Abstract Submitted
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Power exhaust scenarios and control for projected high-power NSTX-U operation[1] JONATHAN MENARD, S.P. GERHARDT, C.E. MYERS, PPPL, M.L. REINKE, ORNL, A. BROOKS, M. MARDENFELD, PPPL, NSTX UPGRADE TEAM — An important goal of the NSTX Upgrade (NSTX-U) research program is to characterize energy confinement in the low-aspect-ratio spherical tokamak configuration over a significantly expanded range of plasma current, toroidal field, and heating power, while increasing flattop durations up to 5 seconds. However, the narrowing of the scrape-off layer at higher current combined with an improved understanding of expected halo-current loads has motivated a significant re-design of NSTX-U plasma facing components in the high-heat-flux regions of the divertor. In order to reduce the expected divertor heat flux to acceptable levels, a combination of mitigation techniques will be used: increased divertor poloidal flux expansion, increased divertor radiation, and controlled strike-point sweeping. The machine requirements for these various mitigation techniques are studied here using a newly implemented reduced heat-flux model. Systematic equilibrium scans are used to quantify the required divertor coil currents and to verify vertical stability for a range of plasma shapes. Free-boundary control schemes to constrain the strike-point location and field-line angle-of-incidence will also be discussed.

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