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Behaviors of blobs/holes and their roles in the enhanced turbulence spreading near the density limit

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The presence of Greenwald limit has been widely observed in magnetic confinement devices since the first discovery about 50 years ago [1]. Experiments in the magnetic confinement device provide evidence that the density limits are linked to the cooling of the edge plasma electron temperature profile dominated by the edge turbulence [2]. Therefore, understanding the behaviors of edge turbulence and their roles in the enhanced turbulence spreading near the density limit is essential for high density operations in future reactors like ITER [3].

The behaviors of blobs and holes are studied near density limits in the edge of tokamak. Conditional averaging analysis confirms the increase of the amplitude and radial size of blobs as the density is approached, which is in consistent with earlier publication [4]. Besides, the burst rate of blobs hardly changes while that of holes is suppressed obviously. The E×B shear flow weakens around the LCFS and enhanced turbulence particle flux and internal energy flux are observed. The particle flux and turbulence spreading induced by blobs increase significantly while contributions of holes are found to decrease. This study provides new experimental evidence for the connection between blobs/holes and turbulence spreading.

References
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