INVESTIGATION OF THE PARAMETERS OF A SONIC BOOM FROM A CIVIL AIRCRAFT WITH NON-CONVENTIONAL CONFIGURATION

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The limited possibilities of the traditional methods by SB level reduction on the background progress ecological limiting a non-traditional methods are stimulate. Following the principle of minimizations about concentration the disturbed pressure on the nose part of aircraft the authors perform the numerical investigations of the effect of lift re-distribution over the body length on the SB parameters in the case of tandem of two wings on the fuselage.

It is shown that the re-distribution of lift part into the aircraft nose section enables to decrease significantly (to 60%) the bow shock wave intensity (comparing to the initial – monoplane – configuration). Regarding the ratio of the front and back wings and their mutual disposition on the body, the SB intensity reduces both due to the middle zone effect and at the pressure profile approaching to the N-shape.

There are several versions of schemes providing the improvement of the aerodynamic efficiency, which show the promising future of such a configuration Modern calculation methods of SB parameters investigation mean the complex approaches involving the determination of disturbed flow parameters in the near field with the aid of numerical methods based on Euler equations integration followed by their conversion for big distances with a quasi-linear theory.

The numerical-simulation results are compared to the experimental pressure profiles measured in the near field and with the results of their re-count for the big distances. Such validation permits to define the adequacy degree of the non-viscous Euler model for the stated task solution. The obtained results confirm the possibility to reduce the SB level in the SCA with the non-conventional wings on the fuselage.

The obtained results can be used in the aviation industry.

Supersonic aircraft, sonic boom, tandem configuration, numerical simulation, validation.