

Seminar

Institute for Plasma Research

Title : Thermo-hydraulic Study for Cryogenic Helium Gas Circulation System of Vacuum Jacketed Flexible Cryoline

Speaker: Mr. Mahesh Ghate
Institute for Plasma Research, Gandhinagar

Date : 21st February 2020 (Friday)

Time : 11.00 AM

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

Abstract :

The superconducting magnets and cables are cooled to required cryogenic temperature using various cooling techniques depending on the operation requirements and its constraints. Liquid Helium and Liquid Nitrogen are used as standard cooling media for superconducting applications such as fusion relevant magnets and power cables. Owing to the various limitations of LN₂, Cryogenic Gaseous Helium (GHe) is emerging as cooling media for various HTS applications using Cryocooler based forced flow system. Under this study, the survey for commercially available off the self cryocoolers is carried out to compile the progress made in recent years. The critical factors affecting the performance of superconducting cables are thermal load and hydraulic resistance from the flexible cryostat to the GHe. The thermo-hydraulic analysis for cryogenic gaseous helium at 50 K-60 K and at 15 bar pressure flowing through the flexible cryostat is numerically investigated to study the effect of various geometrical configurations on its pressure drop and temperature. It will be further useful towards the selection of optimum combination for geometrical configuration of flexible cryostat considering performance requirements towards various superconducting applications. The Cryogenic Gaseous Helium Cooling System (CGHCS) is also proposed for the cryoline of 100 m length with a heat load of ~ 150 W for operating range between 50 K -60 K at 15 bar.
