Contribution ID: **3580** Type: **not specified**

P5.1040 Observations of 3D magnetic perturbation effects on divertor heat flux distribution induced by LHW using the infrared camera on EAST

Friday, 12 July 2019 14:00 (2 hours)

See full abstract here http://ocs.ciemat.es/EPS2019ABS/pdf/P5.1040.pdf

Previous experimental results from the Experimental Advanced Superconducting Tokamak (EAST) have shown that the lower hybrid wave (LHW) can induce a 3D magnetic topology change at the plasma boundary, thus affect significantly the edge plasma transport and divertor heat flux distribution [1, 2]. To investigate further the 3D effects on the interaction between the plasma and the first wall on EAST, a middle-waveband wide-angle infra-red (IR)/visible integrated endoscope diagnostic system has been developed to measure the surface temperature distribution on important inner components like the upper & lower divertors and LHW protection guide limiter etc., simultaneously. Splitting of the original strike line, which characterised as appearance of multiple peaks in the heat flux distribution profile along the divertor target, has been observed during the application of LHW. A temperature measurement method using a proposed nonlinear emissivity of the divertor target plate is developed to obtain more accurate heat flux results.
In this paper, the effects of LHW on the heat flux distribution will be discussed. A numerical model using field-line tracing method for modeling of three-dimensional magnetic field topology change induced by the LHW on EAST is presented. The topological structure is calculated in the vacuum paradigm. The modeling result predicts the toroidal dependence of the strike line splitting on the divertor target, which has been observed by using the IR camera, as well as various divertor probes located at different toroidal cross sections.

[1] Y. Liang et al., Phys Rev Lett 110, 235002 (2013).
[2] J. Li et al., Nature Physics 9, 817 (2013).
[3] K. F. Gan et al., Rev Sci Instrum 84, 023505 (2013).

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Presenter: SHU, S. (EPS 2019)

Session Classification: Poster P5