Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Reduced-model turbulence (nSOLT) simulations comparing three fueling scenarios: neutral puffing (SOL), divertor recycling (edge) and injection from the core[1] DAVID RUSSELL, JAMES MYRA, Lodestar Res Corp — The 2D scrape-off-layer turbulence code (nSOLT) includes 1D Boltzmann neutral-plasma interactions [1], a model of divertor recycling (introduced here), and a fixed source of plasma concentrated at the core-side boundary. 1) Neutral injection in the far-SOL is accomplished by specifying the density of Franck-Condon distributed neutrals, n_{puff}, streaming in from the boundary. 2) Divertor recycling is modeled by injecting a fraction of the particle parallel flux in the SOL back into the edge region as a source of plasma, while 3) the fixed source fuels the edge plasma from the core-side boundary, as in neutral beam injection. For machine parameters (B, R, $L_{//}$) anticipated at MAST-U, and for a deuterium plasma, turbulent equilibria are obtained that share the same plasma fueling rate for each of the three fueling methods, with only one of the sources "on" in each case. Equilibrium plasma and neutral (deuterium) profiles, fueling efficiencies, SOL transparencies, heat flux widths and confinement times are compared. Skewness, cross-phase and spectral measurements of the turbulent fluctuations are presented. [1] D.A. Russell, J.R. Myra and D.P. Stotler, Phys. Plasmas **26**, 022304 (2019).

[1]Work supported by the US Department of Energy Office of Science, Office of Fusion Energy Sciences under Award Numbers DE-FG02-97ER54392.

David Russell
Lodestar Res Corp

Date submitted: 26 Jun 2020 Electronic form version 1.4