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A half-sine type Marx generator designed for HEPS pre-kicker

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HEPS is a nearly finished fourth-generation photon source with a 6 GeV energy storage ring. When machine protection is activated in the storage ring, the low beam emittance causes most particles to deposit nearly vertically on the collimator. This can result in concentrated heating, potentially leading to material melting of the collimator. Thereby, two pre-kickers are used to generate 4.52 μs half-sine magnetic fields in both horizontal and vertical directions upon receiving the protection signal, dispersing the particles throughout the entire ring to safeguard the collimator. However, during engineering construction, the circuit may have a total inductance that far exceeds the initial design, leading to inadequate voltage output from the prepared HV charging power supply. Comparing the Marx generator and the inductive adder voltage boosting topologies, the Marx generator offers a more compact and simpler design for long pulse applications. Therefore, this paper presents the design and testing of a two-stage Marx generator based on LC resonance to deliver a half-sine pulse to the pre-kicker.

Footnotes

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