Contribution ID: **461** Type: **Poster**

Extension of operational boundary of high-beta long-pulse operation at KSTAR

Wednesday, 19 October 2016 14:00 (4h 45m)

For the realization of the fusion reactor, solving issues for high beta steady-state operation is one of the essential research topics for the present superconducting tokamaks and in this regard KSTAR has been focusing on maximizing performance and increasing pulse length addressing scientific and technical issues. Typically, previous study on high beta operation has been focusing on advanced scenario in relatively short pulse discharge at KSTAR and partial success has been reported[1]. However, it must be stressed that it is also essential to verify compatibility of developed high beta scenario to long-pulse and stable long-pulse operation is possible only with reduced level of performance compared with that of the short-pulse. In this work, the results of recent experimental approaches in long-pulse opertion are presented focusing respectively on high betaN, high betap and high li scenario. For high betaN experiments, conditions of the maximum betaN is investigated mainly by parametric scans of toroidal magnetic field (BT=1.4-2.0T) and neutral beam injection power (3-5MW). The achieved betaN is close to 3 with Ip=0.4 MA, BT=1.4T and Pext ˜ 6MW and it is found to be limited by m/n=2/1 tearing mode and is sensitive on the internal inductance. For high betaP experiments, conditions of the maximum betaN is investigated mainly by parametric scans of plasma current (Ip=0.4-0.7 MA) and also neutral beam injection power (3-5MW). The achieved betaP is also close to 3 with Ip=0.4 MA, BT=2.9T and Pext ˜ 6MW and it is found to be limited by heating power and without indication of MHD activities. In addition, high betaP discharge is due to high bootstrap fraction, closed to the state of fully non-inductive current drive though pulse length is limited to 12 second by excessive heat-load on the protection limiters which is probably due to NBI prompt loss. Finally, attempt for high li will be addressed briefly on scenario development and transient results.

Paper Number

EX/P4-1

Country or International Organization

Republic of Korea

Primary author: Dr YOON, Si-Woo (National Fusion Research Institute)

Co-authors: Dr LEE, H. H. (National Fusion Research Institute); Dr KIM, H. S. (National Fusion Research Institute); Dr PARK, J. M. (Oak Ridge National Laboratory); KIM, Jun-Young (National Fusion Research Institute); Dr LANCTOT, M. (General Atomics, USA); Dr WOO, Min-Ho (National Fusion Research Institute); Dr HAN, S. H. (National Fusion Research Institute); Dr LEE, S. H. (National Fusion Research Institute); Dr KO, Won-Ha (National Fusion Research Institute); Dr OH, Y. K. (National Fusion Research Institute, Korea); Dr JEON, Young-Mu (National Fusion Research Institute); Dr BAE, Young-Soon (National Fusion Research Institute)

Presenter: Dr YOON, Si-Woo (National Fusion Research Institute)

Session Classification: Poster 4

Track Classification: EXW - Magnetic Confinement Experiments: Wave–plasma interactions; current drive; heating; energetic particles