

# Kink Mode Study in EAST High $\beta_{\{P\}}$ Plasma

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Two types of kink modes, fishbone and long-lived mode are experimentally and numerically studied at EAST tokamak. In high  $\beta_{\{P\}}$  plasma, sawtooth instability was replaced by a saturated 1/1 internal kink mode which either manifests itself as a periodical burst energetic ion related fishbone or as a long-lived mode which is associated to the core safety factor at  $q_{0-1}$ . The presence of those 1/1 internal modes are beneficial to the sustain of hybrid scenario with extended regions of low-magnetic shear profile and  $q_{0-1}$ , because of that they can expel high-Z impurity and can make flux pumping. The mechanism responsible for the flux pumping caused by kink mode was numerically in nonlinear 3 D magnetohydrodynamic simulations using the M3D code. Furthermore, M3D+K code hybrid simulation shows a good agreement to the fishbone activity in EAST.

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