Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

ORBIT modelling of fast particle redistribution induced by sawtooth instability[1] DOOHYUN KIM, MARIO PODESTÀ, FRANCESCA POLI, Princeton Plasma Phys Lab, PRINCETON PLASMA PHYSICS LABORATORY TEAM — Initial tests on NSTX-U show that introducing energy selectivity for sawtooth (ST) induced fast ion redistribution improves the agreement between experimental and simulated quantities, e.g. neutron rate. Thus, it is expected that a proper description of the fast particle redistribution due to ST can improve the modelling of ST instability and interpretation of experiments using a transport code. In this work, we use ORBIT code [1] to characterise the redistribution of fast particles. In order to simulate a ST crash, a spatial and temporal displacement is implemented as $\xi(\rho,t,\theta,\phi) = \sum \xi_{mn}(\rho,t)\cos(\mathrm{m}\theta + \mathrm{n}\phi)$ [2] to produce perturbed magnetic fields from the equilibrium field $\vec{B}$, $\delta\vec{B} = \nabla \times (\vec{\xi} \times \vec{B})$, which affect the fast particle distribution. From ORBIT simulations, we find suitable amplitudes of for each ST crash to reproduce the experimental results. The comparison of the simulation and the experimental results will be discussed as well as the dependence of fast ion redistribution on fast ion phase space variables (i.e. energy, magnetic moment and toroidal angular momentum). [1] White R.B. and Chance M.S. 1984 Phys. Fluids 27 2455 [2] Farengo R. et al 2013 Nucl. Fusion 53 043012

[1]Work supported by the U.S. Department of Energy, Office of Science, Office of Fusion Energy Sciences under contract number DE-AC02-09CH11466

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Date submitted: 13 Jul 2017 Electronic form version 1.4