Contribution ID: **698** Type: **not specified**

P2.126 ITER-grade tungsten limiters damage under high heat flux in the T-10 tokamak

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

Tungsten is foreseen as plasma facing material for ITER. The tungsten testing under high heat loads is very important for ITER operation prediction. In a real tokamak conditions combination of the heat and particle fluxes could enhance tungsten destruction and erosion. Some mechanisms of plasma-surface interaction can lead to a concentration of heat flux onto the small zones of the divertor and limiters and cause a damage or melting of tungsten. One of such mechanisms could be nonambipolar flow toward the tungsten surface due to the arcs and sparks. This report presents the results of the tungsten limiters analysis in the T-10 tokamak after 2015-2017 experimental campaigns. The limiters were made from the ITER-grade WMP “POLEMA” tungsten. Significant cracking of the tungsten limiter surface was observed. Heat load up to 2 MW /m2 lead to the micro-cracks (1-2 μm wide) development at the grain borders accompanied by the destruction of the surface. On the inner board of the torus heat flux to the edge of the limiter ring can exceed 5 MW m-2 during the ECR heating. In such discharges, the tungsten plates at the inboard of the vessel were heated to temperature exceeded 20000C. Local thermal load of more than 40 MW/m2 leads to tungsten surface melting. Intensive sparking and arcing, deep cracks and edge melting were observed on the tungsten tiles after the experimental campaigns. In these zones macro cracks developed with a width up to 100 μm and lengths of 5-50 mm. It is supposing that the nonambipolar flow due to the arcs and sparks leads to the observed overheating, cracking and melting of the tungsten surface.
In the T-10 tokamak edge plasma conditions strong destruction of the ITER-grade tungsten limiters was observed during the experimental campaigns.

Presenter: GRASHIN, Sergei (Kurchatov Complex of Fusion Power and Plasma Technology National Research Center ÈKurchatov Institute)

Session Classification: P2