

Simulation of Interstrand Coupling Loss in Cable-In-Conduit Conductors with JackPot-AC

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Abstract - Within the framework of the design analysis of ITER PF coil joints, a model is developed that simulates the coupling loss between strands in a cable-in-conduit conductor (CICC). The present version of this model can simulate these losses in a cable section, subjected to any type of time-changing background field. It calculates the trajectories of all strands in the CICC, and uses this as the foundation for the electrical properties of the model, including strand transport properties, saturation and shielding. The simulation results are first compared with measurements on sub-size CICCs with different strand coating, which affects the interstrand resistance. In all but one of these simulations, the coupling loss time constants are lower than the measured values. A better agreement is obtained with the simulation of an ITER PF1 conductor, subjected to Twente Press experiments. For this simulation, only one final stage sub-cable is used, assuming that coupling currents between them is negligible due to the stainless-steel wraps around them.

Index Terms - CICC, coupling loss model, ITER, superconducting strands.

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