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Wed-Af-Po.12-08: Design and Experimental Verification of High-Voltage Power Supply for Electron Irradiation Accelerators Based on Insulated Core Transformer

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This paper presents the design of a high-voltage power supply based on insulated core transformer, specifically tailored for electron irradiation accelerators to meet the demands of irradiation processing applications. The segmented magnetic core structure, however, inevitably leads to leakage issues, complicating the design of this high-voltage power supply. To develop a high-performance electron accelerator, a simulation model was constructed using finite element analysis software. The simulation results of the model were meticulously compared with the experimental data of the prototype to validate the model's accuracy. Utilizing ANSYS software for modeling, this paper provides an in-depth discussion on the design methodology of an insulated core transformer-type high-voltage power supply. This approach has been successfully implemented in the high-voltage power supply of a 200 kV/20 mA electron accelerator system. The study offers valuable insights and a robust foundation for designing high-voltage power supplies with high rated power. The finite element model, corroborated by experimental results, effectively demonstrates the feasibility of this method in designing insulated core transformer-type high-voltage power supplies.

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