# SIMULATION OF PREBREAKDOWN PROCESSES IN DIELECTRIC LIQUIDS

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Results on simulation of streamer dynamics in dielectric liquids are discussed. The model describing the streamer dynamics accounts phase transition - formation of expanding gaseous channels behind streamer heads, due to Joule heating and vaporization of the liquid.

Numerous experimental studies of prebreakdown processes in dielectric liquids have shown that the character of these processes varies substantially depending on the liquid nature, on the discharge gap length and configuration, on hydrostatic pressure, on the duration, polarity and amplitude of applied voltage pulses, etc. [1,2]. While at application of very short (subnanosecond) voltage pulses formation of ionization waves – streamers and their propagation leading to breakdown occurs due to ionization processes in liquid state, at longer pulses the discharge development usually includes the stages of formation of bubbles and propagation of gaseous filaments. Formation, inside liquids, of low-density regions (bubbles or micropores) at application of voltage pulses can be caused by the electrostriction effects or by heating of the liquid (due to Joule energy input) and its vaporisation. The first mechanism can be effective in liquids with high dielectric constants, such as water. In hydrocarbon liquids, with low dielectric constants, the second mechanism is expected to be dominating.

In this talk, a model of streamers in liquids, based on approach developed in [3,4], is presented. It accounts both electron impact ionization in liquid phase, occurring in the streamer front region, and formation of a gaseous channel behind the streamer front. The dynamics of plasma inside gaseous channels during streamer propagation is analyzed. Results of numerical simulation of streamer dynamics in hydrocarbon liquids are compared with available experimental data.

The work was supported by the Russian Science Foundation under Grant 14-12-01295.

## REFERENCES

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