

INDIGENOUSLY DEVELOPED PSEUDOSPARK DISCHARGE BASED HIGH CURRENT SWITCH

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Abstract

High power switches are among key component of all pulse power systems. Pseudospark switches (PSSs) have all desirable pulse power properties: high hold-off voltage, high rates of current rise, high repetition rate, long life and ruggedness. Pseudospark switches, however, are limited in their high current switching capability. CSIR-CEERI is making an effort in the development of a radial multichannel high current switch based on pseudospark discharge which could be suitable for pulse durations of tens of microseconds and peak currents of up to 200 kA. Such high current PSS would be useful for variety of emerging applications including shock wave generation, electro-magnetic forming process, study of high energy physics, etc. [1-2]. CSIR-CEERI knowledge base of hot cathode and cold cathode thyratrons is being utilized for the same. In this regard a 20 kV/20 kA radial multi-channel PSS has been realized first time in the country at CSIR-CEERI [3]. Nevertheless, more refined robust structure is needed to be developed to achieve very high currents up to 100s kA to meet some of the immediate strategic needs in India. Such switches are being presently imported and time to time are subjected to import restrictions.

In this paper a PSS design for very high current up to 100 kA at 20kV hold-off voltage is reported, which has been enriched by geometrical parameters. The electrode shape, material, homogenous distribution of igniting plasma, dense plasma confinement around refractory electrode area and insulator shielding from plasma play crucial role in switching high current and increasing life of the switch. Accordingly these issues have been taken care in the modified design. The proposed design is being validated by switching characteristics. The developed PSS will significantly extend the capabilities of pulse power technology in the country.

References :

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