

Abstract Submitted
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Results of using the NSTX-U Plasma Control System for scenario development¹ M.D. BOYER, D.J. BATTAGLIA, D.A. GATES, S. GERHARDT, J. MENARD, D. MUELLER, C.E. MYERS, PPPL, J. FERRON, GA, S. SAB-BAGH, Columbia University, NSTX-U TEAM — To best use the new capabilities of NSTX-U (e.g., higher toroidal field and additional, more distributed heating and current drive sources) and to achieve the operational goals of the program, major upgrades to the Plasma Control System have been made. These include improvements to vertical control, real-time equilibrium reconstruction, and plasma boundary shape control and the addition of flexible algorithms for beam modulation and gas injection to control the upgraded actuators in real-time, enabling their use in algorithms for stored energy and profile control. Control system commissioning activities have so far focused on vertical position and shape control. The upgraded controllers have been used to explore the vertical stability limits in inner wall limited and diverted discharges, and control of X-point and strike point locations has been demonstrated and is routinely used. A method for controlling the mid-plane inner gap, a challenge for STs, has also been added to improve reproducible control of diverted discharges. A supervisory shutdown handling algorithm has also been commissioned to ramp the plasma down and safely turn off actuators after an event such as loss of vertical control. Use of the upgrades has contributed to achieving 1MA, 0.65T scenarios with greater than 1s pulse length.

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