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Modeling and Experiment Research on Turn-off Characteristics of Pulse Power Thyristor

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Pulse power thyristor has been widely used in pulsed power system for its numerous advantages, such as good controllability, large through-flow capacity and high repetition frequency. To study the device's electrical characteristics and the circuit transient process, a marco model of pulse power thyristor applying to MATLAB software platform was established in this paper,based on research of reverse recovery process of pulse thyristor. This model combined ideal thyristor model in MATLAB with reverse recovery current module, which was designed to describe the reverse recovery process of thyristor after the conducting current rapidly decresed to zero. In the model, reverse current increased with a constant di/dt when accumulated carriers rapidly decreased; and then when space charge region started to recover,the thyristor's recovery current curve was described by two hyperbolic secant curves with different time constant. This established model achieved the smooth transition of current curve from storage time to dropping time, and thus improving the precision of thyristor model comparing with the original one. In addition, experiment was designed to verify the marco model. According to the experimental data, the reverse recovery voltage and recovery current curve calculated by the marco model fitted well with the experiment results.

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