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Modeling of extinguishing ELMs in detached divertor plasmas A. PIGAROV, S. KRASHENINNIKOV, E. HOLLMANN, UCSD, T. ROGNLIEN, LLNL — Detached plasmas, the primary operational regime for divertors in next-step fusion devices, should be compatible with both good H-mode confinement and relatively small ELMs providing tolerable heat power loads on divertor targets. Here, dynamics of boundary plasma, impurities and material walls over a sequence of many type-I ELM events under detached divertor plasma conditions is studied with UEGDE-MB-W, the newest version of 2D edge plasma transport code, which incorporates Macro-Blob (MB) approach to simulate non-diffusive filamentary transport and various "Wall" (W) models for time-dependent hydrogen wall inventory and recycling. We present the results of multi-parametric analysis on the impact of the size and frequency of ELMs on the divertor plasma parameters where we vary the MB characteristics under different pedestals and divertor configurations. We discuss the conditions, under which small but frequent type-I ELMs (typical for high-power H-mode discharges on current tokamaks with hard deuterium gas puff) are not "burning through" the formed detached divertor plasma. In this case, the inner and outer divertors are filled by sub-eV, recombining, highly-impure plasma. Variations of impurity plasma content, radiation pattern, and deuterium wall inventory over the ELM cycle are analyzed. UEDGE-MB-W modeling results are compared to available experimental data.

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