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Investigation of Edge Localized Modes in Alcator C-Mod[1]

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Characteristics of discrete ELMs produced in Alcator C-Mod discharges of low edge collisionality and high triangularity are examined. These discharges have high values for central T_e and n_e (reaching 4.5 keV and 2x10^{20} m^{-3} respectively) and good confinement, consistent with ITER98y2 ELMy H-mode scaling. Pedestal temperature heights reach 0.9 keV at densities above 1x10^{20} m^{-3}. Studies of the stability of the pedestal profiles to peeling/ballooning modes will be presented. The energy lost per ELM from the H-mode pedestal is ∼10-20% of the pedestal energy. These ELMs exhibit relatively long-lived precursor oscillations, often with two modes of intermediate (n∼10) toroidal mode number present. At the ELM "crash" a high frequency (∼0.5 MHz), short-lived magnetic oscillation is initiated, and multiple plasma filament structures are expelled into the Scrape-Off-Layer. The initial ELM filaments, "primaries", are large perturbations to the SOL. The perturbation increases the local D_α emission by factors ranging from 1.5 (just outside the LCFS) to ∼100. In the outboard midplane region the primary filaments have radial extents of 0.5-1 cm and typical radial propagation velocities of 1-2 km/s. The poloidal extent of the filaments is greater than the 4.5 cm diagnostic field-of-view. The initial filaments are followed (at intervals of ∼100μs) by multiple, less perturbing "secondary" filaments. The radial dynamics of the ELM are also studied at the *inboard* midplane. The perturbation on the inboard edge appears to be a rapid profile relaxation and recovery. The onset of the inboard profile relaxation is sometimes observed to occur *before* filaments are seen on the outboard side.

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