

**Abstract Submitted for the 54th Annual Meeting  
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Category Number and Subject: 5.6.2 DIII-D tokamak

Theory     Experiment

**Effects of magnetic perturbations and plasma response on loss of fast ions to the wall in DIII-D and ITER,\*** M. Choi, N.M. Ferraro, L.L. Lao, V.S. Chan, *General Atomics* – External magnetic coils have been used to control locked modes and edge localized modes (ELMs) in present tokamaks and are under consideration for use in ITER. A previous study on its effects on the loss of fast ions for a steady state ITER scenario indicates that the perturbation fields can cause a significant power loss of neutral beam injection (NBI) fast ions [1]. In that study, the effect of plasma response is not included. In this work, the effect of magnetic perturbations on the fast ion loss rate is considered using both a vacuum model and a two-fluid resistive plasma response model. The plasma response to the applied non-axisymmetric fields is calculated using the non-ideal fluid code M3D-C<sup>1</sup>. Preliminary investigation in a typical DIII-D plasma, using the 5-D finite-orbit Monte-Carlo code ORBIT-RF, indicates that a significant amount of 100 keV NBI-produced fast ions located near the magnetic resonant surfaces may be lost to the wall due to the effects of Coulomb collisions and large drift orbit widths. First results on the losses of fast ions at the presence of magnetic perturbations in typical DIII-D plasmas and ITER, using ORBIT-RF/M3D-C1, will be reported in this paper.

[1] K. Tani, et. al, Nucl. Fusion **52** (2012) 013012.

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