

## Modulation of the strike line position using control coils in Wendelstein 7-X

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The stellarator Wendelstein 7-X (W7-X) restarted operation in 2017 with ten divertor modules made of inertially cooled graphite plasma-facing components (PFCs)[1]. They serve a purpose of testing the heat and power exhaust concept of so-called island divertor before installation of water-cooled divertor planned for 2020. The island divertor, developed at Wendelstein 7-AS, uses large magnetic islands to remove heat and particles from the plasma boundary. As W7-X in near future will operate as a quasi steady state device, it is crucial to control the power loads to the divertor to avoid overheating. Therefore W7-X is equipped with ten 3D-shaped control coils which, by creating additional magnetic fields, can be used to modulate position and geometry of strike line and island divertor [2, 3]. This extra field can also correct symmetry of the field, sweep the strike line on the target in order to avoid local overheating or change the X-point position to control detachment.

We will present changes in the geometry of the island divertor as measured by the thermographic diagnostics. Ten infrared cameras, one per each divertor, collected the temperature distribution at the divertor surface. The THEODOR code was used for data analysis in order to extract geometry and movement of the strike line on the horizontal and vertical elements of the divertor during the discharge. Apart of small deviations due to error fields, the measured strike line shows good agreement with predicted by field line tracing codes.

To observe the effect of the correction field on the strike line position and island divertor geometry several discharges with different amplitude of the control coils DC currents (from -2000 A to 2000 A) have been performed. Moreover, AC current of 600 A and frequency of 5 Hz was used to sweep the strike line and caused its movement by a few centimeters.

### References

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- [3] Jauregi, E. et al. Fusion Eng. Des. **66-68**, 1125-1132 (2003)