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Measurements of SOL Density Increase and Poloidal Asymmetry on KSTAR ELMs

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An analysis of edge density evolution during the large ELMs on KSTAR is developed by the measurements including two interferometer systems and the Beam Emission Spectroscopy (BES). The vertical Far Infra-Red interferometer (FIRI) data of large ELM crashes for the high power heated plasma showed plasma density increase, which is a contrary tendency to the general plasma density change at the ELM crashes. The radial Milli-Meter Wave Interferometer (MMWI) data showed smaller density increase than the vertical interferometer and 2-dimensional BES data showed poloidally upward flow of edge density during the ELMs, which implies poloidal asymmetry of edge density distribution. The order of diagnostics response in time is analyzed as: 1. mid-plane emission (Filterscope), 2. SOL density increase (FIRI/MMWI), 3. diverter emission (D-alpha). The magnitude of density increase at the ELM crashes measured by FIRI for high power heated plasmas recorded up to 20% which is contrast to the response of low power heated plasma (5~10 % decrease). A simple one dimensional model of plasma-neutral interaction including ionization and recombination will be presented with detail methods of diagnostics.

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Primary author: Dr LEE, Kwan Chul (National Fusion Research Institute)

Co-authors: Dr PARK, J. G. (NFRI); Dr LEE, J. H. (NFRI); Dr JUHN, J.-W. (NFRI); Dr LAMPERT, M. (Wigner Research Centre for Physics); Dr LEE, S. H. (NFRI); Dr ZOLETNIK, S. (Wigner Research Centre for Physics); Dr NAM, Y. U. (NFRI)

Presenter: Dr LEE, Kwan Chul (National Fusion Research Institute)

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