Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Simulations of Plasma Profile Evolution during SMBI using BOUT++ Code[1] Z.H. WANG, SWIP, China, X.Q. XU, LLNL, T.Y. XIA, ASIPP, China, P.W. XI, Peking Univ., L.H. YAO, SWIP, China — The SBMI (supersonic molecular beam injection) has high fuelling efficiency and low particle recycle coefficient due to the beam particles directed injection. A physical model of SMBI has been developed in BOUT++ framework to study SMBI as an effective fuelling method and a useful tool for plasma control. By adding evolution equations for neutral density and velocities with localized 3D boundary conditions, we study the neutral-plasma interactions via ionization and charge-exchange. The SMBI is modeled as a radial advection, instead of diffusion for neutrals as in gas-puffing. In slab geometry, we found that an edge injected SMB can penetrate to bottom pedestal region within about 0.1ms. If plasma density is lower, beams can penetrate further inside the pedestal. Due to neutral ionization, we found plasma density increases and temperature decreases which are qualitatively consistent with the experiments. The fuelling efficiency of the localized 3D SMB and its impact on the ELM mitigation will be studied in tokamak geometry. Quantitative comparisons between simulation and experiment results at HL-2A will be reported.

[1]This work was supported in part by the U.S. DOE at LLNL under Contract DE-AC52-07NA27344.

T.Y. Xia
ASIPP, China

Date submitted: 09 Jul 2012 Electronic form version 1.4