MF-O20

Interaction between magnetic island, poloidal flow, and turbulence in HL-2A ohmic plasmas

M. Jiang[1], W. L. Zhong[1], Y. Xu[2], Z. B. Shi[1], W. Chen[1], X. T. Ding[1], X. Q. Ji[1], Z. C. Yang[1], P. W. Shi[1], J. Cheng[1], A. S. Liang[1], Yi. Liu[1], Q.W. Yang[1], M. Xu[1] and HL-2A team

[1]*Southwestern Institute of Physics, P. O. Box 432, Chengdu 610041, China*
[2]*Institute of Fusion Science, School of Physical Science and Technology, Southwest Jiaotong University, Chengdu, 610031, China*
Email address: jiangm@swip.ac.cn

Abstract: The radial profiles of poloidal flow at the m/n=2/1 magnetic island were firstly observed in the HL-2A ohmic plasmas. Across the O-point, the flow reduced near the center of island, and strongly enhanced around the boundary of the island, resulting in a large increase of the flow shear in the outer half island. While across the X-point, the flow shear is near zero inside the island, while both flow and flow shear increase outside the island. Density fluctuation reduced inside the island and increased towards the separatrix of the island, in line with the temperature gradient was nearly zero around the center of island while elevated at the island edge. Both the perpendicular rotation velocity and density fluctuation were found to be modulated by the naturally rotating tearing mode near the island boundary, which provides direct experimental evidence for the newest gyrokinetic simulation result that island induced shear flows can regulate turbulent fluctuation levels in the vicinity of the island separatrices. The cross correlation between perpendicular rotation velocity and electron temperature shows the correlation coefficient peaked at the boundary of the island. The timedelay-estimation (TDE) analysis further suggests that the boundary of the 2/1 island acts as a source for the generation of the enhanced local poloidal flow, which propagates inward and outward in the radial direction.