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Investigation of the electrolytes rotation dynamics in dc-magnetic field

D.O. Derecha, Yu.B. Skirta

Institute of Magnetism, Natl. Acad. of Sci. and Min. of Educ. and Sci. of Ukraine. Akad. Vernadskogo blvd. 36-b, Kyiv-03142, Ukraine.
E-mail: dderecha@gmail.com

Nowadays a great attention attracted to the study of the metal surfaces with electrolytes interaction under the influence of an external magnetic field, in particular to the spontaneous formation of spatial structures. However, the works devoted to studying changes in the structure and dynamic properties of electrolytes more theoretical, which is caused with the complexity of the experiment and the inability to use traditional methods.

In the some works [1] showed that during corrosion ferromagnetic sphere in dc- magnetic field at its equator the "sphere-like" electrolyte flows arise. We tried to determine the characteristic frequencies of these processes. We used the steel ball placed on a non-conductive holder in a quartz cell filled with a 7- percent solution of nitric acid. The dc-magnetic field with 0.16 Tesla intensity was directed in a horizontal plane. The electrolyte solution was translucent by semiconductor laser beam. The beam changes were recorded to the video. Further processing consisted in the decomposition of the video to images. Construction of maximum and minimum changes maps in each point of the image and averaging the results obtained in accordance with the selected thresholds. The last step consisted in the Fourier transformation and frequency dependencies formation of the electrolyte rotation.

The results of the current work shows that the developed data processing technique provides the possibility, without the structure of the electrolyte changing, to determine the dynamic characteristics of the rotational movement of electrolytes during chemical reactions in a magnetic field. Overall, the developed technique, with some modifications, can be used to examine the frequency characteristics of the movement of fluids, gases and small objects without direct influence on the investigation environment.

1. *Ilchenko M.Yu., Gorobets O.Yu., Bondar I.A., Gaponov A.M.* Influence of external magnetic field on the etching of a steel ball in an aqueous solution of nitric acid//JMMM.–2010.–322.–P.2075–2080.