

Results of High-Harmonic Fast Wave Experiments on NSTX

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The NSTX (National Spherical Torus Experiment) facility located at Princeton Plasma Physics Laboratory has completed its first 5-month operational period [1]. During initial high-harmonic fast wave (HHFW) experiments, up to 2 MW of HHFW power was injected, using two rf sources to drive eight current straps in two four-strap arrays. Results were obtained with both 0-pi-pi-0 and 0-pi-0-pi inter-strap phasing. Density profile measurements using a microwave reflectometer were obtained, and the experimentally measured plasma loading of the antenna can be compared to theoretical loading calculations made using the experimentally-measured profiles. The loading from the plasma was very good, as expected for the relatively gently-sloping density profiles that were measured. Soft X-ray signals indicated plasma heating for $r/a < 0.4$ with 0-pi-0-pi phasing. For the 0-pi-pi-0 phasing case, significant central heating was not observed.

During the next phase of operation (scheduled to start in the summer of 2000), the HHFW system will consist of a 12-strap fast-wave antenna array and six 2-MW rf sources. The goal is to deliver up to 6 MW of HHFW power to the plasma, and to be able to vary the inter-strap phasing during a plasma pulse in order to control both the heating and driven current in the plasma. The proposed operation of the upgraded system will be discussed.

[1] M. Bell et al., "Operation of the National Spherical Torus Experiment", this conference.