Contribution ID: **293** Type: **not specified**

Thermo-Mechanical behaviour of ITER Blanket Modules interface between First Wall and Shield Block

Monday, 17 September 2018 11:00 (2 hours)

The Blanket System provides a physical boundary for the plasma transients and contributes to the thermal and nuclear shielding of the vacuum vessel (VV). It consists of modular shielding elements, the blanket modules (BM), which are attached to the VV. Each BM consists of two major components: a plasma-facing first wall panel (FW) and a shield block (SB). They are connected by means of a preloaded central bolt working in tension, and they further interface each other through a set of eight compression pads installed in each FW. The design of these pads has a major importance because of the very demanding Thermal and Electromagnetic (EM) loads they are subjected to. The thermal gradients taking place during the normal operation thermal cycling tend to bend the SB and the corresponding FW in different ways and they can induce an over loading of the pads or a loss of pretension with the risk of exceeding the damage load of the pads or of the bolt under the EM Major Disruptions and Vertical Displacement events. These phenomena have been numerically investigated on BM#14 (including a representative Enhanced Heat Flux FW) and BM#06 (including a representative Normal Heat Flux FW). A full set of hydraulic (CFD), thermal and structural finite element analyses and related structural (SDC-IC) assessments was performed, focusing on the behavior of the central bolt's pretension and on the reaction forces at the pads at significant instants of the thermal cycling. The results obtained demonstrated that the pads are within the allowable load for static conditions for all possible combination of thermal and EM loads. However the presence of a physical gap at some pads indicates that a fully conclusive study requires dynamic analysis techniques.

Co-author: Dr VIGANO, Fabio (L.T.CALCOLI S.R.L.)

Presenter: Dr VIGANO, Fabio (L.T.CALCOLI S.R.L.)

Session Classification: P1