



**MT 26**  
**International Conference**  
**on Magnet Technology**  
Vancouver, Canada | 2019

Contribution ID: 1280

Type: **Poster Presentation**

## **Mon-Af-Po1.20-07 [80]: Influence of coil size and operating temperature on transient stability in multi-stacked no-insulation REBCO pancake coil system**

*Monday 23 September 2019 14:30 (2 hours)*

The no-insulation coil is expected as a technology that can realize both high current density and high thermal stability which are originally trade-off relationship in REBCO coil application. And this technique has been mainly studied for application to small diameter inner coil of NMR magnet exceeding 30T. In this case, the coil is cooled by 4.2 K liquid helium. On the other hand, we have been developing a REBCO coil system aimed at application to high-magnetic-field whole-body MRI and medical cyclotron for cancer therapy. For this application as well, a no-insulation coil is considered as a technology satisfying both high current density and high thermal stability. The REBCO coil which we aim for development has a diameter of about 1 m, the generated magnetic field is about 10 T, and conduction cooling around 30 K is assumed. Therefore, since the size, operating temperature and magnetic field are different compared with those of the NMR coil, there is a possibility that the electromagnetic, thermal and mechanical behavior when adopting the no-insulation coil winding may be quite different. In this presentation, we report on the behavior when local normal transition occurred in multi-stacked no-insulation REBCO pancake coils by numerical analysis considering coil size, operating temperature and magnetic field as parameters. For numerical analysis, we conducted a coupled analysis of current distribution analysis based on PEEC (Partial Element Equivalent Circuit) model and thermal analysis by two-dimensional finite element method.

The part of this work was supported by Grant-in-Aid for Scientific Research (S) Grant Number 18H05244, the Ministry of Education, Science, Sports and Culture.

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**Session Classification:** Mon-Af-Po1.20 - Stability of Conductors and Coils I