Contribution ID: **3** Type: **Oral (Plenary Session)**

Excitation of Alfven Eigenmodes and Formation of ITB during off-axis Sawteeth in EAST

Tuesday, 3 September 2019 14:40 (25 minutes)

The internal transport barrier (ITB), Alfven Eigenmodes (AEs) and double tearing modes (DTM) have been observed during the off-axis sawteeth oscillation in EAST.
The ITB of electron temperature T_e is modulated by the sawteeth oscillation, and the formation of ITB can be divided into three stages: (1) the transport produced by sawteeth final crash is suppressed at the first stage with steep gradient of T_e; (2) the micro-instability is developed at the second stage for the further increasing of the gradient of T_e; (3) the ITB is formed eventually after the transition from BAEs to RSAEs, where the BAEs-RSAEs pair enables the tracking of q_min≤1 from the experiment directly.
Furthermore, a new BAAE-like instability is also observed that is coexisted with BAEs pair, while the frequency of the former is far below than the latter. The BAAE-like locates outward than the BAEs pair as Ref [1]. Interestingly, the triangle shape of the two modes are similar that travel in ion diamagnetic drift direction, and the phases of outer regions is lag behind than the center as Ref [1-4]. The radial position of BAAE-like shifts inward after the excitation of RSAEs, and the frequencies of BAAE-like and RSAEs are sweeping upward.
The off-axis sawteeth final crash is triggered by DTM: (1) the DTM can be excited by the redistributed of the profile of thermal particles, where the downward transport of energetic ions is detected indirectly by the SXR arrays for the first time; (2) the DTM can be excited by the transformed from kink instability.

[1] Cheng, J., W. Zhang, et al. "Nonlinear co-existence of beta-induced Alfvén eigenmodes and beta-induced Alfvén-acoustic eigenmodes." Physics of Plasmas 24(9): 092516(2017)
[2] Zhang, H. S., Z. Lin, et al. "Gyrokinetic particle simulation of Beta-induced Alfven Eigenmode." Physics of Plasmas 17(11): 112505 (2010)
[3] Zhang, H. S., Z. Lin, et al. "Nonlinear dynamics of beta-induced Alfven eigenmode in tokamak." Physics of Plasmas 20(1): 012510(2013)
[4] Zhang, H. S., Y. Q. Liu, et al. "Gyrokinetic particle simulation of beta-induced Alfven-acoustic eigenmode." Physics of Plasmas 23(4): 042510(2016)

Country or International Organization

China

Primary author: Dr XU, Ming (Institute of Plasma Physics, Chinese Academy of Sciences)

Presenter: Dr XU, Ming (Institute of Plasma Physics, Chinese Academy of Sciences)

Session Classification: Plenary

Track Classification: Multiscale Physics and Instabilities in Burning Plasmas