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The radiative divertor and in/out asymmetry in HL-2M by impurity seeding with full drifts

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The power exhaust on the plasma-facing comments (PFCs), especially for the divertor, is much challenging for the HL-2M[1]. Radiative divertor has been proposed for standard divertor (SD) by neon (Ne) and argon (Ar) seeding. In this work, the effects of the toroidal magnetic field direction, divertor geometry, D_2 fueling at upstream and impurity species on the divertor in/out asymmetry has been investigated, with emphasis on the impacts of full drifts [2]. The simulation results show that: (1) More Ne particles accumulate in the divertor region with full drifts than that of without drifts. Moreover, the divertor in/out asymmetry [3] is significantly reduced with unfavorable magnetic field (ion B×∇B drift is directed away from the primary X-point), while, the Ne concentration in the core with unfavorable magnetic field is much severe than that of favorable magnetic field. (2) The shrinkage of dome can mitigate the capabilities of pump, significantly affecting the Ne ions distribution and the in/out asymmetry. (3) The upstream D_2 fueling can remarkably promote the impurity screening and affect the Ne distribution, and then influence the in/out asymmetry. (4) The impurity screening with Ar seeding is better than that of Ne seeding. However, the core radiation with Ar seeding is higher than that of Ne due to the high Ar radiative efficiency.

References

The references related to your talks will be used to write summary paper in RMPP (Rev. Mod. Plasma Phys.). So do not miss important papers related to your talk.

[1] Zheng G Y et al 2016 *Nucl. Fusion* **56** 126013

[2] Kaveeva E et al 2020 *Nucl. Fusion* **60** 046019

[3] Liu J B B et al 2019 *Nucl. Fusion* **59** 126046

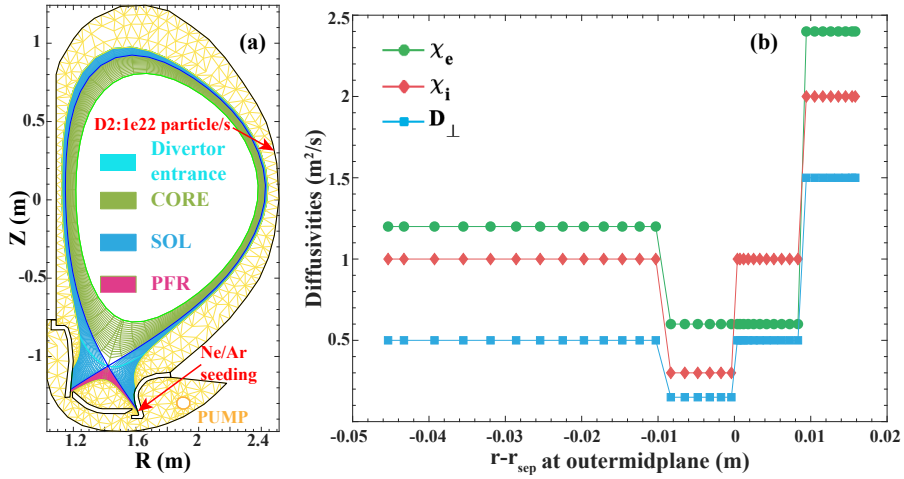

Figure 1 (a) Sketch of the SOLPS simulation domain and wall structure. The regions of the core, SOL, PFR and the divertor entrance are indicated by different colors (the divertor entrance is taken at the X-point). (b) The imposed radial profiles of particle diffusivity $D_\perp$ and electron/ion thermal diffusivity $\chi_{e,i}$ at outer mid-plane (OMP).