Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Dependence of plasma rotation braking on ion temperature and non-axisymmetric magnetic field spectra in high normalized beta KSTAR plasmas[1] Y.S. PARK, S.A. SABBAGH, J.W. BERKERY, J.M. BIALEK, Columbia University, W.H. KO, Y.M. JEON, J.G. BAK, S.H. HAHN, J. KIM, S.G. LEE, NFRI, Korea, S. JARDIN, PPPL, M.J. CHOI, G.S. YUN, POSTECH, Korea, H.K. PARK, UNIST, Korea — H-mode plasma operation of KSTAR has surpassed the ideal MHD $n = 1$ no-wall limit by achieving high normalized beta up to 2.8 while reducing plasma internal inductance to near 0.7. Non-axisymmetric fields were applied using in-vessel control coils with varied $n = 2$ field spectra, ECH, and supersonic molecular beam injection to alter the plasma toroidal rotation profile in high beta H-mode plasmas and to analyze their distinct effects on the rotation. The rotation profile was significantly altered in a self-similar fashion with rotation level reduced by more than 60% without tearing activity or mode locking using the full range of techniques. Changes in the steady-state rotation profiles are analyzed to determine the physical aspects of NTV. The NTV scaling with δB^2 shows good agreement with the measured profile change. The NTV coefficient scales as $T_i^{2.27}$, in general agreement with the low collisionality "$1/\nu$" regime scaling of NTV theory. Resistive tearing stability determined by examining the classical tearing stability index is discussed, and the result is compared with two-fluid resistive MHD solutions from the M3D-C^1 code. The effect of plasma rotation profile on tearing stability is examined using the M3D-C^1 analyses.

[1]Supported by U.S. DOE grant DE-FG02-99ER54524.

Young-Seok Park
Columbia University

Date submitted: 11 Jul 2014 Electronic form version 1.4