

An Overview of NSTX Experiments in 2002*

M.G. Bell (*Princeton Plasma Physics Laboratory*) for the NSTX National Research Team

During the NSTX experimental campaign in 2002, significant progress was made towards demonstrating long-pulse, high-beta, high-confinement operation and establishing its physics basis. Several improvements to the facility contributed to this progress, including operating at toroidal fields up to 0.6T and plasma currents up to 1.5 MA, improving the plasma shape control, introducing the capability for gas fueling on the high-field side and applying 350°C bakeout of the plasma facing surfaces. The improvements in wall conditioning and fueling helped reduce the H-mode power threshold, allowing routine operation in the H-mode. The neutral beam power was increased to 7MW by increasing the acceleration voltage to 100kV. Together, these changes have enabled the achievement of toroidal beta β_T up to 35% and normalized beta values that exceed the no-wall limit. It appears that passive wall mode stabilization is effective for broad pressure profiles characteristic of the H-mode. Bootstrap current fractions up to about 50% have been sustained for several current relaxation times in NB-heated ELMing-H-mode plasmas with β_T above 15%. Evidence for current drive by the High-Harmonic Fast-Waves was obtained.

*Work supported by US DOE Contract DE-AC02-76CH03073.