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2P48 - DIFFERENT PATTERNS OF CURRENT QUENCHING PHENOMENA DURING PSEUDOSPARK DISCHARGE

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Pseudospark discharge are widely used in high power switches, intense electron beam generation and extreme ultra violet light source. Current quenching is one of the most important problems that seriously hamper the applications of the pseudospark discharge, which is characterized by the appearance of sudden current interruption and inductive voltage spikes at the same time. In this paper, current quenching phenomena are studied experimentally by testing the pseudospark discharge device under various conditions. It is observed that current quenching may occur at the starting, rising, peak, descending and zero-crossing phases of the current waveforms. Four main patterns are summarized from the testing results. The first kind occurs at the transition of current from hollow cathode discharge phase to high current conduction phase; the second kind is the oscillation superimposed on the whole current rising edge; the third kind is the temporary extinction of current at zero crossing; and the last one occurs in the high current conduction phase. Previous studies have focused on quenching correlated with the transition two discharge phases at current rising edge. Its mechanism is mostly believed to be the ion depletion near the cathode surface, while it might need amendment for the other quenching patterns. The details related to specific pattern are discussed. The results in this study could provide further understanding for current quenching.

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