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Access to and Characterization of Ohmic H-mode Plasmas at Near-Unity Aspect Ratio[1] R.J. FONCK, M.W. BONGARD, K.E. THOME, M.G. BURKE, L.M. PEGUERO, J.M. PERRY, D.J. SCHLOSSBERG, P.C. SHRIWISE, D.S. THOMPSON, University of Wisconsin-Madison — The low H-mode transition power threshold at near-unity aspect ratio allows access to H-mode in the PEGASUS experiment with only Ohmic heating. Ohmic H-mode plasmas are achieved in both a limited and a new separatrix-limited magnetic configuration. H-mode is attained with high-field-side centerstack fueling, with densities from 1 to >3x10^{19} m^{-3} and Greenwald fractions $\sim$ 0.2–0.7 for $I_p \sim 0.13$ MA. Compared to L-mode plasmas, H-modes show: a doubling of the stored energy; reduced D-α emission; edge current pedestal with characteristic width of $\sim$ 2 cm, with 6 cm for L-mode; reversal of the edge toroidal flow from counter-current to co-current; reduced V-sec consumption due to increased temperatures; and ELM excitation. Operation at A $\sim$1.15 results in strong particle trapping, $f_T \sim 0.7 - 0.9$, and associated neoclassical effects even at modest plasma temperatures so that $P_{OH} \sim$0.4 MW, which readily surpasses the estimated threshold power of <0.1 MW. Low-field-side fueling appears to degrade access to and quality of the H-mode plasma. Characterization of H-mode access in PEGASUS will provide unique data at near-unity A and guide detailed studies of ELM dynamics, as well as provide a critical tool for exploring the extremely high-β_T regime at A $\sim$ 1.

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M.W. Bongard
mbongard@wisc.edu
University of Wisconsin-Madison

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