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P2.064 First heat flux decay length estimation in WEST with embedded thermal measurements

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

The main objective of WEST is to study the behavior of the ITER like Plasma Facing Components (PFCs) and to test the resistance and ageing of these components under high heat loads. To achieve these objectives, two independent thermal diagnostics have been developed and installed in the lower divertor of the WEST tokamak. The first one is based on 20 thermocouples embedded at 7.5 mm from the surface in non-actively cooled W-coated graphite PFCs and distributed at different poloidal and toroidal locations. The second one is the Fiber Bragg Grating (FBG) diagnostic. We have installed four optical fiber temperature probes in the lower divertor of WEST, each of them including 11 FBGs equally spaced by 12.5 mm in the poloidal direction (which is equivalent to one ITER-like tungsten monoblock). The probes are embedded in non-actively cooled W-coated graphite PFCs at 3.5 mm and 7 mm below the surface (2 fibers at each depth).

A short description of the thermocouple and FBG diagnostics and their performances will be presented as well as the first bulk temperature measurements obtained in ohmic and L-mode pulses in the WEST tokamak. A 2D nonlinear unsteady calculation combined with the Conjugate Gradient Method (CGM) and the adjoint state is used in order to estimate the space and time evolution of the surface heat flux based on temperature measurements. The heat flux decay length on the target will be extracted from these estimations. The position of the peak heat flux will be investigated for the two main lower single null magnetic equilibriums foreseen to test the ITER-like tungsten PFCs, with X-point location “close” and “far” from the divertor target.

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