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The NSTX Plasma Control System Operating Experience¹ T. STEVENSON, D. GATES, D. MUELLER, R. RAMAN, D. MASTROVITO, C. LUDESCHER, J. MENARD, S. SABBAGH, R. MAINGI, M. BELL, NSTX RESEARCH TEAM —

The National Spherical Torus Experiment (NSTX) project has developed extensive operating experience using the Plasma Control System (PCS) with rtEFIT control as well as with the original shape control algorithm. While both algorithms were in use during the past run period, rtEFIT shots became the more frequent choice. Control with rtEFIT allowed access to plasma elongation (κ) to a record level above 3, improved stability, produced longer pulse lengths and more consistent edge control, and permitted experiments to make shape comparisons with other machines. To support experiments, the PCS was upgraded to control the Resistive Wall Mode (RWM) coils using active feedback control on resistive wall mode sensors, error field sensors, and ohmic and toroidal field coil currents alone or in combination with preprogrammed current control. Use of the RWM coils to correct error fields was successful in delaying the onset of discharge-ending MHD by about 700 ms in the best cases. Planned improvements for the 2007 run include upgrading to a faster computer that will reduce the latency in the control system and provide faster control of vertical instability and RWM instabilities.

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