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The vacuum ultraviolet imaging system and its application on EAST

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The Chinese Fusion Engineering Test Reactor (CFETR) is the next device scheduled in the roadmap to realize fusion energy in China[1]. It aims to bridge the gaps between ITER and DEMO. Steady-state operation is one of the key issues of CFETR. The EAST tokamak will provide a long-pulse, high power test bench for advanced scenarios under actively cooled metal wall condition, which will play an important role on supporting the steady-state operation of CFETR.

In CFETR, operation scenarios of H factor over ELMy H mode are around or higher than 1.0, as listed in Ref.[1]. For long-pulse ELMy H mode discharge, it is a big challenge for the divertor plate to hold the highlevel transient heat flux due to the quasi-periodic ELM event. Therefore, ELM control is necessary to realize steady state operation. It is known that ELMs are strongly related with the dynamics of the so-called pedestal region, where steep pressure gradient exists. But the mechanism is still an open topic in fusion research. Experimental studies on the pedestal may be helpful on the understanding of the related physics and benefit the development of efficient method on ELM control.

A vacuum ultraviolet (VUV) imaging system is developing on EAST tokamak. It aims to measure the evolution of the spatial structures of the pedestal, by selectively measuring emission of 13.5 nm in wavelength, which mainly comes from C VI (one of the intrinsic impurities in EAST). It has been installed on EAST to view the plasma perpendicularly and has been operated in the 2016 experiment campaign. ELM dynamics can be studied by the combination of VUV imaging and the existing visible imaging system, which mainly monitors the bottom of the pedestal and SOL region on EAST. In this work, the hardware of the VUV imaging system and the first results from the VUV imaging data will be presented. In addition, the upgrade of the optics is scheduled for the next campaign, which can be operated to view the plasma tangentially. The proposals of the upgrade will be discussed as well.

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References:

[1] Y.X.Wan.et al 2016 26th IAEA Fusion Energy Conference, Kyoto, 17-22 Oct. 2016, Paper No. OV/3-4

Eligible for student paper award?

No

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