

EXPERIMENTAL INVESTIGATION OF UNSTEADY REGIMES IN VORTEX WAKE / SHOCK INTERACTIONS

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The results of experimental investigation on interaction of a wing wake with shock waves are presented. Experiments performed with bow shock in front of the cylinder with flat end and with oblique shock in front of wedge with a sharp leading edge. The results of a large series of experiments conducted in supersonic wind tunnels T-313 and T-326 of ITAM SB RAS at Mach number of 3 and 6 are discussed. The wing with a sharp leading and trailing edges was used as a vortex wake generator. It was placed at different angles of attack in order to generate vortices of different intensity. During the vortex / bow shock interaction two different interaction regimes depending on the distance between vortex generator and the cylinder were observed: open-like cavity and closed-like cavity. During the vortex wake / oblique shock wave interaction at $M = 6$ and the flow deflection up to 30 degrees strong interaction mode with the formation of reverse flow was not observed. Vortex core passes through the shock without being destroyed and induces an area of low pressure at the surface of the shock wave generator. At Mach number of 3 moderate or strong interactions were observed depending on the shock wave intensity. Strong interaction regime which is accompanied by destruction of the vortex and the formation of reverse flow region is realized at the flow deflection angles greater than 18 degrees.

Key words: shock-vortex interaction, unsteady process, pressure pulsation measurements, flow visualization.