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P2.065 Analyses and structural integrity estimation of the Divertor Thomson Scattering system

Tuesday, 18 September 2018 11:00 (2 hours)

The presentation is focused on approaches and results of simulations and used for loading analyses made for new design of the Divertor Thomson Scattering (DTS) in-vessel equipment, including spatial stress strain state, seismic analysis, electromagnetic analysis as well as the most important load combinations.

The ITER Divertor Thomson Scattering system is designed to provide an instrument capable of measuring the profiles of electron temperature and relative profiles of electron density in the outer divertor plasma.

Finite element model of the construction includes updated DTS components such as outer and inner frames of the diagnostic racks, neutron shield attached to the front rack outer frame and main components of the vacuum vessel lower divertor port which contact with DTS system. Thermal analyses taking into account thermal radiation between surfaces of the front rack construction and walls of the lower port were conducted for the transient normal operation mode with 500 MW of fusion power. Based on thermal analysis results, DTS in-vessel elements stress strain state was analyzed and the most stressed points were listed. Electromagnetic analysis was conducted to determine force and moment values applied to the constructions for the most severe plasma disruption events. Moreover, interface accelerations received from the vacuum vessel lower port during EM scenarios were obtained. Stress strain state and temperature maps due to plasma disruption events were also obtained. Finally, some load combinations of event categories I-IV were explored and the obtained results were analyzed.

Presenter: KIRIENKO, Ivan (Mechanics and control St.Petersburg Polytechnic university)

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