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Understanding of Impurity Poloidal Distribution in Edge Pedestal by Modeling

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Modeling of the impurities distribution in the pedestal region of ASDEX-Upgrade H-mode shot was done using the B2SOLPS5.2 transport code. Strong LFS-HFS asymmetry of B+5 density and strong decoupling between parallel velocity distribution of the impurities and the main ions was obtained in qualitative agreement with the experimental observations [1]. Similar asymmetry was obtained earlier in the modeling of He ions distribution in the MAST H-mode by the same code [2]. It is demonstrated that the observed phenomena could be understood by the impact of neoclassical effects in the presence of strong density gradients in the barrier region. Obtained results are completely different from the predictions of the standard neoclassical theory. In particular the role of the poloidal drift and parallel thermal force are important. The physical mechanisms can also explain observed phenomena on C-Mod. The poloidal LFS-HFS asymmetry of impurities changes their radial transport so the standard neoclassical transport model for impurities should be revisited in the edge barrier region.

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