Abstract Submitted
for the APR99 Meeting of
The American Physical Society

Sorting Category: O.5 (Theoretical)

Ideal MHD Stability of High Performance Tokamak Plasmas with Finite Edge Pressure Gradient and Current Density[1] A.D. TURNBULL, L.L. LAO, T.H. OSBORNE, J.R. FERRON, R.L. MILLER, Y.R. LIN-LIU, E.J. STRAIT, T.S. TAYLOR, General Atomics, B.W. RICE, Lawrence Livermore National Laboratory — High performance DIII–D plasmas are presently limited by ideal MHD edge instabilities. In VH Mode and Negative Central Shear (NCS) H Mode plasmas, these edge instabilities appear as large ELMs which terminate the high performance phase. In standard H Mode, however, Type I ELMs result only in a temporary relaxation of the plasma edge. Low and intermediate n stability calculations have identified edge peeling modes driven by edge pressure gradient and current density that are correlated with the observed modes. The VH–mode termination instability, however, is much more global than edge instability in standard H–mode. A study of the dependence of the edge stability on the edge profiles is described. The role of the self consistent bootstrap current in driving the instabilities and in opening access to second stability for ballooning modes is evaluated. Cross-section shaping also plays an important role as a result of its effect on second stability access and this is also discussed.

[1]Supported by U.S. DOE Grant DE-FG03-95ER54309 and Contract W-7405-ENG-48.

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Date submitted: December 3, 1998 Electronic form version 1.4