

Abstract Submitted
for the APR09 Meeting of
The American Physical Society

The Role of Passive Momentum Flux in Turbulence Saturation and Bursty Edge Transport¹ J.R. MYRA, D.A. RUSSELL, D.A. D'IPPOLITO, Lodestar Res. Corp. — In edge transport, particle sources (typically ionization) sustain the density (but not the zonal velocity) profile against turbulence-induced losses. The conservation law for zonal momentum $\langle n v_y \rangle$ implies a “passive” momentum flux associated with the radial particle flux of the form $\langle n v_x \rangle \langle v_y \rangle$. When other linear zonal flow damping mechanisms are small, e.g. viscosity and drag, this non-linear passive loss term competes with Reynolds stress $\langle n \rangle \langle v_x v_y \rangle$ to establish a dynamical turbulence quasi-steady state, which is typically very bursty in character. We study the turbulent state in this regime, with attention to the saturation mechanisms of profile modification and zonal flow shear. Reduced dimensionality models are presented together with results from the SOLT turbulence code. We find that bursts are associated with the radial convective (i.e. passive) transport of the zero-velocity-shear point across the instability zone. Broader implications for the role of the $v_y(x)$ profile will be discussed.

¹Supported by USDOE grant DE-FG02-97ER54392.

James Myra
Lodestar

Date submitted: 08 Jan 2009

Electronic form version 1.4