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Analysis of the sequential discharge characteristics of a parallel-type pulsed power supply with an inductance load

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In the sequential discharge of the pulsed power modules connected in parallel, the occurence of a surge voltage at the crowbar diodes of the triggered modules afterward is analyzed and the elimination method of the surge voltage is suggested. In the case using two 100 kJ pulsed power modules and the muzzle-shorted railgun as a load, the surge voltage is generated during the crowbarring period of the module triggered first, and the condition on the reciprocal of time constants between the source module and the inductive load is derived. The effect eliminating the surge voltage by the insertion of a short-circuit resistor is verified by analyses and experimental results. The optimal values of the interconnecting resistor to eliminate surge voltages in the six 100 kJ pulsed power modules are calculated by simulation, and the results reflected in the six sequential pulsed power modules are presented.

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