STUDY OF QUASI-SNOWFLAKE DIVERTOR FOR CFETR BY USING SOLPS

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China Fusion Engineering Test Reactor (CFETR) is proposed as a good complement to ITER for demonstrating of fusion energy and now in conceptual design phase\textsuperscript{[1,2]}. As a key component in the superconducting Tokamak CFETR, divertor is directly faces the outflow particles and power from core plasma, therefore, heat exhaust and impurity screening abilities are desired as higher as possible. Although the expected fusion energy $P_f$ of CFETR is 200 MW which is lower than ITER, due to a higher auxiliary heating power and smaller size, the heat flux flow into scrapped-off layer (SOL) is comparable with ITER. Further considering the smaller size of CFETR than ITER, the heat flux onto divertor targets may even exceed those of ITER.

To find a more effective way to exhaust the heat power, Snowflake\textsuperscript{[3]} divertor is proposed recently and also now under consideration for CFETR along with the standard lower-single-null divertor. In our previous work\textsuperscript{[4]}, a density scan simulation by using SOLPS5.0 is performed on the quasi-snowflake divertor, and the peak heat load is found reduced even the flux expansion is not so broad. Because carbon is used as a substitute of seeded impurities such as Ar, in present work, Ar is injected to find a proper position and puffing rate which could achieve similar heat exhaust ability as carbon, while Ar impurity is well screened from the core plasma.

Reference