Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

The role of plasma response in divertor footprint modification by 3D fields in NSTX JOONWOOK AHN, Oak Ridge National Laboratory, KIMIN KIM, KAIST, GUSTAVO CANAL, GA, KAIFU GAN, UTK, TRAVIS GRAY, ORNL, ADAM MCLEAN, LLNL, JONG-KYU PARK, PPPL, FILIPPO SCOTTI, LLNL — In NSTX, the divertor footprints of both heat and particle fluxes are found to be significantly modified by externally applied 3D magnetic perturbations. Striations on the divertor surface, indicating separatrix splitting and formation of magnetic lobes, are observed for both $n = 1$ and $n = 3$ perturbation fields. These striations can lead to localized heating of the divertor plates and to the re-attachment of detached plasmas, both of which have to be avoided in ITER for successful heat flux management. In this work, the role of plasma response on the formation of separatrix splitting has been investigated in the ideal framework by comparing measured heat and particle flux footprints with field line tracing calculations with and without contributions from the plasma response calculated by the ideal code IPEC. Simulations show that, $n = 3$ fields are slightly shielded by the plasma, with the measured helical pattern of striations in good agreement with the results from the vacuum approximation. The $n = 1$ fields are, however, significantly amplified by the plasma response, which provides a better agreement with the measurements. Resistive plasma response calculations by M3D-C[1] are also in progress and the results will be compared with those from the ideal code IPEC.
*This work was supported by DoE Contracts: DE-AC05-00OR22725, DE-AC52-07NA27344 and DE-AC02-09CH11466.

Joonwook Ahn
Oak Ridge National Laboratory

Date submitted: 24 Jul 2015 Electronic form version 1.4