Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Low-q resonances, transport barriers, and secondary electrostatic convective cells CHRIS MCDEVITT, PATRICK DIAMOND, U.C.S.D. — Recent experimental observations have suggested key characteristics of ITB formation near low-q surfaces in off- axis minimum-q (OAMq) discharges. These observations identify mean profile flattening localized to the low-q surface as a transition precursor in the absence of observable magnetic field perturbations. This observation suggests an electrostatic model of ITB formation which accounts for strong transport in the immediate vicinity of the low-q surface, as well as the formation of an ITB nearby the surface. Here, a low-m electrostatic convective cell driven by modulational instability of the background drift wave turbulence is discussed in the context of ITB formation near low-q resonances in OAMq discharges. Unlike pure m=n=0 zonal flows, convective cells are capable of intense mixing near low-q resonant surfaces as well as shearing, thus relaxing mean profiles near the resonant surface. Field line bending coupled with collisional viscosity are found to strongly damp the intensity of the vortical flows except in the case of weak magnetic shear. Furthermore, collisionless convective cell saturation mechanisms such as nonlinear wave trapping are largely circumvented due to the strong mixing of the convective cell. This suggests that low-m convective cells may play a key role in the regulation of turbulent transport near low-q resonances for OAMq discharges. [1] M. E. Austin et. al., Phys Plasmas 13, 082502 (2006)

Chris McDevitt
U.C.S.D.

Date submitted: 19 Jul 2007 Electronic form version 1.4