# Transport of ELM Energy and Particles into the SOL and Divertor of DIII–D*

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Edge-Localized-Modes (ELMs) have the potential, through surface ablation, to unacceptably reduce the divertor target lifetime for the next generation of tokamaks. The pulse of energy and particles into the Scrape-Off-Layer (SOL) results from an intermediate n kink mode driven by the sharp edge pressure gradient of H–mode operation. To predict the flux of energy and particles to the divertor target and first wall of future devices due to ELMs it is important to understand the processes that are responsible for the transport. These processes are examined in DIII–D by measuring; the ELM perturbation to the pedestal profile with Thomson scattering, ELM SOL fluctuations with a reciprocating Langmuir probe, and target plate fluxes with an IR camera and fixed Langmuir probes. The ELM energy released is found to scale proportionally with the pedestal pressure, but is also strongly affected by the value of the pedestal density. The energy convected from the pedestal, inferred from the loss of density from the pedestal, is found to remain constant, ~6% of pedestal energy, with increasing density until the ELMs become very small at the high density. The conducted ELM energy, inferred from the loss of pedestal temperature, is similar in size at low density, but decreases with increasing density until it becomes essentially zero at a pedestal density of ~65% of the Greenwald limit. These trends are not strongly affected by variations to safety factor q, plasma current and plasma triangularity. The scaling of ELM characteristics is examined in the context of parallel and perpendicular transport processes in the pedestal and SOL. Perpendicular transport from the pedestal to the SOL can be caused by stochastic field lines, magnetic reconnection and fluctuation driven E×B transport, all driven by the ELM instability. Parallel transport processes in the SOL may also limit ELM energy and include parallel electron conduction, convection at the ion sound speed and sheath limits at the divertor target. Previously measured ELM energy scaling with pedestal collisionality is pessimistic for larger next step tokamaks such as ITER-FEAT since they will operate at low collisionality. Indications of a more optimistic scaling are found in the data and will be presented.

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