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Transport Changes Near q=1 Surfaces in the DIII-D Tokamak[1]

M.E. AUSTIN, K.W. GENTLE, University of Texas-Austin, C.T. HOLCOMB, Lawrence Livermore National Laboratory, G.R. MCKEE, M.W. SHAFER, University of Wisconsin-Madison, C.C. PETTY, General Atomics, T.L. RHODES, University of California-Los Angeles — Spontaneous improvement in electron energy transport is routinely seen in the core of DIII-D discharges as the safety factor q approaches 1. For a range of discharge types with constant heating conditions, core χ_e is seen to decrease just before the first sawtooth, as evidenced by a sharp rise in central electron temperature. The behavior is similar to barriers observed in reverse shear plasmas near $q_{min} = 2, 3$; however, the picture is made more complicated by the onset and decay of a variety of MHD modes. Changes in turbulent fluctuation amplitudes are noted as well as the presence of high frequency coherent modes. Further evidence of $q = 1$ transport barriers is exhibited in an off-axis EC-heated discharge where q_{min} is driven above 1 and unusual hollow T_e profiles with sharp changes in gradients are observed. We compare the data with models of transport barriers near low-order rational q surfaces.

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