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Pulsed Resonant Charging Power Supply for the Spallation Neutron Source
Extraction Kicker PFN System

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The Spallation Neutron Source (SNS) at the Oak Ridge National Laboratory (ORNL) uses fourteen pulsed modulators in the extraction system to deflect the proton beam from the accumulation ring to the target. The SNS is executing the Proton Power Upgrade (PPU) project to increase the beam energy from 1.0 to 1.3 GeV, which requires an increase in the extraction kicker magnetic field intensity. Each pulse modulator consists of a pulse forming network (PFN), located in a service building external to the ring tunnel, along with a charging power supply and related controls and interlocks. Increasing the magnet current by charging the PFN to a 20% higher voltage will provide the required deflection. The existing capacitor charging power supply is incapable of charging the PFN to higher voltages between 60 Hz pulses, and therefore a new resonant charging scheme has been developed to charge to the required voltage within the available time. This paper describes the resonant charging power supply design and presents test results from a prototype operating on a full system test stand.

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