Chapter 3

Experimental High Beta Plasma Research, Control, and Integration

Overview of this chapter

The NSTX research program is structured around topical research in several areas of science and control. The integration of critical areas of each represents an element of the program that cuts across topical lines and is aimed towards developing a physics basis for high beta, long pulse operations. The topical areas of experimental research are well aligned with the research elements as outlined in the Integrated Program Planning Activity (IPPA document). Naturally, the research plans in each area do not stand in isolation from one another, and they rely heavily on strong and constructive interactions with the theory and modeling efforts within the NSTX research team and throughout the broader community.

In this chapter, the experimental research plan is described in individual sections for the following topical areas:

3.1 MHD

3.2 Transport and Turbulence

3.3 High Harmonic Fast Wave and Electron Bernstein Wave Heating and Current Drive

3.4 Solenoid-Free Plasma Startup Research

3.5 Boundary Physics

3.6 Control and Integration

After an introduction, each section gives a brief status report on sub-elements, followed by the research plan for the 2004 - 2008 time frame for each of these elements. Aspects of the relation of this research to that of the theory and modeling work that supports each element \are described. To supplement this and to allow for a more complete description, a more detailed exposition of theory and modeling plans for the 2004 - 2008 time frame are described separately in Chapter 5. Important supporting information for each of these sections is also provided in Chapter 2.