# High resolution numerical studies of separatrix splitting due to non-axisymmetric perturbation in DIII-D

**A. Wingen[1], T.E. Evans[2] and K.H. Spatschek[1]**

[1]Institut für Theoretische Physik, Heinrich-Heine-Universität Düsseldorf, D–40225 Düsseldorf, Germany

[2]General Atomics, San Diego, California, 92186-5608, USA

**Abstract.** In DIII-D the splitting and deformation of the separatrix due to externally applied resonant magnetic perturbations is calculated using a vacuum field line integration code (TRIP3D-MAFOT). The resulting footprint pattern on the divertor target plates is shown in high resolution by contour plots of the connection lengths and penetration depths of the magnetic field lines. Substructures inside the divertor footprint stripes are discovered. Regions of deep penetrating long connecting field lines, which are related to the internal resonances by their manifolds, alternate with regions of regular short connecting field lines. The latter are identified as compact laminar flux tubes, which perforate the perturbed plasma region close to the x-point. The properties and consequences of such flux tubes are investigated in detail. The interaction of different resonant magnetic perturbations is analyzed considering the separatrix manifolds. Constructive and destructive interference of the manifolds is discovered and studied.

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