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# DETERMINATION OF PLASMA PARAMETERS IN A JET OF A GAS-DISCHARGE SOURCE USING AN INSULATED PROBE SYSTEM WITH CYLINDRICAL ELECTRODES

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The aim of this work is to develop a procedure for determining the ion dissociation degree and the electron density in a supersonic jet of a gas-discharge source of collisionless plasma from the results of measurements of the current collected by an insulated probe system with transversely oriented cylindrical electrodes. Based on a mathematical model of current collection by an insulated probe system and an asymptotic solution for the probe current in the electron saturation region obtained previously, new computational formulas for plasma parameter determination are derived. It is shown that, in comparison with a single Langmuir probe, an insulated probe system provides more information in diagnosing a jet of a gas-discharge source of laboratory plasma.

The effect of the probe to reference electrode current collection area ratio and the probe measurement errors on the plasma parameter determination accuracy is studied numerically. Within the framework of the mathematical model of current collection, an analysis is made of the effect of the geometrical parameters of the insulated probe system on the method error in plasma parameter determination using the asymptotic solution for the probe current in the electron saturation region. For the determination of the ion dissociation degree, optimal values of the insulated probe system's bias potentials and geometrical parameters (probe to reference electrode area ratio) are found. For the adopted assumptions, the reliability of ion dissociation degree and electron density determination is estimated as a function of the geometrical parameters of the insulated probe system and the probe current and probe potential (relative to the reference electrode) measurement accuracy.

The obtained results may be used in the diagnostics of the laboratory plasma of a gas-discharge source with ion acceleration in the electric field of the jet.

***Keywords***: *collisionless plasma jet, ion dissociation degree, electron density, mathematical model of current collection, estimation of parameter determination error.*

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