Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Numerical study of plasma response for ELM crash suppression by mixed non-axisymmetric fields in KSTAR G.Y. PARK, J. KIM, B.H. PARK, S.W. YOON, National Fusion Research Institute, T.E. EVANS, N.M. FERRARO, General Atomics — Control of the edge localized modes (ELMs) is one of the most critical issues for a successful operation of ITER. Recently, It was revealed that strong n=1 non-resonant magnetic perturbation (NRMP) fields could degrade the ELM suppressed state obtained by n=2 resonant magnetic perturbation (RMP) in KSTAR. This result is completely opposite to the prediction based on the vacuum island overlap physics. Thus, it suggests that plasma response to the RMP with strong fraction of non-resonant components may play an important role in actual ELM suppression process. In this presentation, we report on the numerical results of response of a plasma to applied non-axisymmetric magnetic perturbation field due to the n=2 middle and n=1 top/bottom RMP coils. Simulations for several KSTAR discharges are implemented using a two-fluid code, M3D-C1 [1]. We try to explain the basic experimental characteristics of ELM suppression under mixed RMPs configuration in KSTAR on the basis of the calculated plasma response results. Detailed study of the effect of the perpendicular electron rotation on the penetration of n=2 RMP and its variation with the addition of n=1 NRMP will be presented.

[1] N.M.Ferraro, Phys. Plasmas 19(5), 056105 (2012)

Gunyoung Park
National Fusion Research Institute

Date submitted: 24 Jul 2015 Electronic form version 1.4