Formation of aerosol of conducting liquid in the presence of electric discharge

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In this work the characteristics of a spray of a conductive liquid (a weak solution of sodium chloride in water) created using a centrifugal type nozzle and in the presence of an electric discharge in the area of existence of a gas-droplet flow were measured. The measurements were carried out by the method of double shadow microphotography, which, after computer processing of the obtained images, makes it possible to obtain the distribution of droplets over the diameter, the distribution of the components of the drop velocity vector over the diameter, and also to calculate the average characteristics of the spray (average diameter, Sauter diameter, average speed, etc.). The measurements of the spray properties were carried out at different points in space relative to the region of existence of the discharge plasma. The current-voltage characteristic of the discharge in the presence of a two-phase medium in the region of its existence is measured, and the energy input of the electric discharge into the gas-droplet flow is also calculated. The dependence of the droplet velocity on the power of the electric discharge, in which there is a local maximum, is obtained. The presence of an extremum in this dependence indicates two mechanisms of the effect of the discharge on the two-phase flow: heating, determined by the discharge current, and droplet acceleration in the electric field, which depends on the interelectrode voltage.

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