4 Conclusions

1. In the paper the new method of stability problem solving of the boundary layer is proposed, which is based on an evolutionary perturbations development in time.
2. Influence of the gas blowing direction through a porous surface on the supersonic boundary layer stability was studied for the first time. In the contrast to the strong influence of normal blowing on the boundary layer stability, tangential blowing has a little effect on it.
3. The developed method will be used in problems of the supersonic boundary layer stability with blowing of foreign gases, and the numerical scheme will be work for modeling of nonlinear problems of the laminar-turbulent transition.

This paper has been supported by Russian Foundation for Basic Research (project No.15-01-00866a).

References:

[1] S.S. Kutateladze, A.I. Leontiev, *Heat-mass exchange and a friction in a turbulent boundary layer*, Moscow, Energoizdat, 1985 (in Russian).

[2] E.P. Volchkov, *Wall gases curtains*, Novosibirsk, Nauka, 1983 (in Russian).

[3] J. O Powers., G. Heiche, and S. F. Shen, *The Stability of Selected Boundary-Layer Profiles* // NOLTR 62-143, 1963.

[4] S.A. Gaponov and A.A. Maslov, *Disturbance Development in Compressible Flows*, Novosibirsk, Nauka, 1980, (in Russian).

[5] S.A. Gaponov and N.M. Terekhova, Three-Wave Interactions between Disturbances in the Hypersonic Boundary Layer on Impermeable and Porous Surfaces. *Fluid Dynamics*, 2009, Vol. 44, No. 3, pp. 362–371.

[6] S.A. Gaponov and N.M. Terekhova, Stability and Three- Wave Interaction of Disturbances in a Supersonic Boundary Layer with Mass Transfer on the Wall, *Teplofiz. Aeromekh*. 2012, Vol. 19, № 3, P. 301-316.

[7] D.W. Dunn, C.C. Lin, On the stability of the laminar boundary layer in a compressible fluid, *J.Aero.Sci*., Vol.22, No.7, 1955, pp.455-477.

[8] M. Gaster A note on a relation between temporally increasing and spatially increasing disturbances in hydrodynamic stability, J. *Fluid Mech.*, 1962, Vol. 14. P. 222-224.

[9] L.G. Loitsjansky, *Mechanics of Liquid and Gas*, Moscow, Nauka. 1973, (in Russian).

[10] M.A. Alekseev, *On asymptotic approximations in the laminar boundary layer stability problem at supersonic speeds*, TSAGI, issue 1420, 1972 (in Russian).

[11] V. M. Kovenja, *Differential methods of the solution of multidimensional tasks*. Novosibirsk, NGU, 2004, (in Russian).

[12] Mack L. M. Computation of the stability of the laminar compressible boundary layer. New York: Academic Press, in "*Methods in Computational Physics*" (B. Alder, ed.), 1965, Vol. 4, 247-299.