

Abstract Submitted
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Pressure Profiles and Pressure-Driven Equilibrium Currents near Small Magnetic Islands and near Divertor Separatrices: Resonance and Symmetry Effects¹ DHANUSH RADHAKRISHNAN, NYU, ALLAN REIMAN, Princeton Plasma Phys Lab

— A magnetic island whose width is well below a threshold value, determined by the ratio of perpendicular to parallel transport, has only a small effect on the ambient pressure gradient. We calculate the pressure gradient, and the associated pressure driven current in the neighborhood of such an island, assuming that the pressure is determined by a diffusion equation. We similarly calculate the pressure gradient and pressure driven current in the neighborhood of a divertor separatrix. For the small magnetic island, we consider a cylindrical magnetic field with perturbed circular flux surfaces. The perturbation consists of two components, one that modulates the toroidal magnetic field strength without breaking up the flux surfaces, and a second that introduces a resonant radial component of the magnetic field at the rational surface but has little effect on the toroidal field. The relative phase between the two perturbations is varied. The Pfirsch-Schluter current near the X-line is found to be much larger when both perturbations are present and the relative phase between them breaks the stellarator symmetry than it is when these conditions are not satisfied. The calculations are consistent with previous analytical work predicting a logarithmic singularity at the X-line.

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