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Measurements of magnetization of YBCO CORC and Roebel Cables at 4.2 K

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Coated conductor YBCO cables are of interest for (among other applications) use in high energy physics accelerator magnets. In dipole and quadrupole magnets (where coated conductor YBCO cable may be used for a high field insert) field quality, especially at injection, is a key parameter, and limits the amount of acceptable magnetization in a cable. In this presentation a superconducting 3 Tesla cosine-theta racetrack dipole magnet was used to measure magnetization of coated conductor YBCO CORC and Roebel cables at 4.2 K and at low ramp rates of the applied magnetic field (< 1 Hz). A magnetometer consisting of a saddle-like pick-up coil and a nominally matched compensation coil (both wound using an insulated copper wire 0.1 mm OD) was used for magnetization measurements. The magnetometer allowed sample rotation with respect to the applied magnetic field direction. A calibration was made using calibration coils, of known magnetic moments, which mimic the current flow in the cables. Samples of 15 cm length were measured for a two layer CORC cable with six strands and a cable pitch of 34 mm and for a 30 cm twist pitch Roebel cable. The magnetization of CORC and Roebel cables are compared to each other and to the YBCO tape used in their manufacture. Hysteric losses were dominant over coupling losses for these cables.

Primary author: MAJOROS, Milan (The Ohio State University)

Co-authors: Dr KOVACS, Christopher (The Ohio State University); Prof. COLLINGS, Edward (The Ohio State University); SUMPTION, Mike (The Ohio State University)

Presenter: MAJOROS, Milan (The Ohio State University)

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