Specialization: 010600 Applied Mathematics and Physics

Master's program: 76 Electrophysics

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**Experimental investigation characteristics of leader-streamer transition in conditions of high stress**

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The breakdown of air insulation does not occur usually until streamers close a pair of electrodes and low-temperature plasma of streamers turn to high-temperature plasma of a spark channel. Also if voltage is high enough (a threshold value about 300 kV is mentioned in literature) streamers may turn to leaders "on the run" when the streamers did not reach the opposite electrode yet. The sphere-plane electrode system was exposed by the standard "lightning" pulse of voltage. The rising front of the pulse was 1.2 μs long and the falling front of the pulse was 50 μs long. Photographs of various streamers are presented: streamers closing the pair of electrodes; the so-called explosive streamers which may turn to a leader "on the run" - avoiding closing the pair of electrodes. Oscillograms of streamer current are presented along with photographs. Particularly the oscillograms of closed and unclosed explosive streamers and current impulses of the streamer-to-leader transition have been analyzed. Explosive streamers have branching points from which the tens of channels go while the usual streamers' channel branches on two or three channels only. Current impulses of explosive streamers are longer than ones of the usual streamers and have additional peaks. These peaks may be associated with strong heating of some channels which may cause conduction increasing. Current of usual streamers decreases fast due to plasma degradation processes - recombination and attachment. It is revealed also that explosive streamers occur on the rising edge of the voltage impulse while usual streamers may occur on the long falling edge as well as on the short rising edge of the voltage impulse. Heating of the streamer channels was estimated. Characteristic time values of streamer plasma degradation are presented. The precondition of the transition of unclosed and explosive streamers to leader are considered. The influence of solid dielectric insulation on streamer structure and the streamer-to-leader transition are considered.

The list of publications:

1. Богач А.В., Стишков Ю.К. Некоторые особенности форм коронного разряда у шарообразных электродов // Сборник трудов IX Международной конференции "Волновая электрогидродинамика проводящей жидкости. Долгоживущие плазменные образования и малоизученные формы естественных электрических разрядов в атмосфере", г. Ярославль, 2011.
2. Богач А.В., Головкин Г.Я., Красильников С.Ю., Самусенко А.В., Стишков Ю.К. Особенности осциллограмм токов стримеров // Сборник докладов X Международной научной конференции «Современные проблемы электрофизики и электрогидродинамики жидкостей», 25–28 июня 2012 г., Санкт-Петербург. С. 97–99.