Contribution ID: **127** Type: **not specified**

ITER magnetic sensor platform engineering analyses

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

ITER in-vessel magnetic sensors play a key role for ITER plasma operation. Each of these sensors is accommodated in a platform mounted on the inner surface of ITER vacuum vessel and behind the blanket.
A full set of engineering analysis has been performed on the platform to assess the feasibility of the design configuration.
Electromagnetic (EM) Sub-Modelling technique has been used for very detailed evaluation of the EM loads die to plasma disruption events.
The EM sub-model has been built by taking one sample sensor with a portion of vacuum vessel around it and applying the vector potential obtained from ITER Global Model (IGM) analysis on the boundary nodes.
With this technique, platforms at 23 locations from a full poloidal array have been analyzed under 8 category III plasma disruption events. The two cases yielding highest EM load were selected to complete the structural assessment.
Thermal analysis was performed for a platform located on outboard midplane, where maximum heat load is expected.
The structural assessment has been performed as for the RCC-MR design code and considering a pessimistic input load combination of highest EM loads and highest thermal stresses over ITER operation lifetime.
An optimization process, dealing with EM and structural analyses, was set up, to reduce the EM loads and increase the structural strength of the platform.
The engineering analysis showed positive results on the structural integrity of the platform structure with the optimized design.
Future work is planned to incorporate the thermal deformation of VV surface due to nuclear heating and further refine the calculation.

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Session Classification: P1

Track Classification: Diagnostics