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H-mode Characteristics and ELM Dynamics at Near-Unity Aspect Ratio[1] K.E. THOME, G.M. BODNER, M.W. BONGARD, M.G. BURKE, R.J. FONCK, D.J. SCHLOSSBERG, University of Wisconsin-Madison — Ohmic H-mode is achieved at near-unity aspect ratio in the Pegasus Toroidal Experiment through the use of high-field-side fueling in both limited and diverted geometries. This regime is characterized by: increased edge rotation shear; increased central heating; and measured energy confinement consistent with the ITER98pb(y,2) scaling. In limited plasmas the power threshold is $\sim 10\times$ higher than predicted by the high-A empirical tokamak scaling for $n_G = 0.1 - 0.6$. No significant reduction in the power threshold has been observed in favorable ∇B SN plasma when compared to limited plasmas. Two classes of ELMs have been identified to date by their proximity to the power threshold and measured n spectra. Small, Type III-like ELMs are present at input power $P_{OH} \sim P_{th}$ and have $n \leq 4$. At $P_{OH} \gg P_{th}$, they transition to large, Type-I-like ELMs with intermediate $5 < n < 15$. These general mode numbers are opposite those seen at large A and reflect the increased peeling drive present at low A. The unique operating characteristics available at $A \sim 1$ in Pegasus allow long-sought measurements of the time evolution of the $J_{edge}(R)$ pedestal collapse during an ELM event. They show a complex, multimodal pedestal collapse and the subsequent ejection of a current-carrying filament.

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