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Initial Investigations of H-mode Edge Dynamics in the Pegasus Toroidal Experiment[1] M.W. BONGARD, R.J. FONCK, K.E. THOME, D.S. THOMPSON, University of Wisconsin-Madison — Experiments with ultra-low aspect ratio ($A < 1.2$) H-mode plasmas in PEGASUS enable unique measurements of Edge Localized Mode (ELM) phenomena of import to next-step fusion devices. The modest temperatures and pulse lengths in PEGASUS allow the use of insertable probes to diagnose the edge plasma with high spatial and temporal resolution. In particular, the compatibility of the Hall probe J_{edge} diagnostic with the H-mode edge to date affords the opportunity to study current profile dynamics throughout the ELM cycle. A pedestal in J_{edge} is formed following the L-H transition that is transiently destroyed during ELMs. Presently, Type I and Type III ELMs are accessible. Both types generate field-aligned filaments during the ELM. A prominent current-hole J_{edge} perturbation and low-n MHD signature is evident during Type III ELM crash events, similar to that seen in prior peeling mode studies conducted in L-mode with strong edge current drive[2]. In contrast, Type I ELMs are found to have a complex MHD signature comprised of multiple intermediate toroidal mode numbers ($5 < n < 15$), a steepening of the J_{edge} gradient scale length as well as a slight hump in J_{edge}, which is consistent with a peeling-ballooning nature and the presence of bootstrap current drive. Particle trapping and associated neoclassical effects are expected to be large in PEGASUS plasmas at $A \sim 1$, even with modest pedestal parameters.

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[2]M.W. Bongard *et al.*, Phys. Rev. Lett. **107**, 035003 (2011)

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