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## Current behaviors of NI REBCO pancake coil wound with multi-bundled conductors during charging and against local normal state transition.

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High-temperature superconducting (HTS) magnets have been widely studied for practical applications of NMR, MRI, and medical accelerators. 2nd-generation HTS, REBCO (Rare-Earth Barium Copper Oxide), coated conductors (CC) have a high critical field and excellent electrical properties, compared to other superconducting conductors. REBCO pancake coils using the no-insulation winding technique can carry a large current with small cross-sectional area and have shown a high thermal stability against local normal state transitions. NI REBCO pancake coils are expected to be used for practical ultra-high (>30 T) magnetic field applications. One of critical issues on NI REBCO coils is a charging delay. To solve this issue, pancake coils wound with multi-bundled REBCO CCs was reported in journal papers. As an experimental result, a charging delay was improved, because the inductance of the NI pancake coil wound with multi-bundled REBCO CCs (MB NI REBCO pancake coil) is smaller than that of a conventional NI pancake coil wound with a single REBCO CC. The higher thermal stability of MB NI REBCO pancake coil is also expected than the conventional one. However, the current behavior of an MB NI REBCO pancake coil is complicated and has not yet been clarified. It is pointed out that an operating current may not be evenly distributed in each tape. In this study, the current and thermal distributions of MB NI REBCO pancake coils are investigated numerically, and the stability of the MB NI REBCO pancake coils during charging and against normal state transition is discussed by comparing three cases of MB NI coils with different resistances between turn-to-turn.

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