Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Simulating Re-ionization of the Neutral Beams in the Drift Duct Region of the DIII-D Tokamak[1] S.M. SAIB, UC Berkeley, H.C. FRYE, SDSU, B.J. CROWLEY, J.M. RAUCH, General Atomics — The results of simulation and evaluation of the re-ionization of neutral beams in the DIII-D neutral beam injection (NBI) system are presented in this work. NBI provides plasma heating, non-inductive current drive, toroidal rotation, and fueling in the DIII-D tokamak. To generate neutral beams, first, deuterium ions are produced in the ion source then accelerated electrostatically to up to 85 keV, then neutralized through charge exchange collisions with deuterium gas. This neutralization process has efficiency of 61 % at 85 keV. The residual ions are diverted by a magnet and the neutral beam proceeds to the entrance to the tokamak. However, due to background gas molecules downstream of the magnet, a portion of the beam is re-ionized, and is subsequently subject to the effect of magnetic field in the drift duct region, which curves the path of the re-ionized particles. Damage to the drift duct is expected due to the bombardment of these particles on the wall. To evaluate the damage and develop the operation limit, the path and the final position of the particles must be understood. Simulation of the re-ionized beams is carried out with a particle tracking code and maps of the particle paths are created.

[1]Work supported by US DOE under the SULI program and DE-FC02- 04ER54698.

Sara Saib
University of California, Berkeley

Date submitted: 09 Jul 2020 Electronic form version 1.4