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162.5MHz SINGLE-BUNCH SELECTION ULTRA-FAST BIPOLAR CHOPPER POWER SUPPLY DESIGN

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Neutron energy spectrum measurement imposes requirements for single-bunch selection and acceleration on the CiADS (China Initiative Accelerator Driven System) superconducting linear accelerator, which operates at a fundamental frequency of 162.5 MHz. Existing chopper power supplies have rise/fall times approaching 20 ns, making them unable to achieve the required 6.15ns bunch selection via a stable field-free region. To address this, an ultrafast bipolar high-voltage pulse power supply with fixed voltage slope control has been designed. This design loads linearly varying ± 4 kV voltages (slope ≥ 180 V/ns) onto the chopper's deflection plates to achieve transverse bunch scanning. The physical aperture restriction at the RFQ (Radio Frequency Quadrupole) entrance is utilized to convert this transverse scan into a time selection window, enabling nanosecond-precision beam bunch selection. This power supply provides crucial technical support for single-bunch selection in the RFQ accelerator. This paper elaborates on the design scheme of the chopper power supply and presents relevant circuit simulation analysis.

Footnotes

Funding Agency

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Yes

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