Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

0-D Particle Balance Modeling for the Long-term Density Response and Control in KSTAR JUNE-WOO JUHN, S.H. HONG, S.H. HAHN, National Fusion Research Institute, Y.S. HWANG, Seoul National University, Korea, KSTAR TEAM, VEST TEAM — Long-term density response of KSTAR plasmas has been reproduced with a 0-D particle balance equations. The *long-term* response of density means at least a few seconds of the density decay time during the absent of fuels as well as the full discharge length of the KSTAR within the record of 47s. The model includes reactions between deuterium ions, atoms, molecules and wall contents based on the Maddion's model which is one of the most comprehensive 0-D particle balance and validated with the MAST experiments. In order to reflect the long term response, the model is modified including outgassing-like particle emission from the first walls as the form of wall contents over residence time i.e. N_w/τ_w. The model result in excellent agreement with the experimental density response basically in 0.3MA Ohmic limiter plasmas yielding the global particle confinement time τ_i about 30ms. The model also reproduces the density behavior in the higher I_p diverted plasmas, including ELMy H-modes with the explicit ELM density drop. The model can be used for the improvement of the density feedback control system by comparing the voltage-controlled gas puffing with flux-controlled one for example.

June-Woo Juhn
National Fusion Research Institute

Date submitted: 27 Jul 2015 Electronic form version 1.4