PARAMETERS OF CHARGED PLASMOIDS

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Heterogeneous charged structures were obtained experimentally in our works [1] when Heterogeneous structures with a cladding were obtained experimentally in our works [1] using a capillary corona discharge, the jet of which was directed to an alloy of lead and tin.

Some of the plasmoids finished with explosion. Attempts to investigate them were crowned with success, only when plasmoids fell into a cuvette with water. In this case, it was possible to separate the plasmoid structure into a core and a shell. An estimate of the energy of such a core going to melting and boiling showed a value of the order of 109 J / cm3. The lifetime of such an object was 2 s or more.

High-energy plasmoids are of interest from a point of view of additives in plasma combustion. In the plasma of the capillary discharge, only the neutral plasmoids can be created because of the quasineutrality of the plasma. However, when a charged target is used, it is possible to transfer an excess electric charge to such a plasmoid. In this case, the parameters of such a plasmoid and the nature of its movement in the air will differ from those inherent in the electroneutral one. A similar situation can be realized in the study and charged large aerosol particles.

The aim of the work was to elucidate the energy parameters of such particles, depending on their charge and shell thickness. The character of the motion parallel to two charged aerosols is also considered.

To clarify the energy parameters, the problem of the energy of a charged sphere filled with a metal vapor was solved. The surface tension of the surface of the sphere, atmospheric pressure, Coulomb repulsion, polarization compression, and vapor pressure of the metal expanding the sphere were taken into account.

In the table, the parameters of aerosol particles are given, a is the thickness of the shell, R is the radius of the particle, and E is its energy.

|  |  |  |  |
| --- | --- | --- | --- |
| a, micrometer | R, cm | Q, micro Cu  | E, J/m3 |
| 100 | 0.5 | 100 | 1∙108 |
| 100 | 0.1 | 100 | 3∙1010 |
| 10 | 0.5 | 100 | 1∙108 |
| 10 | 0.1 | 100 | 1∙1011 |
| 10 | 0.5 | 1 | 1∙106 |
| 10 | 0.1 | 1 | 4∙108 |

Calculations confirm an opportunity storing of energy by such aerosols .

References

1. Bychkov V.L., Chernikov V.A., Osokin A.A., Stepanov A.I., Stepanov I.G. Modeling of Artificial Ball Lightning with a Help of Capillary Discharge. IEEE Trans. Plasma Sci. vol. 43, N. 12, 2015, P. 4043-4047. DOI: 10.1109/TPS.2015.2478441.