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Analysis of the ITER PF coil joints under the reference operating scenario

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A superconducting Poloidal Field (PF) coil winding of the ITER Tokamak consists of stacked double pancakes wound with NbTi cable-in-conduit conducto1rs. One of the critical components of the coil is the electrical joint connecting either two conductor lengths within a double pancake or two double pancakes. All joints utilize the twin-box "shaking hands"concept. In each half joint box a bare cable is pressed against a copper plate. The copper plates are soldered forming the joint. The joints will operate under variable field causing undesirable induced currents (in addition to transport current) in superconducting strands and temperature increase of the strands. A solution for the reduction of both was proposed and its effectiveness was verified in [1] by the JackPot-ACDC numerical model. Simplified field vs. time profiles were used to derive the main characteristics of the joint. In this work we explore further the effect of the proposed method on the joint temperature margin and power loss under the field and transport current during the operation cycle of the PF coils with JackPot-ACDC.

[1] Y. Ilyin, G. Rolando, A. Nijhuis, F. Simon, B.S. Lim, N. Mitchell and B. Turck, "Simulations of Twin-Box Joints for ITER PF Coils", accepted for publishing in IEEE Proceedings on Applied Superconductivity, 2014.

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