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TRIGGERING STABILITY OF THE COLD-CATHODE THYRATRON WITH A TRIGGER UNIT BASED ON FLASHOVER*

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Currently, high-current switching devices based on low-pressure hollow-cathode pulsed discharge (so-called pseudospark switches) are widely used [1-4]. The design and principle of operation of these switches are close to those of a classical hot-cathode hydrogen thyratrons. However, these devices do not have a hot cathode. Therefore, pseudospark switches are often called cold-cathode thyratrons or thyratrons with a grounded grid [3, 4].

As in the case of classical thyratrons, a range of operating pressures of the switch corresponds to the left branch of Paschen's curve. Under these conditions, the electron free path for ionization is much in excess of the electrode separation. For both self-breakdown of the main gap of the thyratron and for external discharge triggering a considerable pre-breakdown electron current is required [1, 3, 5]. For the case of external triggering, this current is provided due to a special trigger unit that is placed in the main cathode cavity. One type of trigger units is based a discharge over a dielectric or semiconductor surface or, in other words, based on a flashover [3, 4].

Any trigger unit is intended for plasma generation of trigger discharge inside the thyratron cathode cavity at a curtain instant of time. When a trigger unit based on discharge formation over the dielectric surface is used, trigger discharge plasma is generated due to the interception of surface discharge current to the main cathode cavity. In this report the results of investigation of the trigger unit based on discharge over the dielectric surface with the high value of dielectric permittivity are presented. Schematic of the experimental setup is shown in fig. 1. Experiments were carried out with the demountable single-gap thyratron with the external gas filling. Data on delay times to discharge initiation in the trigger unit, current interception to the main cathode cavity and breakdown in the thyratron main gap were obtained.

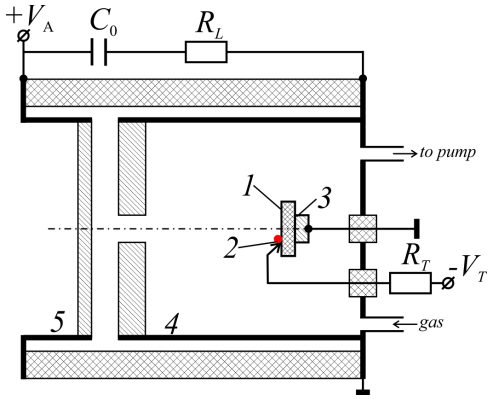

Fig.1. Schematic of the experimental setup. 1 – dielectric, 2 – multipoint contact, 3 – ground contact, 4 – main cathode cavity, 5 – main anode, V_A = 15 kV, R_L = 15 Ω, C_0 = 10 nF, R_T = (15 – 50) Ω, V_T = (2 – 8) kV.

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