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M1Po2B-03 [33]: Investigation of Electromechanical Properties in REBCO Coated Conductor Tapes during Fatigue Test at 77 K

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In the HTS superconducting magnet application fields like motors, generators, and SMES, 2G REBCO coated conductor (CC) tapes will be subjected to alternating stress or strain during manufacturing and operation. In these applications, the repeated load affects the mechanical integrity and eventually the electrical transport property of CC tapes. Therefore, mechanical and electromechanical properties of CC tapes under cyclic loading should be evaluated. In this study, a high-cycle fatigue test of 4 mm and 12 mm-width CC tapes at 77 K and room temperature has carried out. A relation between applied maximum stress and fatigue life (S-N curve) was obtained. The electromechanical properties of CC tapes were evaluated from the degradation behaviors of critical current measured at specified repeated cycles during fatigue testing. Fracture surface morphologies were observed to clarify the influence of slit edge on the fatigue strength. Considering the practical operating environment, the influence of stress ratio on the electromechanical properties was also investigated. In the aspect of reliability assessment of CC tapes, the correlation between the mechanically determined fatigue strength and electromechanical fatigue strength will be discussed.

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