MT25

25th International Conference on Magnet Technology

RAI - Amsterdam
August 27 - September 1, 2017

Contribution ID: **728**   Type: **Poster Presentation of 1h45m**

AC Loss Properties of Stacked Multifilamentary REBCO Superconducting Tapes

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

For ac applications of superconductors, ac loss is most of the heat load. So it is very important to estimate the ac losses in superconducting windings for the design of cooling system. However the measurement of ac loss takes much time and cost and also needs large facilities. So simple and easy estimation method of ac loss is required. In this study we investigated the ac loss properties of multi-filamentary REBCO superconducting tapes which were made by the IBAD-PLD technique and laser-scribing. The thickness of a REBCO superconducting layer was 3.6μm. The length and width of sample tapes was 60mm and 10mm respectively. We measured ac losses of sample tapes with a saddle-shaped pick-up coil applying ac magnetic field perpendicularly to the tape face. Temperature was 30, 40, 50, 64 and 77 K. Number of stacked tapes was 1, 3 and 6. We measured the ac losses in multi-filamentary REBCO superconducting tapes and compered with the ac loss of non-scribed tapes. The number of filament of the laser-scribed tape was 4. When the observed ac losses were normalized by I_{c0}, which was the evaluated critical current at zero field at the respective temperature by using the observed magnetization curve, those agreed with one master-curve regardless of temperature. The ac losses were scaled with temperature whether the tapes were scribed or non-scribed. In addition the ac losses were scaled regardless of the number of stacked tapes. However the dependences of ac losses on the number of stacked tapes for the smaller amplitude than the penetration field, B_p, were different between the scribed tapes and non-scribed ones. In this conference, we will report the observed results and discuss on the simple and easy estimation methods of ac losses.

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Session Classification: Wed-Af-Po3.12

Track Classification: G4 - Losses in Conductors and Coils