Abstract Submitted
for the DPP96 Meeting of
The American Physical Society

Sorting Category: 5.1.1.2 (Experimental)

Energy Transport in Neutral Beam Heated DIII–D Discharges with Negative Magnetic Shear,[1] D.P. SCHISSEL, J.C. DEBOO, C.M. GREENFIELD, K.H. BURRELL, L.L. LAO, E.J. STRAIT, General Atomics, E.A. LAZARUS, M. MURAKAMI, Oak Ridge National Laboratory, B.W. RICE, B.W. STALLARD, Lawrence Livermore National Laboratory, G.A. NAVRATIL, Columbia University — Experiments on DIII–D have tailored the shape of the plasma current profile to create a region of negative magnetic shear. NCS discharges have resulted in superior $\tau_{\rm TH}$ with both an L–mode and H–mode edge plasma; enhancements of over four times the ITER89-P scaling have been obtained. The increased performance results directly from the formation of a transport barrier inside the region of negative shear which reduces heat, particle, and momentum transport. The reduced transport lowers both χ_i and χ_e with the most dramatic effect in the ion channel; χ_i has been reduced up to a factor of ten. In the core region of these plasmas, convected and conducted ion power becomes negligible. The overall power flow has the majority of beam power absorbed by the ion channel, the ions increasing their temperature and transferring power to the electrons via classical energy exchange, and the power exiting the plasma via electron conduction.

[1]Work supported by U.S. DOE Contracts DE-AC03-89ER51114, DE-AC05-96OR22464, W-7405-ENG-48.

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Special instructions: P-1-12

Date submitted: August 1, 1996 Electronic form version 1.1