

Comparison of AC Magnetic Loss of Coated Conductors

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The ac power loss in a superconducting tape is due to magnetic hysteresis of fluxes which were penetrated into superconducting film. The ac power loss values can be theoretically obtained by integrating the area of the closed curve in the flux density (B) and magnetization (M) space along the tape width. In this research, we calculated the ac power loss numerically from the field profiles data measured near the superconducting tape under external magnetic field. The scanning Hall probe method was employed to collecting the data. First, the current profiles were calculated by an inversion of the Bio-Savart Law which is the field-current relation equation. The magnetic flux density profiles on the superconducting surface were obtained with the Bio-Savart Law using the calculated current densities. From both the data of the current density and flux density profiles, the magnetic hysteresis curves were obtained along the tape width. The ac losses and $g = \pi Q_M / \mu_0 I_c^2$ of IBAD template-PLD YBCO tape were compared with those of and the IBAD template-EDDC SmBCO tapes. In the case of PLD YBCO tape, the f-factor data were consistent with those calculated theoretically in the reference. However, in the case of the IBAD template-EDDC SmBCO tapes, the values of the f-factor data were smaller than them.

keywords: AC magnetic loss, coated conductor

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