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Temperature evolution in ITER CSU2 coil module during 15MA plasma scenario

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The JackPot-ACDC model, an electromagnetic-thermal model for Cable-in-Conduit Conductors and THEA, a thermo-hydraulic model for superconductors can be combined to reproduce and predict the behavior of a conductor under any current and magnetic field variations. JackPot+THEA is used to model the most demanding turns of the CSU2 module quadra-pancake of the ITER Central Solenoid. The chosen Nb3Sn conductor section is about 150 m long from helium inlet to helium outlet, which are placed respectively in the most inner and outer turns of the pancake. The conductor temperature margin and electric field levels are compared with those obtained at minimum quench energy (MQE) simulations and experiments in order to evaluate possible critical issues. The results confirm sufficient stability of the conductor section, both from electrical and thermal point of view. The temperature evolution during the 15MA plasma scenario is also analyzed to evaluate the feasibility of concatenate multiple scenarios without interruption due to accumulative heat storage in the helium slug, necessary for continues energy production for future fusion power plants.
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