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M1Po3C-03: Thermal Modeling of CCT Dipole Magnets wound using Defected REBCO Cables

Monday 19 May 2025 14:00 (2 hours)

We analyzed numerically, using a Finite Element Method (FEM), the performance of REBCO CORC® cable containing various structural defects. We focused on defects of the defects on heating and thermal runaway of the magnets. Defects are possible in any HTS cable, originating from the tape manufacture, or during cabling, or in service. We considered a design based on real Canted Cosine Theta (CCT) dipole magnet, wound using CORC® cable, which was built and tested at the Lawrence Berkeley National Laboratory, USA as a stand-alone dipole magnet providing a magnetic field of 2.9 T in liquid He bath at 4.2 K. Because, thermally the turns of the CCT dipole magnet behave as parallel straight wires immersed half way in the grooves of the mandrel material with their outside surfaces in direct contact with pool boiling liquid He, in our FEM model we adopted a 3D straight geometry which significantly reduces the computational cost. To model the REBCO superconducting material we used its measured power law E-J curve.

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