Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Understanding first-principles RMP physics to obtain predictive ELM control capability in ITER[1] C.S. CHANG, PPPL, THE CPES TEAM — A significant new first-principles understanding in RMP penetration and pedestal response has been obtained in the kinetic particle code XGC0 in realistic diverted magnetic field geometry (cf., invited talk by G. Park at this meeting). Results are validated against DIII-D pedestal experiments, including n, T, Er, toroidal plasma flow, and the electron perpendicular flow profiles simulataneously. It appears that one of the key elements is the magnetic field stochasticity, modified by plasma response: The result is consistent with the experimental observation that "the vacuum Chirikov>1 in the whole edge" is only a necessary condition for ELM control. When the edge plasma is in the so-called "ELM suppression q- window," the magnetic field stochasticity changes abruptly to connect the pedestal top to the material wall. Otherwise, there is a disconnect due to the plasma suppression of the resonant magnetic field. Dependence on the edge collisionality is being investigated. Implication of these new findings to ITER RMP coil design will be discussed. Plans for a more decisive first-prinicples investigation will be presented, including the different inter-device results on DIII-D, ASDEX- U, MAST, and NSTX.

[1]Research supported by US DOE, OFES and ASCR.

Choong-Seock Chang
PPPL

Date submitted: 26 Jul 2011 Electronic form version 1.4