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Low-Frequency Fishbone Driven by Passing Fast Ions in Tokamak Plasmas[1] FENG WANG, School of Physics, Dalian University of Technology, LIMIN YU, Department of Physics, East China University of Science and Technology, G.Y. FU, Institute for Fusion Theory and Simulation and Department of Physics, Zhejiang University — After the first report in PDX [1], fishbone instabilities were commonly observed in tokamak plasmas with fast ions induced by NBI and/or RF heating. In PDX, with perpendicular NBI, it was understood that the fishbone instability was driven through the resonance with the trapped energetic ions' toroidal precessional drift frequency [2]. In PBX, fishbone instability driven by passing fast ions was first reported. In ITER-like plasmas, fast ions are mostly passing particles. Thus it is important to understand fishbone instability driven by passing fast ions. With finite FOW effects of passing fast ions, analytical results showed that there exist two branches of fishbone with low and high frequency [3-5]. For the low frequency fishbone, previously, the mode frequency of the low frequency fishbone was determined by the bulk ion-diamagnetic-drift frequency [3]. In this work, the fishbone dispersion relation is solved self-consistently and the obtained mode is of EPM type where the frequency is determined by fast ion dynamics. In addition to the analytical results, numerical study using HL-2A tokamak parameters is also presented. These results are helpful to understand the low frequency fishbone observed in HL-2A. [1] McGuire K. et al., 1983 Phys. Rev. Lett. 50, 891 [2] Chen L. et al., 1984 Phys. Rev. Lett. 52, 1122 [3] R. Betti et al., 1993 Rev. Lett. 70, 3428 [4] Wang S.J. 2001 Phys. Rev. Lett. 86, 8286 [5] Wang Feng et al., 2017 Nucl. Fusion 57, 056013

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