

Abstract Submitted  
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**Lift enhancement by thermal forcing at the trailing edge** SUMIT VASHISHTHA, MF BAIG, NADEEM HASAN, Aligarh Muslim University — Using numerical simulations of Viscous Compressible flow around a canonical case of 2-D flat plate airfoil, it is shown how a simple yet unexplored active flow control method - Thermal Forcing at the trailing edge - can enhance the lift to drag ratio by as much as 60% at low Reynolds numbers and low angles of attack. Here thermal forcing at the trailing edge implies heating a small portion - 5% of the chord length - at the lower surface of the trailing edge. Moreover, such active control when applied at locations upstream of the trailing edge is ineffective in enhancing the lift to drag ratio and most of the energy supplied is simply drained without influencing the aerodynamic performance. Application of the control on the upper surface in fact deteriorates the lift to drag ratio. A Vorticity Dynamics analysis reveals that, for the case of thermal forcing at the trailing edge, the viscous term in vorticity evolution equation for viscous compressible flows acts as a strong source of negative vorticity near the trailing edge. The negative vorticity thus generated induces an additional clockwise circulation around the airfoil and thereby enhances the lift.

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