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KSTAR first plasma equilibrium reconstruction and study of global MHD stability control[1] O. KATSURO-HOPKINS, S.A. SABBAGH, J.M. BIALEK, Columbia University, USA, H.K. PARK, POSTECH, Korea, K.I. YOU, S.G. LEE, J.G. BAK, S.W. YOON, J.H. KIM, J.Y. KIM, NFRI, Korea, A.H. GLASSER, LANL, USA, L.L. LAO, General Atomics, USA — Korea Superconducting Tokamak Advanced Research, KSTAR, equilibria are computed using EFIT and VALEN based on numerical models and recent experimental data from first plasma operation. A 3-D double-walled vacuum vessel model with port penetrations was used to evaluate the vacuum vessel effective resistance and to simulate and compare to the time evolution of experimental magnetic diagnostic measurements during vacuum poloidal field coil testing and plasma start-up scenarios. KSTAR is designed to produce wall-stabilized high beta equilibria. Ideal MHD stability of toroidal mode number of unity using DCON shows a factor of two improvement in the normalized beta limit over the no-wall beta limit (up to 5) at moderate to low plasma internal inductance. Reaching these high normalized beta levels is possible using passive and active control with classical and advanced state-space based control algorithms at the reasonable power levels.

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