Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Optimization of accelerator grid potentials in the DIII-D neutral beam source using numerical simulations[1] HAYDEN FRYE, San Diego State University, SARA SAIB, University of California, Berkeley, BRENDAN CROWLEY, General Atomics — The Neutral Beam Injection system of the DIII-D tokamak consists of eight ion sources based on the US Common Long Pulse Source (CLPS), with a total output power of 20 MW. The ion source is a filament driven magnetic bucket design and the accelerator is a slot and rail tetrode design with vertical focusing achieved through tilted grids. Precursor ion beam divergence is one of the most important quantities that determine the quality of a beam in a neutral beam injector. Factors that affect the divergence of a neutral beam include ion and electron temperatures in the source, accelerator extraction geometry, stray electric and magnetic fields in the extraction region, grid potential distribution, and ion species composition. The accelerator is modeled electrostatically with finite element analysis using the beam transport code IGUN. The results are used to find the optimal settings that minimize divergence and maximize the brightness of the precursor ion beam in the DIII-D neutral beam source. Additionally the output from IGUN is used to establish the initial conditions for a particle tracking code used to predict the interaction of the beam and beamline components.

[1]Work supported by US DOE under the SULI and DE-FC02-04ER54698 (GA)

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Date submitted: 07 Jul 2020 Electronic form version 1.4