

# **Possibilities of direct methods for solving kinetic equations in the study of microflows**

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## **Abstract**

The methods of direct solving the Boltzmann and other kinetic equations have been developed in the last decades. These approaches have some advantages in the study and simulations of microflows, in comparison with popular DSMC methods, in particular, for simulating slow subsonic and unsteady flows as well as for constructing hybrid and parallel algorithms (and implicit and high order schemes). In the present paper we describe recent results and future possibilities of direct methods of solving kinetic equations for the investigation of a wide circle of problems of rarefied gas dynamics and gas kinetics. The possibilities of UFS (Unified Flow Solver) with the hybrid schemes are overviewed. Steady and unsteady problems for simulating microflows are solved. A special attention is paid to the new effects at the microscale predicted by the kinetic theory which could be useful from the point of view of innovative technologies. These effects related to the nongradient transfer with anomalous transport properties in the nonequilibrium relaxation spatial zones are considered and discussed.