HYPERSONIC FLOWS SIMULATION USING PARALLEL PROGRAM COMPLEX "EXPRESS-3D"

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ABSTRACT   This paper presents an experience in using a program complex Express-3D. The program complex uses the explicit variant of kinetically consistent finite difference schemes based on quasi gas dynamic (QGD) equation system. QGD equation system differs from Navier-Stokes equations in specific additional dissipative terms. These terms serve as efficient numerical stabilizers. The used algorithm allows simulate gas flows in a wide diapason of Mach numbers with minimum changes in program code. New version of program complex Express-3D uses multi block non orthogonal structured hexahedral grids. This permits to solve problems with complex geometry. On the other hand, the computational algorithm for structured grid is usually much simpler than for widely used unstructured tetrahedral grids. The method of difference scheme construction on non-orthogonal grids is described. The program complex showed a good efficiency in solving a set of problems including subsonic and supersonic flows. Here we present some new results of using this program complex for the problems of hypersonic flow/boundary layer interaction. The simulations results are discussed and compared with known experimental data.