

DOI: 10.34854/ICPAF.51.2024.1.1.180

SOURCES AND GENERATION MECHANISMS OF POWERFUL ULTRAHIGH-FREQUENCY RADIATION IN THE LONG HIGH-VOLTAGE DISCHARGE ^{*)}

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Exhaustive measurements of powerful ultrahigh-frequency (UHF-) emissions at frequencies within 1–6 GHz were carried out during the development of a laboratory high-voltage discharge in 50 cm air gaps at voltages up to 1 MV (with negative and positive polarity) [1–4]. The generation regions of such a radiation were localized with a high accuracy using the developed ultra-wideband radio registration system. The spatial regions of the UHF-emissions were established, and analyzed for the presence of the relationship with the plasma structures developing in the discharge. The correlation between the UHF-emissions and hard x-rays in the discharge was investigated as well. It is shown that the generation of the UHF-emissions in a discharge cannot be unambiguously explained in terms of the established concepts of the developing or colliding streamers. It is assumed that the appearance of the UHF-emission in the discharge at frequencies above 1 GHz is associated with the local development of the Cherenkov beam instabilities in plasma [5].

The study is supported by the Russian Science Foundation (grant number No. 23-19-00524).

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