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Wed-Mo-Po.09-10: Analysis of Transverse Compression Performance for 6-Slot twisted stacked-tape cable in conduit conductor

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Twisted stacked-tape cable in conduit conductor (TSTC-CICC) structure have garnered significant attention due to their excellent electromagnetic performance and manufacturing simplicity. However, in fusion engineering applications, these cables are subjected to substantial transverse compressive loads during operation, transportation, and assembly stages, which primarily lead to irreversible degradation of their current-carrying capacity. This study investigates the pressure performance of 6-slot TSTC-CICC through transverse compression tests and cyclic loading experiments, verifying their Lorentz force-bearing capacity under high magnetic field and high-current conditions. Finite element analysis (FEA) is systematically employed to evaluate the structural response of stacked tapes under rigid copper core constraints, elucidating the mechanisms underlying the varying degradation rates of current-carrying capacity under different stress conditions. The research findings provide critical theoretical support for the structural optimization design of fusion reactor cables.

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