Research opportunities in Transport and Turbulence on NSTX-U

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Abstract

As a major magnetic confinement fusion device in the US, NSTX-U offers unique opportunities of studying transport and turbulence in low collisionality and high beta plasmas that are relevant to future devices, e.g. ST-FNSF [1] and ITER. In particular, with doubled toroidal field, plasma current, and NBI heating power, NSTX-U will be able to access next factor of 3–6 reduction in collisionality, reaching the upper collisionality region predicted for ST-FNSF. Furthermore, the more tangential 2nd NBI allows controlling/varying flow and current profile, providing a great experimental tool for exploring the relation between transport and turbulence. Together with a comprehensive suite of profile and turbulence diagnostics, NSTX-U is an idea platform for validating first-principle and reduced turbulence and transport models that are important for predicting and optimizing the confinement performance of future fusion devices,. Here we present some research opportunities in transport and turbulence on NSTX-U, including unsolved problems in particle, thermal and momentum transport. Potential collaborators are welcomed to lead or participate in experimental data analysis and/or modeling using first-principle and/or reduced codes.

[1] J.E. Menard et al., Nucl. Fusion **52**, 083015 (2012)