Materials of Conferences

KINETIC EQUATIONS FOR THE TRIPLE COLLISIONS OF MOLECULES

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State of gas determined by interaction of molecules each other and with the boundaries of the solid or liquid bodies. The concept of elastic collisions play an important role in physics, as collisions often have to deal with physical experiment in the field of atomic phenomena. The interaction of particles may be a variety of processes. The process of collision is to change the properties of the particles as a result of interaction. Conservation laws provide an easy way to set the ratio between the various physical quantities in the collision of particles [1]. In this paper we consider the interaction of molecules with potential for pair and triple elastic collisions of particles. Gas properties with noticeable influence of triple collisions will differ from the usual properties due to the collision of the particles each other and with the solid surface. In accordance to Gibbs formalism considers not a single system, but the ensemble of them in 6-*N* dimensional *G*-space, with system's distributed according to the *N*-particle distribution function. Such an ensemble is described by the famous *Liouville* equation. The statistical independence of three particles before collision, solution of equation is $f_3(t, \tau_1, \tau_2, \tau_3)=f_1(t_0, \tau_{10})f_1(t_0, \tau_{20}) f_1(t_0, \tau_{30})$, $\tau_{a0} = \tau_{a0}$ (t, t_0, τ_1, τ_2, τ_3) - coordinate and impulse values which particles at the moment t_0 for that at the time t get into given points τ_1, τ_2, τ_3 of the phase space. Now, let's move from f_1 to $f = Nf_1$, and find kinetic equation in the form of

$$\frac{\partial f}{\partial t}+\bar{\xi}\nabla f = St_2 f + St_3 f, \quad St_2 f(t,\tau_1) = \int \frac{\partial F_{12}}{m}\frac{\partial}{\partial \xi}\left\{S_{12} f(t,\tau_1) f(t,\tau_2)\right\} d\tau_2$$ - Integral for pair collisions

$$St_3 f(t,\tau_1) = \frac{1}{N}\int \frac{F_{12}}{m}\frac{\partial}{\partial \xi}\left\{R_{123} f(t,\tau_1) f(t,\tau_2) f(t,\tau_3)\right\} d\tau_2 d\tau_3$$ - Integral for triple collision

As processes for $R_{123} \neq 0$ which are including not only the triple collisions, but also combination of several pair of molecules [2].

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PARALLEL COMPUTING SYSTEM OF MONTE CARLO METHODS

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The parallelization of computations for the high-productive supercomputer systems appears to be one of the main ways of development of the modern computational mathematics. The supercomputers are the more and more widely used for a solution of the fundamental and applied problems in the areas of nuclear physics, climatology, economics, pharmacology, modeling of the training devices, and of the virtual reality, computational aerodynamics. Due to those specific features of the Monte Carlo methods, which were repeatedly stressed in the present paper, the statistical modeling begins to play the more and more noticeable role in all, indicated above areas of science and techniques. For these reasons, the actuality of the problems mentioned is growing very considerably, taking into account the fact that the computational aerodynamics is the most promoted area of the elaboration, development, and application of the Monte Carlo methods [1]. As the mentioned above features of these methods permit to state, that the numerical schemes of a statistical modeling might be, in quite a natural way, transferred onto the parallel processors. Clearly, the successive modeling of the independent trajectories should be entrusted to the individual processors, while the information for the averaging will be gathered by a server [2]. In this case, the productivity of the method is growing in direct proportionality to the number of parallel processors.

Nowadays, as computer processors become cheaper and more plentiful, there is great potential for having them compute together in a coordinated application. A major point of parallel computing is how to coordinate communication between the