GAZODYNAMIC MODELING OF GATCHINA DISCHARGE

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Long-lived plasmoids realized in the Gatchina discharge are of interest because at present there is no single point on the nature of these objects. The electric, so-called, Gatchina discharge is realized when energy is introduced between two electrodes, one of which is located on the bottom of a vessel filled with liquid (water) and the other above the surface of the liquid. As a result of the energy input, one part of it passes into the liquid with the formation of active particles upon dissociation of water, the other near the upper electrode. In this case, the upper electrode is heated to the melting point during the discharge pulse. Later, a luminescent sphere appears near this electrode, and it rises up. These objects exist from milliseconds to a fraction of a second and have dimensions up to 10-12 cm [1]. Their temperature varies in the range from 300 to2000 K. In [2], based on gas-dynamic calculations, it was shown that these objects have a vortex structure, which was confirmed in [3].

When simulating a plasmoid, we used the ascending velocity and the data on the energy input in time. The Navier-Stokes equations took into account the corresponding boundary conditions, similar to the conditions of known experiments.

Our calculations confirm the vortex nature of the object. It is shown that not all of the energy goes into the dynamics of the motion of the plasmoid, some of its energy goes into radiation.

References

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