CONCLUSIONS

Various collisional processes occurring in particle-laden gas flows are considered. Such processes include collisions of particles with one another ("particle–particle" interaction), collisions of particles with the surfaces ("particle–wall" interaction) which bound a flow, and collisions of particles with bodies subjected to a heterogeneous flow ("particle–body" interaction). The indicated processes may play a significant part in the formation of the statistical characteristics of particle motion and, consequently, affect the characteristics of the gas flow carrying them.

The basic results given in the book include:

1) the suggested technique of analyzing the processes of relaxation of the velocities of particles in the presence of collisional processes;

2) the solution of a large complex of metrological problems associated with the diagnostics of the structure of particle-laden turbulent flows of gas (including heavily dusted ones);

3) detailed analysis of the characteristics of motion of particles and of their inverse effect on the parameters of carrier gas under conditions of flow in vertical pipes and of flow past bodies;

4) the introduction and verification of dimensionless parameters (Stokes numbers) responsible for the presence and intensity of various collisional processes in heterogeneous flows.

The investigations referred to in the book are not characterized by a clearly defined application pattern, therefore the results obtained will find application in the most diverse spheres of human activities. We will take a brief look at possible spheres of practical utilization of these results.

The suggested classification (Chapter 1) of turbulent heterogeneous flows and dimensionless parameters (Stokes numbers) can be used to estimate in advance (before carrying out investigations) the presence and intensity of the determining interphase interactions and collisional processes. Thus, we may recommend the classification developed to be used in statement of theoretical and experimental investigations of different types of multiphase flows.

Numerous modes of gas suspension flows, the attempt at classification of which is described in Chapter 1, resulted in the development of a significant number of mathematical models of two-phase flows. Chapter 2 contains the description of the algorithm suggested by the present author for the generalized computer model for specialists to aid them in selecting specific mathematical models for calculating a wide range of applied and research problems.

The developed procedures of measurements in heterogeneous flows open up extensive possibilities for improving the diagnostics of multiphase flows. The diagnostics of heterogeneous flows pursue two objectives: 1) the determination of the characteristics of flow for the purpose of maintaining optimal process conditions and 2) the acquisition of data to be employed in calculations of concrete technological processes.

The results of investigations given in Chapter 3 allow one to *a priori* determine the parameters of heterogeneous flows, for which account for interparticle collisions in carrying out calculations is indispensable.

The analysis performed in Chapter 4 for the force factors that lead to settling out of particles on channel walls can be employed for optimizing pulverized-coal ducts and pneumatic conveyers of loose materials, that is, the facilities which in the nearest future will possibly compete advantageously with automobile and railway transport. As the conducted research has proved, account for the actual roughness of walls of conveyers will make it possible to considerably reduce energy expenditures on transportation and avoid clogging of the transported material.

The results of investigations given in Chapter 5 allow one to predict the pattern of heterogeneous flow past differently shaped bodies. The knowledge of the fields of velocities and concentrations of particles in the vicinity of the stagnation point of a body exposed to flow, as well as in a boundary layer developing along its surface will make it possible to correctly calculate the thermal and erosive effect of particles on the surface of bodies. This is important for designing solid–fuel combustion chambers, heat exchangers with two-phase working media, as well as flying vehicles moving in a dust-laden atmosphere.

In hope that this monograph will evoke interest among students, postgraduates, and researchers involved in investigations of hydrodynamics and heat transfer in solid particle-laden flows and will give the stimulus for the further development of the theory of multiphase flows.