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 \(>3\times10^{19}\) 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-\(\alpha\) 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-\(\beta_T\) regime at \(A \sim 1\).

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