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Thermal-hydraulic analysis of the HTS DEMO TF coil

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Abstract
The new HTS design concept for the DEMO toroidal field (TF) coil, based on cross-conductor (CroCo) strands, has been proposed by KIT. The coil is layer wound and consists of 12 layers with different jacket radial thickness grades. The present work is focused on the thermal-hydraulic analysis of the conductors'design, which includes: 1) hydraulic analysis—calculation of the mass flow rates in each conductor at operating conditions during the dwell time; 2) heat removal analysis aimed at the assessment of the temperature margin at the expected nuclear heat load during the plasma burn; and 3) estimation of the maximum hot spot temperature and pressure in each conductor during quench. The analysis is performed using simplified models and the THEA code, and is aimed at verification if the proposed design fulfills the acceptance criteria.
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