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# The drift kinetic effects of the magnetic coherent mode in the H-mode pedestal of EAST

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To be compatible with high confinement performance and low collisionality of plasma with strong heating power, a Magnetic Coherent Mode (MCM) with toroidal mode number about 1 and characteristic frequency about 20–60 kHz appears spontaneously in the H-mode pedestal of the EAST tokamak[1], which has distinct capacity to regulate the deposition intensity of boundary particle flux on the divertor target. The MCM only appears in H-mode, but is not seen in low-Te highly collisional pedestal (typically at marginal heating power with type-III ELMs). No ceiling in the heating power (up to 9 MW source power so far in EAST) for the mode appearance has been found. It has been observed recently in an ELM-free H-mode plasma at high heating power (~7MW) and low pedestal collisionality. It becomes stronger or more coherent in the lithium-aerosol-injection-induced ELM-free H-mode plasmas with low-power RF heating. Its appearance is independent of either heating schemes (NBI alone, LHCD alone or with additional power from ICRF, ECRH) or wall coating (mostly lithium, sometimes silicon), wall materials (full C, C divertor + Mo first wall, C lower divertor + W upper divertor + Mo first wall). This may exclude the possibility of fast particle driven modes. It disappears when the pedestal collapses either induced by large ELMs or RMPs, and reappears when the pedestal recovers, strongly suggesting the pressure gradient as the main driving force of the mode.

The experimental results on EAST show that the frequency of MCM is close to the kinetic resonance frequency of the trapped thermal electrons, which exhibits a Alfvenic scaling on plasma parameters but has on dependence on energetic particles. In order to understand the driving mechanism of MCM, the drift kinetic resonance between MCM and the thermal particles is applied to analyze pedestal instability and the energy channel via the resonance. The preliminary results for five different plasma parameters shown in the figure 1 indicate the toroidal mode number and frequency are in close compliance with the relevant experiment results. This work could provide a certain identification and demonstration of the pressure-gradient-driven alfvenic mode by thermal resonance, which may broaden the horizon of interaction between plasma wave and particles

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References

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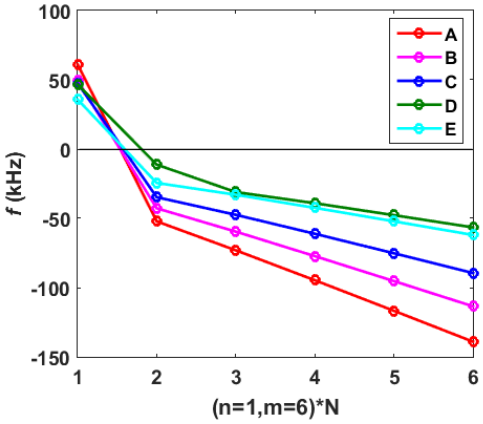


Figure 1. The mode frequency versus the toroidal mode number