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Quiescence of magnetic braking and control of 3D non-resonance in KSTAR J.-K. PARK, PPPL, Y. IN, Y.M. JEON, NFRI, N.C. LOGAN, Z.R. WANG, J.E. MENARD, PPPL, J.H. KIM, W.H. KO, NFRI, KSTAR TEAM — Magnetic braking using non-axisymmetric (3D) field is a promising tool to control rotation in tokamaks and thereby micro-to-macro instabilities. Ideally magnetic braking should induce only neoclassical momentum transport, without provoking resonant instabilities or unnecessary perturbations in particle or heat transport. Indeed in KSTAR, it was shown that the 3 rows of internal coils could be used to generate highly non-resonant n=1 with backward-helicity field distribution, called -90 phasing, and to change rotation without any perturbations to other transport channels [1]. Recent KSTAR experiments, however, have also shown that the broad-wavelength field distribution, called 0 phasing, is rather more quiescent whereas -90 phasing can be highly degrading especially in high q_{95} plasmas. IPEC and NTV modeling are consistent with both observations, and further provide the optimal point in coil phasing and amplitude space. Additional experiments and comparisons with modeling all imply the sensitivity of plasma response to remnant resonant field, and thus importance of non-resonance control, to accomplish quiescent magnetic braking. This work was supported by DOE Contract DE-AC02-09CH11466. [1] J.-K. Park, Y.M. Jeon et al., Phys. Rev. Lett. **111**, 095002 (2013)

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