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Physics of Very Slow L–H Transitions[1] E.J. DOYLE, W.A. PEEBLES, C.L. RETTIG, T.L. RHODES, University of California, Los Angeles, R.A. MOYER, University of California, San Diego, R.J. GROEBNER, K.H. BURRELL, P. GOHIL, General Atomics, R. MAINGI, Oak Ridge Associated Universities, G.D. PORTER, Lawrence Livermore National Laboratory, J.G. WATKINS, Sandia National Laboratories — DIII–D has previously developed a detailed phenomenology of fast (<1 ms), slow (≈1–3 ms) and dithering L–H transitions, including quantitative agreement with $\mathbf{E} \times \mathbf{B}$ shear theories of turbulence and transport suppression. Recently, attention has focused on a "very slow" type of L–H transition in which the edge D_α emission can take >50 ms to evolve from L– to H–mode levels. The very slow transitions studied to date occur at power levels close to threshold, and at high densities. Radiated power measurements indicate that an X–point MARFE forms in L–mode, and is extinguished in H–mode. In these plasmas, SOL turbulence is unchanged across the L–H transition, while inside the separatrix a gradual reduction in turbulence levels is observed in the E_r shear layer. These transitions are of interest for ITER, which will operate close to the L–H threshold, and they may provide a link to observations on JET.

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