

Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

3D halo neutral simulations in TRANSP code and application to NPA diagnostic on NSTX¹ M.V. GORELENKOVA, S.S. MEDLEY, PPPL, Princeton University — The TRANSP-based NPA simulations made up to 2014 were not accurate since they did not handle halo neutrals properly. The halo neutrals were volume averaged both poloidally and toroidally. However estimates show that halo neutrals remain in the vicinity of the neutral beam footprint and because of multi-generations they have comparable density as primary beam neutrals. To address this inconsistency a 3D halo neutral module has been developed and implemented for the analysis in TRANSP code. The 3D halo neutral module uses a “beam-in-a-box” model that encompasses both injected beam neutrals and resulting halo neutrals. Upon the deposition by charge exchange, subsets of the full, one-half and one-third beam energy components produce thermal halo neutrals that are tracked through successive halo neutral generations until an ionization event occurs or a descendant halo exits the box. The Neutral Particle Analyzer (NPA) simulator in TRANSP is applied to NSTX discharges to study the effect of 3D halo neutrals on temporal evolution of NPA flux and the shape of energy spectra of fast particles.

¹Supported by US DOE contract DE-AC02-09CH11466.

Nikolai Gorelenkov
PPPL, Princeton University

Date submitted: 11 Jul 2014

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