

Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Results of the NSTX Control Experiments¹ EGEMEN KOLEMEN, D.A. GATES, S. GERHARDT, R. KAITA, J. KALLMAN, H. KUGEL, D. MUELLER, PPPL, V. SOUKHANOVSKII, LLNL, PPPL TEAM — New control implementations and its effect on plasma performance on the NSTX are summarized. The control algorithm for the NSTX system has been tuned for performance and four new controllers namely, upper/lower inner/outer strike point (SP) controllers, were installed. An offline system identification of the plasma response to the control inputs was performed and several control improvements were identified. An online automatic relay-feedback PID tuning algorithm was implemented which has the advantage of tuning the controller in a single shot and more accurately. The PID controller for the SP was tuned by employing the Ziegler-Nichols method. The resulting SP controller was successfully employed to control the particle and heat flux on the Liquid Lithium Divertor. This capability enabled achieving the “snowflake” divertor configuration for the first time in NSTX. The new control algorithm lead to better disturbance rejection (more stable against ELMs) with longer pulse length compared to the uncontrolled shots. Work supported by U.S. DOE Contract DE-AC02-09CH11466.

¹Work supported by U.S. DOE Contract DE-AC02-09CH11466.

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Date submitted: 20 Jul 2010

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