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Wed-Af-Po3.24-10 [104]: An Experimental Study on “Defect-irrelevant” Behavior of No-insulation REBCO Pancake Coil in Conduction-Cooling Operation

Wednesday, 25 September 2019 14:00 (2 hours)

Previously we reported the “Defect-irrelevant” behavior of a no-insulation (NI) high temperature superconductor (HTS) pancake coil in 2016. The test coil was wound with REBCO tapes having multiple “defects” and tested in a bath of liquid nitrogen at 77 K. Coil terminal voltages and magnetic constant of the test coil are essentially identical to those of its “healthy (defect-free)” counterpart in steady-state operation below the critical current, which demonstrated a potential of the defect-irrelevant-winding (DIW) approach to build an NI magnet with a substantially reduced cost. Here we report, as a continuation to our previous study, test results of a “DIW” REBCO pancake coil operated in a conduction-cooling environment below 77 K. Our primary goal is to demonstrate the DIW approach for mid-scale industrial applications of which typical magnetic field requirements range 1 –5 T at an operating temperature ranged 30 –50 K. Charging tests were performed and the results were analyzed by use of both lumped and distributed models.

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