

Abstract Submitted
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Improvement of vertical stabilization on KSTAR¹ D. MUELLER, PPPL, J.G. BAK, NFRI, M.D. BOYER, PPPL, N. EIDEITIS, General Atomics, S.H. HAHN, NFRI, D.A. HUMPHREYS, General Atomics, H.S. KIM, Y.M. JEON, NFRI, M. LANCTOT, Formerly at General Atomics, M.L. WALKER, General Atomics — The successful control of strongly shaped plasmas on the Korea Superconducting Tokamak Advanced Research (KSTAR) device requires active feedback of fast motion of the plasma vertical position by the use of internal normal conducting coils (IVC). This has required new electronics to supply relative flux loop differences, for z_p , and voltage loop differences, for dz_p/dt , as well as a novel technique (Zfast) to use a high-pass filter, typically 1 Hz, on the error in the signal in the feedback loop. Use of Zfast avoids the potential contention encountered when the internal coil attempts to perform control of the plasma shape which should be controlled by the slower and more powerful superconducting coils. A common problem of this contention is saturation of the IVC and loss of fast vertical control. This is eliminated by proper use of the Zfast. A Ziegler-Nichols relay feedback system was used to fine tune the required feedback gains. The selection of the magnetic sensors, filter time constants, control gains and of the Zfast control strategy which allowed vertically stable operation at a plasma elongation, $kappa$, of up to 2.16 at $l_i = 1.15$ and $Beta_p = 2.4$ will be discussed which is beyond the design reference of KSTAR of $kappa = 2.0$ at $l_i = 1.2$ and $Beta_p = 1.9$.

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