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Interaction between ELM and ITB on EAST tokamak

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The penetration of edge localized mode (ELM) into internal transport barrier (ITB) plasma has been studied on the EAST tokamak with flat central safety factor profile $q(0) \sim 1$ recently. The experiment indicates that when the ELM inward penetration radius reaches to the ITB foot region, a significant influence on the ITB plasma is manifested, leading to the shrinking or collapse of the ITB on the EAST tokamak. Observations suggest that the onset of large ELM penetration, which extremely reduces the pedestal temperature and density, can trigger the collapse of the ITB, by means with the off-axis sawtooth on EAST tokamak. The off-axis sawtooth events contribute to a further decrement in the core stored energy after a bigger ELM crashes in the pedestal region. The reversal surface of the off-axis sawtooth is situated around the ITB foot. The delay time between ELM penetration reached to ITB foot and the followed off-axis sawtooth collapse is about 2~3 ms. It is also found that the shrinking and expanding of ITB is related with the net heating power. Mechanism of ITB collapse from ELM penetration to the off-axis sawtooth triggered is not clear yet. Experiment results for understanding ELM penetration in ITB plasmas are summarized and discussed. This work has been supported by the National Key R&D Program of China (Contract No. 2022YFE03050003) and the National Nature Science Foundation of China (Grant Nos. 12175277). This work was supported by the RIAM joint usage/research project in 2024.

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Keyword-2

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Keyword-3

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