

Control Flow around NACA 4415 Airfoil Using Slot and Injection

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Abstract : One of the most vital aerodynamic organs of a flying machine is the wing, which allows it to fly in the air efficiently. The flow around the wing is very sensitive to changes in the angle of attack. Beyond a value, there is a phenomenon of the boundary layer separation on the upper surface, which causes instability and total degradation of aerodynamic performance called a stall. However, controlling flow around an airfoil has become a researcher concern in the aeronautics field. There are two techniques for controlling flow around a wing to improve its aerodynamic performance: passive and active controls. Blowing and suction are among the active techniques that control the boundary layer separation around an airfoil. Their objective is to give energy to the air particles in the boundary layer separation zones and to create vortex structures that will homogenize the velocity near the wall and allow control. Blowing and suction have long been used as flow control actuators around obstacles. In 1904 Prandtl applied a permanent blowing to a cylinder to delay the boundary layer separation. In the present study, several numerical investigations have been developed to predict a turbulent flow around an aerodynamic profile. CFD code was used for several angles of attack in order to validate the present work with that of the literature in the case of a clean profile. The variation of the lift coefficient CL with the momentum coefficient

Keywords : CFD, control flow, lift, slot

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