



Contribution ID: 968 Contribution code: TUE-PO1-305-08

Type: Poster

Fabrication and characterization of BSCCO-2223 tape based compact coils

Tuesday 16 November 2021 13:15 (20 minutes)

High Temperature Superconductor (HTS) based magnets are potential candidate for the future fusion reactors and electrical industries due to its compact size and operational economy. A SS laminated BSCCO-2223 HTS tape based and double pancake wound compact solenoid coil with an inter-double pancake joint of bore diameter 50 mm with 24 nos. of turns has been fabricated and tested at LN₂ temperature. This coil has been charged up to 2.1 kA with maximum current ramp rate per turn of about 8.5 MA/s and generated axial magnetic field of 1.1 T at 77 K, self-field. The estimated axial magnetic field ramp rate of this coil is greater than 4 kT/s. This has inter-turn Kapton insulation. In order to study the effect of inter-turn electrical insulation on the current ramp rate, double pancake based solenoid coils with and without inter-turn Kapton insulation of similar dimensions have also been fabricated and tested up to 10 K using Cryo-cooler. The differences in the current and voltage profiles during current ramp up and ramp down observed for coil with and without electrical insulation. These coils were charged up to 440 A at 10 K and produced magnetic field up to 2 kG. The inter-double pancake joint resistance with overlap length of 100 mm is measured around 48 nΩ at 10 K, self-field. The first coil was operated in pulsed mode for about one millisecond up to the current 20 times higher than the critical current without any thermal damage at 77 K. I-V characteristics for all three coils, joint resistance, and axial magnetic field measurement results and analysis will be reported in this presentation.

Primary authors: Mr PRASAD, Upendra (Institute For Plasma Research); Mr RAJ, Piyush (Institute For Plasma Research); Mrs BANO, Anees (Institute For Plasma Research); PANCHAL, Arun (Institute For Plasma Research); Mr KANABAR, Deven (Institute For Plasma Research); Dr SRINIVASAN, R (Institute For Plasma Research)

Presenter: Mr PRASAD, Upendra (Institute For Plasma Research)

Session Classification: TUE-PO1-305 HTS/LTS coil