number of 2.0 agreed with the manual calculations. The modified airfoil gave optimum performance with the addition of a blowing stream at subsonic speeds.*

Keywords: Double Wedge Airfoil (DWA), Computational Fluid Dynamics (CFD), Shock Wave, Mach Number, Co-efficient of Drag, Co-efficient of Lift

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