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## A pulsed current supply based on solid-state Marx generators in parallel

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A novel paralled topology of all solid-state Marx generator using metal–oxide–semiconductor- field-effect transistors (MOSFETs) has been developed for high current with steep edges. This kind of Marx generator has a stacked-stage structure from the bottom to the top with low voltage at the bottom and high voltage at the top. Each stage is combined by many modules in a single board, and one of the modules is also a stage in one Marx generator, all modules in one board with equal potential are connected by the same reference node, likely to the linear transformer driver(LTD). This special connected node makes it possible for the Marx generator outputing high stable pulsed current. All the MOSFETs are driven synchronously through magetic rings. The lack of synchronization of the driven signals and switch fault which may cause unbalance of current and overcurrent problems are studied in this paper, and some methods have been carried for current balancing and overcurrent protection in this new topology. For experimental demonstration, we constructed a twenty-stage Marx modulator in series (eight modules paralled in one stage) using 600-v MOSFETs to operate at 500-v dc input voltage, which output pulses with max voltage of ~-10kv, max current of ~400A(depending on the load), rise time of ~30ns, fall time of ~50ns, controlled pulse width from 500ns to 5us. The whole Marx modulator(without the driver board) has a compact structure with a length of 21cm, a width of 21cm and a height of 24cm.

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