Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Large transport induced operational limits in tokamak plasmas
P.N. GUZDAR, R.G. KLEVA, IREAP, University of Maryland, MD, USA, P.K. KAW, R. SINGH, IPR, Gandhinagar, India, B. LABOMBARD, M. GREENWALD, PSFC, MIT, Cambridge, MA, USA — Recent observations on Alcator C-Mod by LaBombard et al.[1] of various confinement regimes in the phase space identified by Rogers et al[2], is found to be in very good agreement with their simulation results[2]. In this phase space, they both identified a boundary at high collisionality (related to the empirical 'density limit') which defines a region that is inaccessible due to very large transport in the edge region of the tokamaks. Simulations indicate that the generation of secondary zonal flows saturates the primary instability (drift-resistive ballooning or dissipative curvature driven drift waves). If, however the zonal flow becomes unstable below an amplitude necessary to saturate the primary instability, the transport can become prohibitively large and can lead to disruption of the plasma. Using this basic idea, a stability curve in the two-dimensional phase-space has been determined which provides a plausible explanation of the boundary between the accessible and inaccessible regions identified both in the simulations of Rogers et al. and the observations on Alcator C-Mod reported by LaBombard et al.

[1]B. LaBombard et al., Nuclear Fusion, **45**, 1568 (2005).
[2]B. Rogers et al. Phys. Rev. Lett. **81**, 4396 (1998).

Parvez Guzdar
IREAP, University of Maryland

Date submitted: 20 Jul 2006 Electronic form version 1.4