Abstract Submitted for the 53rd Annual Meeting
Division of Plasma Physics
November 14–18, 2011, Salt Lake City, Utah

Category Number and Subject:

[ ] Theory [X] Experiment

Pedestal Plasma Control With Small 3D Magnetic Fields*

T.E. Evans, *GA* — Recent experiments on a variety of tokamaks have conclusively demonstrated that externally applied 3D magnetic fields can be used to control the confinement and stability of H-mode pedestal plasmas without destroying the edge transport barrier. These results have important practical implications and are of intrinsic scientific interest for understanding the physics of H-mode confinement and pedestal stability. For example, the applied fields predominantly act on the particle confinement with little effect on energy confinement. This is at odds with quasi-linear transport theory suggesting that either the induced pedestal magnetic topology differs from that observed in Ohmic plasmas or that physics other than parallel heat conduction along open stochastic field lines is dominate. Recent progress in our understanding of the pedestal plasma during the application of 3D magnetic fields will be discussed. In addition, implications of gaps in our ability to predict how these fields will affect the performance of plasmas with higher pedestal densities and temperatures such as those needed in ITER to achieve a fusion gain $Q_{DT} = 10$ will be presented.

*Supported by the US Department of Energy under DE-FC02-04ER54698.