Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Coupling of the XGC and M3D codes and corresponding XGC-based linear and nonlinear ELM simulations G. PARK, H. STRAUSS, C.S. CHANG, S. KU, New York University, L. SUGIYAMA, MIT — Linear and nonlinear simulations with the M3D extended MHD code are being carried out by coupling with the XGC edge kinetic code, which is able to simulate the edge plasma density and pressure pedestal buildup. Currently, the XGC-0 version, which includes a turbulence diffusion model as well as neoclassical effects, is considered for coupling work. Kinetic pedestal information from the XGC code, comprising density, pressure, and bootstrap current profiles across the pedestal, is imported into the M3D input and added to an initial DIIID EQDSK equilibrium data to construct a new consistent equilibrium and associated field-aligned mesh, which can be subsequently utilized for the XGC and M3D nonlinear ELM simulations. Several existing neoclassical bootstrap current formulas can be tested against the XGC simulation results and embedded in it. Different kinds of ELMs (i.e., pressure-driven ballooning and current-driven peeling modes) and their evolution could be obtained from the XGC kinetic input by carefully controlling initial profile characteristics such as pedestal height and bootstrap current strength, etc. Additionally, XGC-based ELMs are compared with the other ones which use different models of ELM instability drive such as the fluid bootstrap current model. We will present briefly our initial linear and nonlinear simulation results which are based on the combined implementation of M3D and XGC codes.

S. Ku
New York University

Date submitted: 21 Jul 2006 Electronic form version 1.4