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AC Loss Calculation on Stacked HTS YBCO Tapes Based on Magnetic Field Characteristic Parameters Analysis

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This paper studied the alternating current (AC) loss of stacked high-temperature superconducting (HTS) tapes based on the finite-element method (FEM). By solving the partial differential equation (PDE) of H formulation, this research analyzed the effects of the frequency, amplitude and phase of the current and magnetic field on the AC loss of the three-layer stacked HTS tapes which works under AC transmission current and AC external magnetic field. To fully understand the AC loss distribution in the HTS tapes, the total loss in the stacked tapes was investigated and the difference in loss between the middle tape and the end tape were highlighted. The results shows that the AC loss of the tapes at both ends is always greater than that of the tape in the middle, and the total AC loss of the tapes varies linearly with frequency, symmetrically with phase. Over all, The characteristic parameters of current and magnetic field are quantitatively studied to find the optimal solution of AC loss under the coordination of all parameters, which plays a key role in the subsequent optimization of flux pump system.

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