Contribution ID: **49** Contribution code: **TUE-OR1-602-08** Type: **Oral**

Low-AC-loss SCSC cable: magnetization loss measurements of spiral copper-plated multifilament coated conductors

Tuesday, 16 November 2021 11:45 (15 minutes)

We have been developing the SCSC cable (or double "SC"cable, standing for Spiral Copper-plated Striated Coated-conductor cable), in which we wind copper-plated striated (multifilament) coated conductors spirally around a round core. In the SCSC cable, its spiral geometry decouples filaments against transverse AC magnetic fields to reduce its AC loss while the plated copper allowing current sharing among filaments enhances the robustness against normal transition.
In order to verify the effect of the spiral geometry to decouple filaments, we prepared the following three samples: a 150 mm long straight monofilament coated conductor; a 150 mm long straight 5-filament coated conductor; a 174 mm long 5-filament coated conductor wound spirally around a GFRP core with a diameter of 5 mm. The conductor width and the copper thickness per side were 4 mm and 0.02 mm, respectively, in all samples. We measured the magnetization losses of these samples in the transverse AC magnetic field with a frequency of 65.44 Hz. The measured magnetization loss of the straight 5-filament coated conductor was almost same as that of the straight monofilament one. These results are understandable, because the filaments could couple at 65.44 Hz, when the coupling current expands to the entire length of 150 mm long 5-filament coated conductor. Meanwhile, the magnetization loss of the spiral 5-filament coated conductor was much smaller than that of straight one, even though the former was longer than the latter. We also measured the magnetization losses of various samples made with narrower filaments (0.4 mm), a narrower core (3 mm), and various copper thicknesses at various frequencies. We compare the comprehensive set of experimental data and discuss the potential of the SCSC cable in the operating conditions in various practical applications.

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

Primary authors: Prof. AMEMIYA, Naoyuki (Kyoto University); SHIGEMASA, Mao (Kyoto University); Dr TAKAHASHI, Akira (Kyoto University); SOGABE, Yusuke (Kyoto University); YAMANO, Satoshi (SuperPower Inc.); SAKAMOTO, Hisaki (Furukawa Electric Co., Ltd)

Presenter: Prof. AMEMIYA, Naoyuki (Kyoto University)

Session Classification: TUE-OR1-602 High Tc Wires and Cables I