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Predictive Simulations of Pellet Injection in ITER and DEMOs

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The impacts of pellet mass ablation and deposition that consider the effect of the particle drift due to the gradient of magnetic field are investigated for International Thermonuclear Experimental Reactor (ITER) and Demonstration Nuclear Fusion Power Stations (DEMOs). In the core area, the plasma profiles are predicted by the TASK/TR code in which the core transport models consist of a combination of the MMM95 anomalous transport model and NCLASS neoclassical transport. The pellet ablation in the plasma is described using neutral gas shielding (NGS) model with inclusion of the ∇B-induced $E \times B$ drift of the ionized ablated pellet particles. These models are implemented in the HPI2 code that is coupled with the TASK/TR code. It is found that the high-field-side (HFS) injection can deposit the pellet mass deeper than the injection from the low-field-side (LFS) due to the advantage of the ∇B-induced drift. The optimized injection scenarios for achieving the highest fusion performance for these reactors are also reported in this study.

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