

Localization and spectral-temporal characteristics of microwave sources in high-voltage spark discharge

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The work demonstrates the radio registration system, based on four ultra-wideband antennas, which allows us to localize microwave radiation sources in a high-voltage extended spark discharge with centimeter accuracy and investigate the temporal and spatial correlation of microwave sources with discharge structures [1]. We demonstrate the results of localization of microwave sources for both positive and negative polarity of the voltage pulse. It can be noted that most localized sources are concentrated either near or on the surface of the electrodes. It is also noted that the observed microwave radiation appears mainly as a harbinger of intensive plasma development. A study of the temporal correlation between x-ray and radio emission in the frequency band from 1 to 6 GHz, accompanying the development of laboratory high-voltage discharge, has been performed [2]. It is demonstrated that the appearance of x-ray and radio emission correlates with the onset of an increase in current in the discharge gap. It is shown that x-ray radiation can appear simultaneously with microwave radiation or later with a certain delay, but there are no situations when x-ray radiation is observed before microwave. At the stage of discharge development, when microwave radiation stops being generated, x-ray radiation is also not observed. The work was carried out with the financial support of the Russian Science Foundation (project No. 23-19-00524).

[1] Parkevich E V and [et al] 2023 *Phys. Rev. E* **108** 025201

[2] Parkevich E V and [et al] 2023 *J. Appl. Phys.* **134**