MT 26
International Conference
on Magnet Technology
Vancouver, Canada | 2019

Contribution ID: **727** Type: **Poster Presentation**

Wed-Mo-Po3.12-13 [108]: Application of AC Loss on HTS Magnet using Frequency Loss Induced Quench (FLIQ) Protection System.

Wednesday, 25 September 2019 09:30 (1h 45m)

A fundamental challenge with High Temperature Superconductors (HTS) is their high critical temperature (Tc) values and the stability that they impart when used in a magnet device with sufficient stored energy. Low normal propagation velocities and high stability of HTS wires cause localized damage due to an excessive peak hot spot temperature during a quench. Protection of HTS magnets for reliable operation has proven to be a challenge with the large amount of energy that is required to raise a significant fraction of the conductor above its local critical temperature which will dissipate the stored energy throughout the volume of the coil. Frequency Loss Induced Quench (FLIQ) system is a novel advancement of a relatively new technique that relies on AC losses to uniformly heat up a superconducting coil or sections of the coil to quench the coil accordingly. FLIQ drives an imbalance in the transport current between two or more sections of the magnet through a capacitor. To drive the imbalance, FLIQ uses an H-bridge design with Insulated Gate Bipolar Transistor (IGBT)s, whose gates are driven based on the current feedback control that allows the system to operate at resonance. This paper will discuss the application of FLIQ for HTS magnets and discuss recent data from experiments carried out on an insulated REBCO coil.

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Session Classification: Wed-Mo-Po3.12 - Motors IX