

ACTIVE CONTROL OF TURBULENT SEPARATION WITH AIR JET VORTEX GENERATORS

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In this work we present the results of experimental study of control by air jet vortex generators the turbulent separation. The delaying of boundary layer separation is important in aspect of high lift generation and drag reduction. Among of many passive mechanical turbulizators we notice this shapes with produce counter rotating vortex. One of this techniques was proposed by Szumowski and Wojciechowski where two semi circular rods was set up in V-shape to produce streamwise vortices in turbulent boundary layer. Another is presented by Godard and Stanislas whose study thin plates vortex generators to generate co-rotating and counter-rotating vortices.

Another group of devices for decreasing of separation are jet turbulizators. This devices can be a basic line of holes with increase energy in turbulent boundary layer, or more sophisticated combinations to generate streamwise sheet vortices like this described by Godard and Stanislas. Our active vortex generator is made by continuous slot witch characteristic shape.

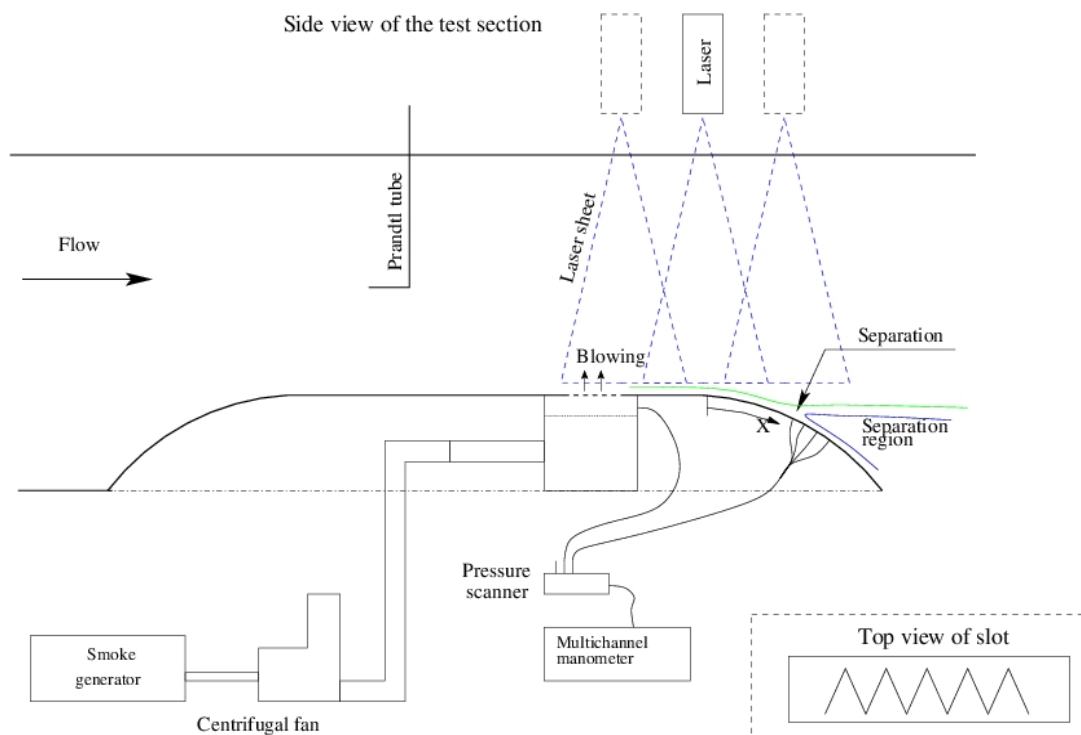


Fig. 1: Experimental setup

The investigation show that this provide similar effect as passive vortex generators proposed by Szumowski and Wojciechowski. The conditions of experiments in both cases where

similar. Typical flow velocity of the free stream was 20m/s with turbulence level around 1,2%. Separation was tested on curved shape with radius $R=500\text{mm}$. During experiments the pressure distributions, oil and smoke visualizations on curved surface were performed. The optimization of jet flow rate vs. stream velocity was done with pressure coefficient containing pressure profiles along curved shape.

References

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