

ELM-induced plasma wall interactions in DIII-D

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Abstract. Intense transient fluxes of particles and heat to the main chamber components induced by edge localized modes (ELMs) are of serious concern for ITER. Plasma interaction with the outboard chamber wall is studied in DIII-D using Langmuir probes and optical diagnostics. Fast camera data shows that ELMs feature helical filamentary structures aligned with the local magnetic field. During an ELM, multiple filaments are ejected from the plasma edge and propagate towards the outboard wall with velocities of 0.5-0.7 km/s. Upon reaching the wall, filaments result in regions of local intense plasma-material interaction (PMI) where peak incident particle and heat fluxes are up to 2 orders of magnitude higher than those between ELMs. In low density/collisionality H-mode discharges, PMI at the outboard wall is almost entirely due to ELMs. A moderate change of the gap between the separatrix and the outer wall strongly affects PMI intensity at the wall.