

Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Second Order Magnetic Barriers in Tokamaks, Noble Tori, and Topological Noise HALIMA ALI, ALKESH PUNJABI, Center for Fusion Research and Training, Hampton University, Hampton, VA 23668 — Second order perturbation method of creating invariant manifold inside chaos in Hamiltonian systems [1-4] is applied to tokamak to build magnetic barriers inside the region of magnetic chaos created by resonant magnetic perturbations. Different safety factor profiles are used to represent tokamaks such as the ohmically heated tokamaks (OHT), the DIII-D and the ASDEX UG. In OHT, a magnetic barrier is created at about midway between two resonant magnetic surfaces. The barrier reduces the diffusion of magnetic field lines by about half. The barrier is fortified by adding up to third order magnetic perturbation. Beyond a maximum value of magnetic perturbation, the barrier is not sustainable. However, if a barrier is created at noble value of safety factor, then it is found to be much more robust. For the DIII-D, the robustness of magnetic barrier is tested for topological noise, and the barrier is found to be robust up to some maximum value of noise. This work is supported by US DOE OFES DE-FG02-01ER54624 and DE-FG02-04ER54793.

- [1] Ciralo G *et al.* 2004, *J. Phys. A: Math Gen* **37** 3589.
- [2] Ciralo G *et al.* 2004, *Phys. Rev. E* **69** 056213.
- [3] Vittot M 2004, *Phys. A: Math Gen* **37** 6337.
- [4] Chandre C *et al.* 2005, *Phys. Rev. Lett.* **94** 074101.

Halima Ali
Center for Fusion Research and Training,
Hampton University, Hampton, VA 23668

Date submitted: 17 Jul 2007

Electronic form version 1.4