

Public Abstract

Laura K. Heffernan

M.S.

Electrical and Computer Engineering

A Fast, 3 MV Marx Generator for Megavolt Oil Switch Testing and Integrated Abramyan Network Design

Advisor: Dr. Randy Curry

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The University of Missouri-Columbia has a new test facility online to study oil breakdown of enhanced and uniform gaps. The test facility includes a 3 MV Marx generator consisting of 30 stages with a total capacitance of 1.6 nF. With an inductance of 4.6  $\mu$ H, the pulser is designed to deliver the 3 MV output pulse with a risetime (10-90%) of  $\leq 10$  ns with a peaking gap. The output polarity of the pulser can be easily reversed for switch and dielectric testing. The configurations tested include large electrode gap spacings with point-ball electrodes. The test results from these experiments will be reported along with a conceptual design for a simple modification which will allow a rectangular pulse to be applied to the sample under test.

The conceptual design for the pulser includes an Abramyan network designed to extend the output at 1-1.5 MV to a pulse width of 1 $\mu$ s. By reverse-discharging a fraction of the stages in parallel with an inductor of an optimized value, the pulse width increases dramatically at a minimal cost to the pulse amplitude. The cost-effective addition of a single inductor will be compared to the efficiencies of traditional pulse-forming networks. This thesis will also discuss the Abramyan network versatility with respect to altering pulse amplitude and width using a simple modification to the inductor. Benefits for system implementation will be presented.