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Creation of a magnetic barrier at a noble q close to physical midpoint between two resonant surfaces in the ASDEX UG tokamak JUSTIN VAZQUEZ, College of William and Mary, HALIMA ALI, ALKESH PUNJABI, Hampton University — Ciraolo, Vittot and Chandre method of building invariant manifolds inside chaos in Hamiltonian systems [Ali H. and Punjabi A, Plasma Phys. Control. Fusion, **49**, 1565–1582 (2007)] is used in the ASDEX UG tokamak. In this method, a second order perturbation is added to the perturbed Hamiltonian [*op cit*]. It creates an invariant torus inside the chaos, and reduces the plasma transport. The perturbation that is added to the equilibrium Hamiltonian is at least an order of magnitude smaller than the perturbation that causes chaos. This additional term has a finite, limited number of Fourier modes. Resonant magnetic perturbations (m,n) = (3,2)+(4,3) are added to the field line Hamiltonian for the ASDEX UG. An area-preserving map for the field line trajectories in the ASDEX UG is used. The common amplitude δ of these modes that gives complete chaos between the resonant surfaces $\Psi 43$ and $\Psi 32$ is determined. A magnetic barrier is built at a surface with noble q that is very nearly equals to the q at the physical midpoint between the two resonant surfaces. The maximum amplitude of magnetic perturbation for which this barrier can be sustained is determined. This work is supported by US Department of Energy grants DE-FG02-07ER54937, DE-FG02-01ER54624 and DE-FG02-04ER54793.

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