Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Control advances for achieving the ITER baseline scenario on KSTAR[1] N.W. EIDIETIS, General Atomics, J. BARR, Oak Ridge Associated Universities, S.H. HAHN, National Fusion Research Institute, D.A. HUMPHREYS, General Atomics, Y.K. IN, Y.M. JEON, National Fusion Research Institute, M.J. LANCTOT[2], US DOE, D. MUELLER, Princeton Plasma Phsyics Laboratory, M.L. WALKER, General Atomics — Control methodologies developed to enable successful production of ITER baseline scenario (IBS) plasmas on the superconducting KSTAR tokamak are presented: decoupled vertical control (DVC), real-time feedforward (rtFF) calculation, and multi-input multi-output (MIMO) X-point control. DVC provides fast vertical control with the in-vessel control coils (IVCC) while sharing slow vertical control with the poloidal field (PF) coils to avoid IVCC saturation. rtFF compensates for inaccuracies in offline PF current feedforward programming, allowing reduction or removal of integral gain (and its detrimental phase lag) from the shape controller. Finally, MIMO X-point control provides accurate positioning of the X-point despite low controllability due to the large distance between coils and plasma. Combined, these techniques enabled achievement of IBS parameters (q_{95} = 3.2, β_N = 2) with a scaled ITER shape on KSTAR. n=2 RMP response displays a strong dependence upon this shaping..

[1]Work supported by the US DOE under Award DE-SC0010685 and the KSTAR project
[2]Formerly General Atomics

Nicholas Eidietis
General Atomics

Date submitted: 14 Jul 2017 Electronic form version 1.4