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P5.1018 Impact of an inward particle flux inducing the coherent fluctuation on pedestal dynamics in toroidal plasmas

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In the transition from low (L) to high (H) confinement regime a transport barrier usually develops in a narrow layer and so called pedestal of high temperature and density gradients forms at tokamak plasma edge [1]. The accumulation of energy and particles inside the pedestal normally leads to an explosive relaxation of the gradients through edge localized mode (ELM) onset. The gradients then intrinsically develop
again until a next ELM onset under a variety of physics mechanisms. This is a typical self-organization process of edge gradients in magnetic confinement fusion plasmas
[2]. Understanding the pedestal dynamics and relaxation mechanism in the inter-ELM phases is essential for advance of the pedestal nonlinear physics.
In the recent experiments of the HL-2A tokamak, the pedestal dynamics has been investigated in detail [3]. The increases of density and its gradient were observed in the edge transport barrier prior to each ELM onset in a series. An inward particle flux inducing the coherent fluctuation mode (f=30-70 kHz) was found to be responsible for such changes. The characteristics of the coherent fluctuation, including frequency, wave vector and propagation velocity were identified. The mode localizes in the pedestal, leads to the rapid increase of density gradient, and has strong nonlinear interaction with the turbulence. The impact of the inward particle flux in the particle balance and increases of pedestal density is also discussed.

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[1] F. Wagner, et al 1982 Phys. Rev. Lett. 49 1408
[2] A. Loarte, et al 2003 Plasma Phys. Control. Fusion 45 1549
[3] J. Cheng, et al., the 27th IAEA-FEC, 22-27 October, 2018, India, EX/P5-6

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