

Abstract Submitted for the 56th Annual Meeting
Division of Plasma Physics
October 27–31, 2014
New Orleans, Louisiana

Category Number and Subject:

[] Theory [X] Experiment

Edge Radial Electric Field and Ion Orbit Loss in DIII-D,*

J.S. deGrassie, R.J. Groebner, *General Atomics*; J.A. Boedo, *UCSD*; B.A. Grierson, *PPPL* – The edge radial electric field, E_r , may be largely determined by the value necessary to supply the neoclassical return current to balance the loss current due to ion orbit loss. This is the indication from a phenomenological model, motivated by recent Mach Probe measurements of the edge co- I_p flow layer in DIII-D [1,2], based on a simple empty loss cone orbit loss model [3,4]. Probe and charge exchange recombination measurements also show a relatively large positive edge E_r just inside the LCFS in Ohmic conditions, ~ 10 kV/m, which is explained in this model by the propensity of the flow layer to drive return current. The E_r level is also dependent on Z_{eff} in the edge - lower Z_{eff} promotes greater negative E_r for current balance. The model will be compared with measurements in Ohmic, L- and H-mode conditions.

[1] J.A. Boedo et al., *Phys. Plasmas* **18**, 035510 (2011).

[2] S.H. Müller et al., *Phys. Rev. Lett.* **106**, 115001 (2011).

[3] J.S. deGrassie et al., *Nucl. Fusion* **49**, 085020 (2009).

[4] J.S. deGrassie et al., *Nucl. Fusion* **52**, 013010 (2012).

*Work supported by the US DOE under DE-FC02-04ER54698, DE-FG02-07ER54917 and DE-AC02-04ER54698.