STUDY OF THE DISCHARGE WITH AN ELECTROLYTIC ELECTRODE (GATCHINA'S DISCHARGE)

S.E. Emelin, *V.L. Bychkov, A.A. Kudryavtsev, A.M. Astafiev
Saint-Petersburg State University, St. Petersburg, Russia
**Moscow State University, Moscow, Russia*

Gatchina's discharge [1, 2, 3] is one of the most interesting experimental devices that gives a possibility to model some properties of the ball lightning on the base of a non-ideal dusty chemical plasma. It is a discharge between the surface of a low conductive solution and a metal or carbon central electrode isolated from the water via a fused silica tube.

In this work we report studies of a discharge between the surface of a low conductive solution and the carbon electrode. The aim of our researches was to investigate a space-temporal dynamics of the dust component of the Gatchina's discharge plasma and its influence on the formation of an afterglow.

For this purpose, electric parameters of the discharge, signals from electric probes placed under the water surface and a radiation intensity in the visible range were measured and a video recording through optical light filters was carried out.

We showed that under the initial voltage of a storage capacitor (600 μF) ~ 5 kV and a current attaining at maximum of a magnitude about tens of Amperes a characteristic feature of the discharge is a setting in of a uniform current distribution with a low density (~ 0.1 -1 A/cm^2) over the electrolytic anode surface, while at a sufficient decrease of the current a transition to a non-uniform distribution with a current density occurs by three order of magnitude greater.

In the present report we also point out differences between the discharge modes of opposite polarity and with a help of an additional experiment indicate a nature of the current distribution peculiarity.

References

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