

EXPERIMENTAL TECHNIQUES OF THE STUDY OF VORTEX STRUCTURES CAUSED BY POINT INJECTION ON THE LEADING EDGE OF THE OBLIQUE WING

S.N. Tolkachev, V.N. Gorev, G.M. Zharkova, V.N. Kovrizhina

***Khristianovich Institute of Theoretical and Applied Mechanics SB RAS,
630090 Novosibirsk, Russia***

Key words: oblique wing, cross-flow instability, leading edge, visualization, thermoanemometry, liquid-crystal thermography, point-source blowing, streamwise vortices

The boundary layer of the leading edge of the oblique wing is complex object for investigations, so two methods are tested to reveal the flow structure after the airjet, which was injected from the hole near the attachment line.

The numeric results of the velocity disturbance distribution in the boundary layer near the attachment line were received by the thermoanemometry technique. It was found out, that the boundary layer become less stable, when a stationary vortex modifies the flow. The liquid crystal thermography technique allowed to expand the workspace for investigations up to 70° from the attachment line, to receive the visualization pictures of disturbed flow for several regimes of blowing, to reveal an influence of the blow velocity on dimensions and trajectory of stationary disturbances, which were induced by injection. The results of visualizations are in a good agreement with thermoanemometry results.

The general result of the work is that the weak point injection can be used as a tool to study the boundary layer of the oblique wing leading edge. Strong injection results in the flow complication and heavy non-linear effects, thus it is an independent subject of research which results can be utilized for flow control and icing problems solution.