Torsion Strain Effects on Critical Currents of HTS Superconducting Tapes

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Abstract - A torsional twist strain effect on the critical current of a thin HTS tape has been found to be well described by a longitudinal strain model taking into account the internal shortening compressive strains accompanied with the tensile longitudinal strains due to a torsional twist. The critical current of a twisted tape is given by the integration of the critical current densities corresponding to the strain distribution over the tape cross-section using axial strain data of the tape. The model is supported with experimental results of YBCO and BSCCO-2223 tapes. It has been also found that torsional twisting effects on the critical currents of a tape composing of the conventional lapped-tape cable and the twisted stacked-tape cable are described by the same equation as that of a twisted single tape.

Keywords - Torsion, twist, cabling, tape cable, critical current, high temperature superconductor, HTS cable

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