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Role of the equilibrium and perturbative core current density in sawtoothing and non-sawtoothing discharges in KSTAR[1] YOONBUM NAM, Pohang Univ of Sci & Tech, HYEON PARK, Ulsan National Institute of Science and Technology, MINJUN CHOI, GYUENGHYUEN CHOE, Pohang Univ of Sci & Tech, WOOCHANG LEE, Ulsan National Institute of Science and Technology, GUNSU YUN, Pohang Univ of Sci & Tech, STEPHEN JARDIN, Princeton Plasma Physics Laboratory — New study of multimode physics in the core of the KSTAR plasma provides an opportunity to address the long standing issue of the central current density during sawooth crash. The recent experiment [1] on excitation of the m/n=3/3 mode with a current blip induced by ECH and successive evolution to the m/n=2/2 and m/n=1/1 mode during one sawtooth period in the core of the sawtoothing discharge in KSTAR suggests that the central safety factor (q0) may have to change from below ~ 1 (before crash) to slightly above ~ 1(after crash). This interpretation is consistent with the q profile condition for MHD simulation necessary for the growth of the higher order modes which require q0 slightly above ~ 1 until the 1/1 mode becomes dominant [2]. Experimental observation of a long lived higher order mode in non-sawtoothing discharge (presumably q0>1) is consistent with the fact that the q0 has to be below ~ 1 to support the growth of the m/n=1/1 mode.

[1] G. H. Choe et al, Nuclear Fusion 55 013015 (2015)
[2] A. Bierwage et al, Nuclear Fusion 55 013016 (2015)

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