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P3.094 Validation of the updated DTT TF coil conceptual design

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The Divertor Tokamak Test (DTT) facility is a satellite experiment in the same research and development framework of the European DEMOnstrating fusion power reactor. It shall evaluate different divertor solutions for power and particles exhaust, and shall investigate the plasma-material interaction scaled to long pulse operation. It is part of the European Fusion Roadmap and shall be completed in Italy. ENEA is designing the complete magnet system and is performing the great part of the mechanical finite element analyses. The design of the machine has been reiterated from what initially presented in 2015, as the major plasma radius has been reduced from 2.15m to 2.08m. The analyses hereby reported are thus aimed to support the validation of the updated design by focusing on the response of the Toroidal Field (TF) coil system. Mechanical stress resulting from the magnets' cool-down and from electromagnetic loads due to different operative conditions have been computed. The results are a combination of bi- and tri-dimensional analyses. The first make use of the generalised plane strain formulation to model in full detail the equatorial section of the TF inner leg. The latter include the complete TF coil system and implement homogenised material properties for the Winding Pack (WP). Particular attention has been put in correctly modelling the structural contacts and the wedging effect of the TF coil. This report thoroughly describes the developed approach. The presented results show that stress concentration values are below allowable limits. Hence, this work validates the latest design update of the DTT TF coil system.

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