The influence of random statistical parameters on the irregularity localization of particles in a supersonic carrier flow

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In this paper, the issues of the distribution of metallized high-density particles in a supersonic flow of non-reacting gas are considered. An algorithm for processing calculated data based on a probabilistic approach for trajectory estimation of the distribution of dispersed phase particles in cross sections of a two-phase flow is proposed. The experimental part of the study was carried out on a model laboratory installation with subsequent validation of the mathematical models used based on a comparison of calculated and experimental data. The determination of the characteristic value of the parameter of the discrete-continuous transformation of the flow rate function of condensed particles is carried out on the basis of comparing the experimental data obtained as a result of the conducted research at the experimental facility with the results of the mathematical modeling of this experiment. Based on the analysis of the obtained computational results and experimental data, it was found that for a dispersed phase with a size from 15 to 40 μm in a supersonic carrier flow in conditions of presence or absence of the impact of a demolishing flow at a value of relative velocity pressure up to $k = 4$, the standard deviation of the spatial localization of particles relative to its trajectory will be lie in the range from 4.8 to 5.4 mm.