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RESEARCH TESTS OF ION THRUSTER WITH ELECTRODES OF ION-EXTRACTION SYSTEM MADE OF CARBON-CARBON COMPOSITE MATERIAL

Abstract

The paper is devoted to research tests of low-power radio-frequency ion thruster (RIT) with electrodes of ion-extraction system made of the carbon-carbon composite material based on non-woven reinforcing frame Ipresskon® (CCCM-Ipresskon®), developed by the JSC Kompozit. The main properties of such material and its advantages in comparison with other materials used to manufacture both emission and accelerating electrodes of the ion-extraction systems of ion thrusters are presented. RIT with electrodes made of CCCM- Ipresskon® passed research tests with duration of about a thousand hours at the test facility of RIAME MAI. The paper presents data on changes in the main operating parameters of RIT, taken during the tests. The influence of deposition of the accelerating electrode sputtered material on the walls of the RIT discharge chamber on the ionization rate of the plasma-forming gas was also investigated. After the tests, the structure of the electrodes was examined using an electron microscope. The accelerating electrode erosion rate and pattern were estimated by profilometer. The erosion pattern obtained experimentally was compared with the one calculated by the software package IOS-3D.