Abstract Submitted for the Forty-Seventh Annual Meeting
Division of Plasma Physics
October 24–28, 2005, Denver, Colorado

Category Number and Subject:

[ ] Theory [ ] Experiment

Improved Performance in DIII-D Hybrid Discharges With a Dominant 4/3 Tearing Mode,* C.C. Petty, P.A. Politzer, T.C. Luce, M.R. Wade *GA*, R.J. Jayakumar, M.A. Makowski, *LLNL* – Hybrid discharges on DIII-D usually have a dominant (but relatively small) 3/2 tearing mode that maintains the safety factor above unity when q_{95} >4. Recent DIII-D experiments have shown that small changes in the plasma conditions can result in the development of a dominant 4/3 tearing mode instead, resulting in up to 30% improvement in the energy confinement time at the same beta. Explanations for the improved confinement include increased toroidal rotation in the plasma core and less flattening of the measured pressure profile near the island location. Direct analysis of the MSE signals confirm that pressure driven currents increase near the q=1.5 surface for the 4/3 mode case compared to the 3/2 mode case. Hybrid discharges with β_N = 2.8 and q_{95} = 4.7 achieve performance close to the ITER baseline when the 4/3 mode is dominant. Even more spectacular are dominant 4/3 mode discharges with q_{95} = 3.1, where $\beta_N H_{89}/q_{95}^2 \geq 0.7$ can be maintained for several current relaxation times, exceeding the ITER baseline by 75%.

*Work supported by US DOE under DE-FC02-04ER54698.

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