



Contribution ID: 179

Type: Poster Presentation of 1h45m

A Facile Method to Estimate Screening Current-Induced Fields in REBCO Pancake Coils

Wednesday 30 August 2017 13:15 (1h 45m)

Screening currents induced in HTS coils generate an irregular magnetic field. In particular, a large amount of screening currents are induced in REBCO tapes due to the tape shape, consequently a large screening current-induced fields is produced. Screening current-induced fields are a crucial problem for NMR/MRI applications. However, it is not easy to estimate screening current-induced fields at magnet design stage. So far, a few methods were proposed to estimate screening currents and their induced field. However, the already proposed methods are highly complicated and state-of-the-art simulation techniques, such as a finite element method with a thin approximation method, a fast multipole method, etc., are necessary to develop them. In addition, it takes a lot of time to simulate screening currents in REBCO tapes. As the result, most of researchers cannot use these simulation tools. In this paper, hence, we propose a facile method to estimate screening currents and their induced fields in REBCO pancake coils. In the proposed method, equivalent inductances of screening-current circuits are derived from magnet shapes, and then the induced screening currents are computed from the equivalent inductances and the magnetic fields penetrating into REBCO tapes. Then, the screening current-induced fields are estimated from the computed screening currents. Although accurate screening current-induced fields can be obtained by the previously proposed state-of-the-art simulation methods, the proposed method cannot give so accurate results. However, it is easy to get the screening current-induced fields with rough accuracy in a short computation time. No special advanced simulation skill is needed. We will present the facile method to estimate screening current-induced field, and the estimated results are compared with measurements and results obtained by the finite element method with the thin approximation method.

Submitters Country

Japan

Authors: Prof. NOGUCHI, So (Hokkaido University); Prof. UEDA, Hiroshi (Okayama University); Prof. HAHN, Seungyong (Seoul National University); Prof. ISHIYAMA, Atsushi (Waseda University)

Presenter: Prof. NOGUCHI, So (Hokkaido University)

Session Classification: Wed-Af-Po3.12

Track Classification: G5 - Magnetization and Field Quality