



Contribution ID: 1561

Type: **Poster Presentation**

Tue-Mo-Po2.05-08 [31]: Numerical evaluation on electromagnetic force and stress due to screening current in REBCO coil

Tuesday 24 September 2019 08:45 (2 hours)

The research and development on the applications of REBCO superconducting coil to the high field magnets for NMR, MRI, accelerator and so on are in progress. In coils wound with REBCO tapes, large screening currents are induced by the radial component of the magnetic field. The magnetic field due to the screening current (hereinafter referred to as screening current-induced field) is generated in the direction opposite to the field by the transport current, thus reducing the magnetic field, deteriorating the field homogeneity and affecting the time stability of the magnetic field. These problems of screening current have been discussed. However, the electromagnetic force due to screening current have not been discussed in detail yet. The screening current leads to non-uniform current distributions in the REBCO tape. Therefore, the distribution of electromagnetic force in REBCO coils is different from that at designing the coil assuming that the current uniformly flows on the cross section of coils. Thus, there is the possibility that the screening current is a serious problem in mechanical design of REBCO coils. In previous study, three-dimensional numerical simulation code has been developed to calculate the spatial and temporal behavior of screening current distribution in REBCO coil. The validity of the developed numerical simulation was confirmed by comparison with the experiments. In this study, we expand the developed numerical simulation code to calculate the electromagnetic force and stress due to screening current and discuss the mechanical strength structure of REBCO coil.

Acknowledgements

The part of this work was supported by TEPCO Memorial Foundation Research Grant (Basic Research) and JSPS Grant-in-Aid for Scientific Research (C) Grant Number 16K06222

Primary author: Prof. UEDA, Hiroshi (Okayama University)

Co-authors: TOKUNAGA, Keisuke (Okayama University); MORIKAWA, Eisuke (Okayama University); KIM, SeokBeom (Okayama University)

Presenter: Prof. UEDA, Hiroshi (Okayama University)

Session Classification: Tue-Mo-Po2.05 - Mechanical Behavior I