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Degradation of Critical Current in an HTS Tape Considering Curvature of Elliptical Shape under Combined Bending and Torsion

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Degradation of critical current in a high temperature superconducting (HTS) tape under bending conditions had been previously investigated. These investigations were focused on only either bending or torsion. A rotating flux pump is used to study the charging characteristics of HTS synchronous motor. In order to design the rotating flux pump connected in series, the elliptical winding applied together with combined bending and torsion is essential. Therefore, in this paper, the critical current considering curvature of elliptical shape is measured with regard to nine kinds of mandrels. The shapes of mandrels are a tall prolate ellipsoid, oblate ellipsoid and half circle. The diameters of each shape are 20, 30 and 40 mm, respectively. The experiments are mainly composed of four conditions; straight, bending, torsion, and combined bending and torsion. Finally, the experimental observations have been compared with the theoretical predictions.

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