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Experimental and simulation investigations on a solid-state switched spiral generator for triggering of large scale pulsed power accelerators JIAQI YAN, SUSAN PARKER, SIMON BLAND, Imperial College London, PLASMA PHYSICS GROUP TEAM — This paper presents experimental and simulation work on a solid-state switched spiral generator, designed to trigger high current switches in the next generation of pulsed power devices. The spiral generator utilized new ultra-fast Thyristor as an input switch and a polarity dependent gap to sharpen the output pulse. It can produce 50 kV from a 3.6 kV charging voltage, with a risetime of <50 ns and a jitter of 1.3 ns - directly comparable, if not better than a generator employing triggered spark gap as the input switch. The entire spiral generator, along with control and charging electronics fitted into a case 21014533 mm. The behavior of the spiral generator was modelled through a combination of the telegraph equations to account for the voltage waveforms as they travel along the spiral and an equivalent circuit exchanging charge between the spiral with the input switch and load. The influence of the spiral geometry, input switch and load were investigated. The model is compared to experimental measurements and shows remarkable agreement – with the predicted output voltage waveform being within 10% of the experimental values. The model will enable spiral generators to be readily optimized for different uses.

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