Contribution ID: **1095** Contribution code: **TUE-PO1-LN1-04** Type: **Poster**

Current-sharing between filaments and voltage-current characteristics of copper-plated multifilament coated conductors

Tuesday, 16 November 2021 13:15 (2 hours)

If filaments in a multifilament coated conductor are insulated electrically one another, the current carried by each filament could be restricted by its lowest local critical current along its length. The critical current of such a multifilament coated conductor could be the sum of the lowest local critical currents of all filaments. Considering a longitudinal variation in local critical current of each filament is unavoidable, the critical current of a multifilament coated conductor consisting of insulated filaments might be degraded substantially with increasing its length. If we plate copper over the entire group of filaments, because the overlaid copper allows current sharing to detour any section of a filament where its local critical current is low, longitudinal variations in local critical currents of filaments do not directly lead to the degradation of the critical current of the entire multifilament coated conductor. We prepared short pieces of copper-plated multifilament coated conductors and measured their voltage –current curves using a comprehensive system of voltage taps. We attached series of voltage taps on both side edges of a copper-plated multifilament coated conductor (longitudinal voltage-tap series) and pairs of voltage taps across its width (transverse voltage-tap pairs). When we increased the current supplied to the sample gradually, a voltage appeared in a section of the longitudinal voltage-tape series on one side of the conductor: the local critical currents of the filaments near the series could be low. Voltages in different directions appeared in the transverse-tap pairs: it indicates the current flow detouring the low-critical-current section through the plated copper. Although such a current sharing helps to avoid the degradation of a long multifilament coated conductor, the n value might degrade, because a part of the current flows through the copper.

This work was supported by JST-Mirai Program Grant Number JPMJMI19E1, Japan.

Primary authors: AMEMIYA, Naoyuki (Kyoto University); ZHAO, Yifan (Kyoto University); LUO, Xijie (Kyoto University); XU, Guangwei (Kyoto University); SOGABE, Yusuke (Kyoto University)

Presenter: AMEMIYA, Naoyuki (Kyoto University)

Session Classification: TUE-PO1-LN1 Late News I

Track Classification: F: Conductors and Materials for Magnets: F03 REBCO Wires and Cables