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Published in:
Programme & Book of Abstracts

Publication date:
2012

Document Version
Publisher's PDF, also known as Version of record

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The ELM-resolved particle and power loads on divertor targets were studied in a wide range of discharge conditions in the EAST superconducting tokamak, mainly using divertor triple Langmuir probe (DTLP) arrays embedded in the target plates, along with infrared (IR) camera and other key divertor diagnostics. The target particle and power loads for type-I, type-III and mossy ELMy H-mode plasmas are investigated, respectively. The experiments were performed with lower hybrid current drive (LHCD) alone or combined with ion cyclotron resonance heating (ICRH), with Lithium wall coatings. For a typical type-I ELM in EAST, the divertor heat load is about 10% the plasma stored energy, while it is about $1-2\%$ for a typical type-III ELM in EAST. The mossy ELMs induce even less change to the plasma stored energy, i.e., $\sim 0.1\%$. The peak heat fluxes on the divertor targets for mossy, type-III and type-I ELMs are characteristically ~ 0.1 MW/m^2, ~ 2 MW/m^2 and ~ 10 MW/m^2, respectively. The mossy ELMy H-mode in EAST may provide a potential scenario for ITER. In the present ongoing campaign of EAST, mossy ELMy H-mode duration has been lengthened to 1 s with LHCD+ICRH, which is only limited by ICRH pulse length and may be readily extended to longer values. In an ELM-free period, the power deposition obtained from DTLPs was compared to that from IR camera, which is not ELM-resolved at present. And the results of the two cross diagnostics are comparable. Statistically, the frequencies for mossy, type-III, and type-I ELMs are $1-2$ kHz, $200-800$ Hz, and < 100 Hz. During both type-I and type-III ELM phases, the SOL width and plasma-wetted area on divertor targets broaden insignificantly, compared to that between ELMs. This insignificant broadening is independent of the auxiliary heating technique. The mid-plane SOL width for type-III ELMs in EAST is $\sim 8-15$ mm, being different to that during type-I ELMs. The divertor in-out asymmetry during both type-III and type-I ELMs has also been studied. For type-III ELMs, divertor plasmas favor the outboard target in LSN, which exhibits an even stronger in-out divertor asymmetry in DN. Also in the ongoing campaign the fine structure of ELMs, i. e., ELM filaments were observed by DTLPs. The typical interval time between adjacent ELM filaments for type-III ones in EAST is $\sim 150-250\,\mu$s.

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