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Tue-Af-Po2.19-05 [46]: Test Results of Quench-back Management Due to Fast Decaying Current Induced AC Losses in SHMS Superconducting Magnet at Jefferson Lab

Tuesday, 24 September 2019 14:00 (2 hours)

The Super High Momentum Spectrometer (SHMS) of Hall C, part of the recent 12 GeV accelerator Upgrade at Jefferson Lab, was successfully commissioned in 2017. During pre-commissioning, fast dumps of the SHMS Q2/Q3 quadrupole and Dipole superconducting magnets experienced some level of operational difficulty. Measurements and analyses demonstrate that the fast discharge caused fast current decay, which resulted in substantial ac loss in the conductor and subsequently triggered a quench-back effect. The details of the measurements and analyses have been reported previously. This paper will focus on the test results of the magnets with recommended modifications to the respective dump resistors. The physical test and measurement setup will be the same as for the previous measurements except the sampling rates. The sampling rates of the digital scopes will be changed to 250 Hz for all magnets from 1 kHz for the Q2/3 magnet and 500 Hz for the Dipole because the recommended dump resistors have low resistance values—producing slow decaying currents. The test results will be compared with the calculations. The detailed analysis and measurement techniques used during this investigation could lead to the development of a fine-tuned ac loss computational procedure for future similar projects.

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