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Modeling of dynamic plasma-wall coupling during series of ELM pulses.[1] ROMAN SMIRNOV, SERGEI KRASHENINNIKOV, UCSD, MAXIM UMANSKY, LLNL — Plasma recycling on material walls plays a crucial role in edge plasma transport in tokamaks. Recycling depends on both plasma and wall conditions, which are mutually dependent. However, in most edge plasma modeling studies a fixed recycling coefficient is used. This simplified approach can be insufficient when transient plasma processes, e.g. ELMs, are considered. These processes can strongly perturb plasma and wall states triggering complex plasma-wall dynamics. In this work we model dynamics of edge plasma and hydrogen retention/outgassing from divertor targets during series of ELM pulses. The modeling is performed using edge plasma transport code UEDGE and wall code FACE coupled in a fully time-dependent manner. Various initial divertor plasma conditions and ELM characteristics are simulated. The obtained results demonstrate that ELMs can cause release of significant amounts of hydrogen from the target material, triggering plasma detachment in the divertor. The simulated recycling dynamics demonstrates complex response of wall outgassing to plasma perturbations, which depends on the hydrogen density profiles in the material, with longer response times corresponding to deeper material layers.

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