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Development of a High Voltage, 240ps Pulse Generator in GIS for PD Experiment

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Partial discharge(PD) in gas-insulated switchgear(GIS) includes electrical signals with broad bandwidth. In order to simulate and study the propagation characteristics of specific frequency band, pulses with rise time on the order of subnanosecond are required. We have developed a pulse generator which provides 240ps rise time with an amplitude up to 2kV into a 50Ω coaxial capacitive load with an extensive variation of amplitude. The pulse generator consists of a mercury switch. The rise time of the output pulse from the generator is reduced shorter than 300ps due to precise designs of PCB circuit board, tail-cut capacitor and a head resistance. The tail-cut capacitor and the head resistance determine the duration and amplitude of the pulse, meanwhile a slide rheostat can adjust the amplitude independently. By adjusting the input voltage and parameters of adjustable components, different FWHM, rise time and amplitude of the output pulse are obtained. The shortest rise time 240ps is recorded with a 480ps pulse duration while the longest 980ps is recorded with 10ns pulse duration. It is possible to study different propagation characteristics of both high and low frequency signals as well as large and short band discharge signals.

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