EXPERIMENTAL STUDY OF THE PARAMETERS OF AEROSOL PARTICLES IN A HEAT PIPE

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A model of a plasma photoelectric converter (PPEC) based on a heat pipe filled with a mixture of alkali metal vapor and inert gas was proposed [1]. Alkali metal vapor is concentrated in the cathode region, the anode part is filled mainly with inert gas, and a transition region is formed in the place of the external cooling circuit, which is characterized by the presence of a micro droplet component. The efficiency of the PPEC depends on the conductivity of the transition region and its optical properties. Previously, the effect of the aerosol component on increasing the plasma conductivity and forming an abnormally high optical density in the infrared region of the spectrum was noted [2].

In this study, the parameters of the microdroplet component in the cooled zone of a heat pipe in Na+He and Na+Kr mixtures measured by the visualization method are presented.

The optical observation system consisted of a microscope, a digital camera and a copper vapor laser, the radiation of which was used as a light backlight to increase the brightness of the image. The image was recorded in the plane of the microscope focus with different exposure times. This made it possible to determine for helium the average particle size of 14 μm, their concentration of $16 \cdot 10^3$ cm^{-3} and the speed of movement of 2.8 mm/s. The corresponding values in krypton are 42 μm, $3 \cdot 10^3$ cm^{-3} and 3.5 mm/s [3]. Near the heat pipe axis, particles move from the central hot region toward an optical window. In the vicinity of the window, the particles are deflected to the lateral cell walls. This fact indicates dominant effect of convective flows on the motion od micro particles.

The influence of microdroplets as sources of non-equilibrium increased concentration of sodium trimers can qualitatively explain high absorption coefficients in the IR region of the spectrum in the heat pipe.

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