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Design and Electromechanical Properties of HTS Twisted Stacked-Tape Conductor with Three Stepped Slots

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The high temperature superconducting (HTS) twisted stacked tape conductor (TSTC) is one of the methods to improve the current-carrying capability of a superconducting conductor. A three stepped slots with twisted stacked YBCO tapes is presented in this paper. The YBCO tapes embedded in the stepped grooves of two different lengths. A 2D finite-element model is used to computes the magnetic field and current distribution. The current carrying characteristics under 2 T background magnetic field are studied. The minimum critical current of 4108 A is measured under the perpendicular field, and maximum of 4535 A for parallel. The correlation between the maximum von Mises stress of the conductor and the external field angle is also studied. A 20+10 tapes in each single groove configuration conductor of YBCO was fabricated using the twisted stacked-tape method, and the bending test of the samples at 77 K in self-field are performed to verify the electromechanical characteristics.

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