

Seminar

Institute for Plasma Research

Title : Design of High Power and High Frequency Inverter Based Power Supply for Particle Accelerators

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Date : 16th July 2018 (Monday)

Time : 02.00 PM

Venue : Committee Room 3, (New Building), IPR

Abstract :

This thesis presents a design concept and simulation of a 106 kVA high-power highfrequency (HPHF) power supply for feeding a transformer coupled symmetrical Cockcroft – Walton (CW) voltage multiplier producing 500 kV, 100 mA as the rated output for particle accelerators. Key technology includes high power converter with single-phase inverter that runs at 20 kHz and yields voltage of low THD and dv/dt to prevent partial discharge in the transformer. The HPHF system is designed for varying the rated output voltage of 500 kV from 5% to 100 % of its value and to restrict the voltage rise time below 100 ms. A power loss calculation and thermal design analysis of the arrangement of semiconductor devices on heat sink has been carried out for maintaining the temperature rise below permissible limit. The designed HPHF system supplying the CW circuit has been simulated in MATLAB Simulink, presented and compared with design theory. Simulations have also been carried out on the entire system under various fault conditions and effects of transient voltage and current on various devices presented.
