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Simulation study for the advanced divertor for fusion reactor

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EXTENDED ABSTRACT: The fusion energy is the most promising way in the future due to the abundant fuel source and low contamination to the environment. The magnetic confined fusion is now the most possible way to realize the controlled fusion reaction and the tokamak is now considered as the best choice among the various magnetic confined devices. One of the most critical issue for the future fusion reactor is the huge heat load onto the divertor target, where the heating power in the main plasma is exhausted. While the traditional lower-single-null (LSN) divertor configuration is adopted in the International Thermonuclear Experimental Reactor as the heat exhaust solution, the ability may not sufficient for the future fusion reactor with higher fusion power. To explore the divertor solution for the critical heat exhaust issue, several advanced divertor configuration is proposed by introducing alternative magnetic configuration or optimizing the divertor geometry [1-2]. Based on the parameter of China Fusion Engineering Test Reactor, the snowflake divertor and long-legged divertor [3-5] is studied by numerical simulation using SOLPS (scrape-off layer plasma simulation) code. The effect on reducing the divertor heat load is confirmed in the simulations, and the detailed physical mechanism will be discussed in the conference. These works provides a useful reference for the physical design of the divertor in the future fusion reactor.

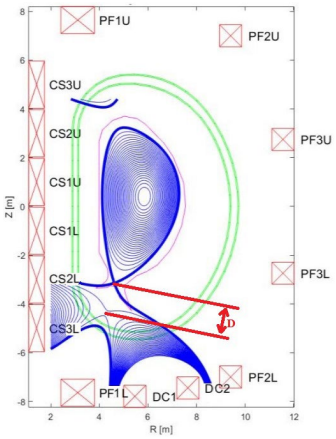

Figure 1. The snow-flake divertor configuration for CFETR [3]..

Keywords： Fusion; tokamak; advanced divertor; scrape-off layer; heat load

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BIOGRAPHY

Shifeng MAO has completed his PhD at the age of 25 years from University of Science and Technology of China and continue his Postdoctoral Studies there. He is now the associated professor in School of Nuclear Science and Technology of China. He has published more than 75 papers in reputed journals.