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Study of REBCO Trapezoidal Armature Windings for Superconducting Induction Motor

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Superconducting motors have been studied for electric vehicles, airplanes, and so on in the world. Therefore, superconducting motors become lightweight and have a high-power density. Since REBCO superconducting tapes have tape-shapes, motors with racetrack coils as armature windings have been studied. However, race-track coils are inferiority in the respect of increasing interlinkage flux to rotor than distributed windings. In this study, considering characteristics of REBCO tapes, we proposed trapezoidal coils for armature windings to become shapes like distributed windings. Then, 2 kW-class induction motors used two-types coils were designed in order to compare two motors' characteristics. JMAG Designer executed electromagnetic simulations about two models. As a result, the motor with trapezoidal coils used less REBCO tapes and indicated less amount of the vertical component of magnetic flux density than racetrack coils. For these reasons, the AC loss of trapezoidal coils become smaller than racetrack coils and the weight of trapezoidal coils are lighter than racetrack coils.

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