Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

The effects of divertor parameters on the plasma penetration depth of the castellated tile gaps: a kinetic simulation[1] CHAOFENG SANG, JIZHONG SUN, SHUYU DAI, DEZHEN WANG, Dalian University of Technology, PLASMA SURFACE INTERCTION AND ATOMOSPHERE DISCHARGE GROUP OF DLUT TEAM — Castellated tiles construction is thought to be the best solution to ensure the thermo-mechanical durability and integrity of materials under high heat flux loads. However, issues such as material migration into gaps and the subsequent fuel retention, are of crucial important for the fusion devices with castellation structure. Therefore, concerns over the fuel accumulation and impurity deposition in the gaps calls for dedicated studies. To know how the fuel retained inside the gap, the plasma sheath around the gaps should be understood first. Since PIC model possesses the merits of kinetic methods, it has been applied extensively to edge plasma studies. In this work, a 2D PIC model is applied to study plasma around the divertor gaps with the focus on the H+ penetration depth inside the gaps. By varying the magnetic field and plasma temperature, the relationship between penetration depth and cyclotron radius of the ions is obtained, we find the H+ cyclotron radius has a significant effect on the penetration depth. Besides, the effects of gap width, plasma parameters and magnetic field are analyzed and discussed. Finally, effect of penetration depth on the fuel retention inside the tile is illustrated, which shows it can increase retention dramatically.

[1]Work supported by National Magnetic Confinement Fusion Science Program Nos 2013GB109001 and 2013GB107003, the National Natural Science Foundation of China under Grant No. 11275042, China Postdoctoral Science Foundation funded project No. 2012M520613.

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Date submitted: 07 Jun 2013 Electronic form version 1.4