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Physics and Geometry Design of Lower Divertor Upgrade in EAST Tokamak

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Abstract-Experimental Advanced Superconducting Tokamak(EAST) device is a D-shaped full superconducting tokamak with actively water cooled plasma facing components. Before this upgrade, three generations of divertors, which, respectively, are steel divertor and carbon divertor and International Thermonuclear Experimental Reactor (ITER)-like divertor have designed. To achieve long pulse and high β H-mode plasma, new plasma position and shape are calculated and optimized in 2016 for EAST. The new geometry of lower divertor heavily relies on numerical simulations of the plasma in EAST.
New divertors are designing to fit the high β H-mode plasma and endure the heat flux up to 10 MW/m2. To solve this issue, the lower carbon divertor will be upgrading in the future in EAST, which is in conceptual design phase. In consideration of the structure profile and function in EAST tokamak, in conceptual design phase these questions will be solved as follow. Firstly, the divertor should be better designed with advanced physical operation mode. Secondly, the divertor should be advanced geometry and high efficient cooling structure. The cooling circuit and the support systems of the component are installed on the vacuum vessel. The size of the space under the divertor should be consideration, which is very important. Thirdly, the cooling structure and maintenance of the divertor are also introduced in the paper.
In consideration of physics and geometry design of lower divertor upgrade in EAST Tokamak, in the paper, mainly introduce the research progress of the fourth generation of divertors in EAST, much effort was focus on the divertor configuration and geometry.

Eligible for student paper award?

Yes

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