



Contribution ID: 881 Contribution code: TUE-PO1-715-01

Type: Poster

Deformation Analysis of no-insulation REBCO coils considering turn-to-turn contact configuration

Tuesday 16 November 2021 13:15 (20 minutes)

In recent year, there has been remarkable progress in the use of high-field rare-earth barium copper oxide (REBCO) coils in NMR, MRI, and accelerator applications. No-insulation (NI) winding techniques are adopted to achieve high thermal stability and high current density. Thus, each winding in a non-impregnated NI REBCO coil can deform separately and move freely because of the thermal strain and electromagnetic force. The additional force and stress due to a screening current has also become an issue in REBCO coils. The screening current leads to a non-uniform force distribution in REBCO tapes and forces exceeding an acceptable value. It has been reported that REBCO coils have experienced mechanical deterioration or damage when operating under high magnetic fields. However, the detailed mechanism for this damage or deterioration has not been clarified. In order to clarify the detailed mechanism of this damage to a REBCO coil, the stress and strain during the winding, cooling down, charging, and discharging processes need to be evaluated. Furthermore, in NI REBCO coils, the turn-to-turn contact configurations are very important for the current bypassing, the thermal and mechanical stability. In previous studies, we have developed the numerical simulation code on the electromagnetic behavior of screening current and mechanical behavior of the turn-to-turn contact state. This study evaluated the deformation and stress in REBCO tape and the turn-to-turn contact in NI REBCO coils.

Primary author: Dr UEDA, Hiroshi (Okayama University)

Co-authors: Mr NAITO, Keisuke (Okayama University); Dr INOUE, Ryota (Okayama University); Prof. KIM, SEOKBEOM (Okayama University)

Presenter: Dr UEDA, Hiroshi (Okayama University)

Session Classification: TUE-PO1-715 Mechanical Behavior of Coil I