



Contribution ID: 479 Contribution code: TUE-PO1-722-01

Type: Poster

## **Analysis and Experiments on Electrical and Thermal Characteristics of REBCO Racetrack Coil co-wound by Stainless Steel Tape under asynchronous rotating magnetic field**

*Tuesday 16 November 2021 13:15 (20 minutes)*

This paper presents the results about analysis and experiment on the electrical and thermal characteristics of metal insulation (MI) REBCO racetrack coil wound with stainless steel (SS) tape under rotating magnetic field. The field windings of synchronous rotating machine can be occasionally operated under time-varying magnetic field due to the unsynchronized armature windings during electrical or mechanical load fluctuations. Therefore, the transient operation reliability of SS MI coil should be examined and investigated under unsynchronized operation environment to confirm the applicability of SS tape on the turn-to-turn insulator of REBCO field winding. In this study a characteristic evaluation device to apply asynchronous rotating magnetic field was firstly designed and developed. The system is divided into two parts. One is cryostat part to test the REBCO racetrack coil, the other is three phase armature winding part to generate the rotating magnetic field. Then, the electrical and thermal characteristics of SS-MI REBCO racetrack coil installed on salient pole are experimentally investigated according to changes in the operation temperatures at the test coil and strengths and frequencies of the injected rotating magnetic field from the armature winding at the most outer part of the characteristic evaluation system.

Acknowledgement: This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIT). (Nos. 2021R1C1C2003235 and 2019R1A2C1004715)

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**Session Classification:** TUE-PO1-722 Model Coil I