

THEORETICAL INVESTIGATION OF A LASER TRIGGERED SPARK GAP

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ABSTRACT

A model of a spark gap used as a shorting switch in a Blumlein pulse power system has been developed. The model is separated into a pre-breakdown kinetic model and a post-breakdown fluid model. The kinetic model is used to simulate streamer formation, and the fluid model is used to simulate the behavior of the conducting arc. Intrinsic switch parameters that were varied in the kinetic model included electric field, gas pressure and gas type. Laser triggering parameters varied included spot shape, spot area, and laser power. Parameters varied in the fluid model were the initial arc radius, arc conductivity, and gas density. Initial arc radius and conductivity for the fluid model are found from the end result of the kinetic model. The goal was to evaluate parameters to discover their effects on the resistive fall time of the switch. Increasing the initial arc radius and conductivity were a large factor in decreasing the resistive fall time. Increasing the electric field and reorienting the laser trigger spot to a linear beam transverse to the electric field were significant factors in increasing the initial arc radius.