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Magnetic Transport Barriers in the DIII-D Tokamak,*

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H. Ali, A. Punjabi, *Hampton U* — Large overlapping magnetic islands generate chaotic fields. However, a previous work [1] showed that second or third order perturbations of special topology and strength can also generate magnetic diffusion “barriers” in the middle of stochastic regions. In the present study, we numerically assess their experimental feasibility at DIII-D. For this, realistic I- and C-coils perturbations are superimposed on the equilibrium field and puncture plots are generated with a field-line tracer. A criterion is defined for the automatic recognition of barriers and successfully tested on earlier symplectic maps in magnetic coordinates. The criterion is systematically applied to the new puncture plots in search for dependencies, e.g. upon the edge safety factor q_{95} , which might be relevant to edge localized mode (ELM) stability, as well as to assess the robustness of barriers against fluctuations of the plasma parameters and coil currents.

[1] H. Ali and A. Punjabi, 2007 *Plasma Phys. Control. Fusion* **49** 1565.

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