Fishbone activity in the improved H-mode plasmas on the EAST tokamak*

S.B. Zhang¹, L. Zeng¹, H. Liu¹, J. Qian¹, X. Gong¹, Y. Jie¹, Y. Yang¹, T. Zhang¹, X. Gao¹

¹Institute of Plasma Physics, Chinese Academy of Sciences, 230031 Hefei, China
E-mail: bszhang@ipp.ac.cn

The (1,1) Fishbone activity [1] has been identified in the improved H-mode plasmas during NBI heating experiments on the EAST tokamak. The burst fishbones have repetition times of 10-25 ms and oscillation frequencies ranging from 6 kHz to 14 kHz. A study of the dependence of fishbone activity on beam injection angle is performed [2]. NUBEAM calculations predict strongly peaked beam deposition profiles in both cases. The computed number of trapped beam ions is much smaller for the case of co-current beams than for the counter-current beams. The experimental results indicates that the angle of beam injection has little effect on the observed mode frequency and the oscillation amplitude of the fishbone activity but clear effect on the repetition times. The repetition time of the fishbone activity for the case of co-current beams is only half for the counter-current beams. These results suggest that the fishbone activity in EAST is the ion diamagnetic branch of the internal kink [3].

(1, 1) fishbones, identified to clamp central q at value close to unity, is a key element for the achievement of the improved H-mode on EAST. The q-profile measurement by the POINT system [4] show that the q profile is central flat with no reversal and q₀ is close to 1 when the fishbone activity sets in. In addition, the q profile evolution is consistent with appearance of fishbones. Periodic fishbone activity clearly reduce the core impurity concentration, which is beneficial for the improved H-mode scenario development on EAST.


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