Non-axisymmetric edge coherent mode with applied 3D fields in EAST

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Edge coherent mode (ECM), previously identified as the dissipative trapped electron mode [1], is commonly observed in the H-mode pedestal with a relative high collisionality in the EAST tokamak. This mode is considered contributing significantly to suppression of crash of large ELMs benefitting from the remarkable particle and heat exhaust induced by the mode. Recently, when ELMs are suppressed by applying a slowly rotating resonant magnetic fields perturbations (RMPs) in the toroidal direction with a dominant n=1 component, both amplitude and spectral width of ECM are observed periodically with the rotation of RMP. Utilizing multi pedestal fluctuation diagnostics including the lithium beam emission spectroscopy (Li-BES), the electron cyclotron emission imaging (ECEI) and the Doppler back-scattering (DBS), synchronous measurements of ECM evolution were performed at different toroidal locations, showing that this mode appears sequentially according to the chronological stages of RMP currents toroidal rotating phase. Besides, the increase of spectral width is also accompanied by a decrease of vertical wavenumber of ECM.

In this experiment, plasma stored energy and global density changes less than 5% during 3D fields applied. Local measurements of plasma density and electron temperature in the pedestal are also modulated with the toroidal rotation of 3D fields. Comparing the measurements of toroidal distribution of ECM with those of pedestal pressure gradient shows that a maximized ECM amplitude is approximately concomitant with a maximized radial gradient of local pedestal pressure, while ECM nearly disappear with a minimized radial gradient of local pedestal pressure. However, it should be stressed that only a small modification (<±5%) of radial gradient of pedestal pressure induced by the application 3D field is estimated, which is unlikely to be responsible for such a non-axisymmetric distribution of ECM. These results suggest that, rather than the

modification of local pressure profile, this observed non-axisymmetric distribution of ECM may be induced by 3D fields due to some other mechanisms. The relevant simulation work is still ongoing now.

[1] H.Q. Wang and G.S. Xu, *et al*, *Phys. Rev. Lett.* **112** 185004 (2014)