Contribution ID: **256** Type: **Oral**

Effect of multiscale interaction between an m/n=2/1 mode and micro instabilities on transport of KSTAR plasmas*

Saturday 27 October 2018 11:05 (20 minutes)

Tokamak plasmas often encounter non-axisymmetric magnetic topology due to unavoidable magnetohydrodynamic (MHD) instabilities and/or external magnetic perturbation. Transport with non-axisymmetric perturbed equilibrium can be very complicated due to various multiscale interactions between a large scale MHD instability and small scale micro instabilities. This paper reports experimental observations and analyses of two distinguishing multiscale interactions. First, a multiscale interaction between the stationary large m/n=2/1 magnetic island and turbulence through profile modification has been identified using simultaneous 2-D measurements of electron temperature (Te) as well as turbulence and their flow profiles. A significant increase of Te turbulence is only observed near the X-point, while it is not observed both in inside and outside of the magnetic island near the O-point possibly due to the strong flow shear. The increased turbulence and Te gradient lead to the violent minor disruption of the plasma. In addition, a small amplitude m/n=2/1 mode can generate a modified spectrum of micro instabilities. The Doppler shift analysis of the measured frequencies of the modes revealed the nonlinear mode coupling among the m/n=12/6 main mode, the m/n=10/5 and m/n=14/7 side lobes, and the m/n=2/1 mode. These coupled modes appear to degrade the tokamak plasma confinement significantly without the violent disruption event. *This work is supported by the KSTAR research project funded by Korea Ministry of Science and ICT

Country or International Organization

Korea, Republic of

Paper Number

EX/11-2

Author: Dr CHOI, Minjun J. (National Fusion Research Institute)

Co-authors: Prof. YUN, Gunsu (Pohang University of Science and Technology); Prof. PARK, Hyeon K. (UNIST); Dr KWON, Jae-Min (National Fusion Research Institute); Dr KIM, Jayhyun (National Fusion Research Institute); Dr LEE, K.D. (National Fusion Research Institute); Dr WOO, Min Ho (National Fusion Research Institute); Dr KO, Sehoon (National Fusion Research Institute); Prof. HAHM, Taik Soo (Seoul National University); Dr IN, Yongkyoon (Ulsan National Institute of Science and Technology)

Presenter: Dr CHOI, Minjun J. (National Fusion Research Institute)

Session Classification: EX/11-SEE/3-PD Stability, Environmental, Post Deadline

Track Classification: EXS - Magnetic Confinement Experiments: Stability