

Seminar

Institute for Plasma Research

- Title :** Power Source with integrated quench protection system for large superconducting magnet
- Speaker:** Mr. Amit Ojha
Institute for Plasma Research, Gandhinagar
- Date :** 27th July 2022 (Wednesday)
- Time :** 03.30 PM
- Venue :** Committee Room 3, (New Building), IPR
- Online - Join the talk: https://lobby.ipr.res.in/AOjha_Talk

Abstract:

Superconducting (SC) magnets are characterized by their large inductance, negligible resistance and their ability to carry high current continuously. The source powering SC magnets are derived from very specific class of power supplies; the main characteristic of these supplies are low ripple and large current. These Power Sources (PS) are also responsible for rapidly extracting magnet's stored energy and dissipating it outside the magnet during contingencies.

The two most popular PS topologies are Phase Shifted Full-Bridge Converters (PSFB) and Phase Controlled Rectifiers (PCR). PSFB uses multiple stages to obtain desired output and PCR uses filters and voltage boost systems to obtain desired output.

In the presented work, a two stage converter which is a hybrid of PSFB and PCR uses paralleled time delayed modules with PWM control to overcome shortcomings of PSFB and PCR. For rapidly discharging the magnet during contingencies, bypass switch and switched resistors are integrated with modules of converter. Simulation tools were used for validating the Converter's module design.

Implementation of this design will reduce dependencies on specialized transformers (PCR) and multiple output improvement stages (PSFB).

Keywords: DC-DC converters, Superconducting Magnet, Ripple improvement
