

Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

The study of non-axisymmetric control coil applications in NSTX-U¹ J.-K. PARK, J.E. MENARD, K. KIM, S.P. GERHARDT, R. MAINGI, PPPL, J.M. BIALEK, S.A. SABBAGH, J.W. BERKERY, A.H. BOOZER, Columbia U., J.M. CANIK, ORNL, T.E. EVANS, GA — As expanded 3D field capability is essential to meet NSTX-U programmatic goals and support ITER, non-axisymmetric control coil (NCC) configurations have been proposed and studied to assess potential physics applications. IPEC-NTV, POCA, and TRIP-3D code analysis show that NCC can provide a range of non-resonant error field control while minimizing resonant error field, and enhance NTV variability to better control rotation and shear, and also largely vary stochastic layers in the edge while maintaining similar plasma response characteristics. VALEN-3D analysis shows that RWM control performance increases with NCC and indicates even the possibility of operation near the ideal-wall limit. In addition, 3D analysis using stellarator codes such as COBRA indicates that NCC can directly broaden ballooning unstable region across radius and thus can be used to improve ELM pacing in NSTX-U. Relevant figures-of-merit are defined and used to quantify these NCC physics capabilities, as will be presented with future analysis plans.

¹This work was supported by DOE Contract DE-AC02-09CH11466.

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Date submitted: 12 Jul 2013

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