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EX/P7-13: Correlations of the Turbulent Structures during Nonlocal Effect Caused by SMBI on the HL-2A Tokamak

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Experiments with nonlocal effect have been performed by using supersonic molecular beam injection (SMBI) in the case of the low density operation on the HL-2A tokamak. The increase in central electron temperature by the perturbations can be prolonged to about 100 ms by using repetitive SMBI with density control. A nearly relation between the central temperature rise and the edge perturbation caused by SMBI has been observed. The nonlocal effect becomes strong as the edge perturbation increases. The rise of the central temperature becomes small as the density increases, and it is saturated in the high density plasma. The cutoff density for nonlocal has been found. There is an upper density limit to induce non-local transport and the value corresponds to about 40% of the Greenwald density limit. The correlations of the fluctuations are measured by using a correlation reflectometer, which has the capability to measure the fluctuations both in the poloidal and radial directions. The low frequency fluctuation rise and the high frequency fluctuation suppression are observed after SMBI injection. It is found that the radial correlation of the fluctuation decreases, while the poloidal correlation of the fluctuation increases compared without nonlocal effect. This suggests that the low frequency fluctuation has a poloidal structure rather than a radial structure. So, the low frequency fluctuation rise can be considered as the enhancement of the poloidal elongated structures. The high frequency fluctuation can be suppressed by these poloidal elongated structures.

Country or International Organization of Primary Author

CAEA

Primary author: Mr SHI, Zhongbing (China)**Co-authors:** Dr SUN, Hongjuan (WCI Center for Fusion Theory, National Fusion Research Institute); Dr RAO, Jun (Southwestern Institute of Physics); Dr ZHOU, Jun (Southwestern Institute of Physics); Dr YANG, Qingwei (Southwestern Institute of Physics); Mr ZHONG, Wulu (Southwestern Institute of Physics); Mr HUANG, Xianli (Southwestern Institute of Physics); Prof. DING, Xuantong (Southwestern Institute of Physics); Dr DUAN, Xuru (Southwestern Institute of Physics); Dr ZHOU, Yan (Southwestern Institute of Physics); Dr LIU, Yi (Southwestern Institute of Physics); Dr DONG, Yunbo (Southwestern Institute of Physics)**Presenter:** Mr SHI, Zhongbing (China)**Session Classification:** Poster: P7**Track Classification:** EXC - Magnetic Confinement Experiments: Confinement