



Contribution ID: 344

Type: **not specified**

P4.008 Support structure of the COMPASS-U tokamak: validation by ANSYS modelling

Thursday, 20 September 2018 11:00 (2 hours)

A new high magnetic field tokamak, COMPASS-U [Panek et al., Fusion Eng. Des. 123 (2017) 11 – 16], replacing the currently operating COMPASS tokamak at IPP Prague is being designed and constructed nowadays. As a result of high magnetic field in the machine ($B_0 = 5$ T) large forces (up to 6.5 MN) acting especially on the TF coils are expected. In order to keep the loading of the coils, which will be made of OFHC copper, low enough to prevent material failure and to ensure their high cycle-life, massive external support structure was designed. The outer support structure will be made of the stainless steel plates of 200 mm width.

The numerical validation of the support structure design was performed by means of ANSYS software calculations. Electromagnetic forces for several worst-case scenarios acting on the TF and PF coils and on the coils of the central solenoid were evaluated using ANSYS Maxwell code. The resultant volume force density was consequently used as a load in mechanical stress distribution calculation by ANSYS Mechanical.

The results revealed that the suggested support structure is fully able to capture vertical separating force acting on the TF coils. As a result of the interaction between the TF coil currents and the poloidal fields significant torsional shear stress in the TF coils was evaluated. High pressures between the coils of the central solenoid and TF coils were also observed. Critical places were identified and structural design changes were suggested to keep the mechanical stress below the acceptable limits.

Presenter: HROMADKA, Jakub (Tokamak Department Institute of Plasma Physics of the Czech Academy of Sciences)

Session Classification: P4