Mathematical modeling of rf plasma flow at low pressures in vacuum chamber with charged sample

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RF plasma at low pressures ($p = 13.3-133$ Pa) with gas flow is effectively used for modifying the surfaces of materials of organic and inorganic nature [1]. This type of plasma has the following properties: degree of ionization is 10^{-4}-10^{-7}, electron density is 10^{15}—10^{19} m^{-3}, the electron temperature is 1—4 eV, the temperature of the atoms and ions in the bunch $(3-4)\times10^3$ K in the plasma jet $(3.2-10)\times10^2$ K. The main feature of RF plasma flow at low pressure is that for neutral component plasma flows in a transitional mode between the continuum mode and free-molecule flow, the charged components can be approximated of continuous medium [2–4]. Calculations of the flow of RF plasma with sample are completed. The distributions of the velocity modulus, pressure and temperature of the carrier gas argon and the electron density, electron temperature, electric field are obtained. The reported study was funded by Russian Science Foundation, according to the research project No. 19-71-10055.

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