Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Extinguishing ELMs in detached radiative divertor plasmas ALEXANDER PIGAROV, SERGEI KRASHENINNIKOV, UCSD, THOMAS ROGNLIEN, LLNL — In order to avoid deleterious effects of ELMs on PFCs in next-step fusion devices it has been suggested to operate with small-sized ELMs naturally extinguishing in the divertor. Our modeling effort is focusing at extinguishing type-I ELMs: conditions for expelled plasma dissipation; efficiency of ELM power handling by detached radiative divertors; and the ELM impact on detachment state. Here time-dependent modeling of a sequence of many ELMs was performed with 2-D edge plasma transport code UEDGE-MB-W which incorporates the Macro-Blob (MB) approach to simulate non-diffusive filamentary transport and various "Wall" (W) models for time-dependent hydrogen wall inventory and recycling. Three cases were modeled, in which extinguishing ELMs are achieved due to: (i)intrinsic impurities via graphite sputtering, (ii)extrinsic impurity gas puff (Ne), and (iii)=(i)+(ii). For each case, we performed a series of UEDGE-MB-W runs scanning the deuterium and impurity inventories, pedestal losses and ELM frequency. Temporal variations of the degree of detachment, ionization front shape, recombination sink strength, radiated fraction, peak power loads, OSP, impurity charge states, and in/out asymmetries were analyzed. We discuss the onset of extinguishing ELMs, conditions for not burning through and enhanced plasma recombination as functions of scanned parameters. Efficiencies of intrinsic and extrinsic impurities in ELM extinguishing are compared.

Alexander Pigarov
UCSD

Date submitted: 15 Jul 2016 Electronic form version 1.4