On the plasma mechanism of the initial stages of development of high-pressure gas breakdown

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The ideology of the plasma mechanism of the initial stages of development of high-pressure gas breakdown is presented. The basis of the mechanism are the origin and development mechanisms anoddirection avalanche ionization by random one electron, avalanche in the transition state of the plasma , with subsequent transfer into the plasma streamer. Streamer on stage, complete screening of the external electric field in the plasma streamer, rapid cooling of the plasma electrons and the recombination radiation splash on both sides of the tape . The latter leads to the emergence of new avalanches as anoddirection and katoddirection, repetition development cycles avalanche - streamer stages until full coverage of the discharge gap breakdown channel.

Set out the initial stages of development ideology breakdown high-pressure gases in good agreement with experiments on the breakdown of gases at atmospheric pressure in the absence of an external magnetic field [1]. In the present report discusses the effect of an external strong longitudinal magnetic field on the temporal characteristics of the initial stages. Easy to show that with increasing magnetic field just before manifest its influence on the development of the initial stages of breakdown when the electron cyclotron frequency will be of the order of their collision frequency. Gases at atmospheric pressure, this condition begins to run when the magnetic fields > 100 kOe. This reduces transport coefficients in the avalanche - streamer plasma across the magnetic field, increases the density and temperature of the plasma electrons, times change transitions avalanche in the plasma state and the avalanche into a streamer. As a consequence of increasing temperature expands the area of the continuum emission in the short wavelength region. All these phenomena have been observed in experiments [ 2], conducted at the Physics Department of the University of Dagestan .

References

1. Omarov O.A., Rukhadze A.A. Kr. Soobshcenia FIAN, 2009, №10, р.45.
2. Omarov O.A., Rukhadze A.A., Shikhaev A. Sh., JTf, 1982,т.52,№2,р.255.