

Abstract Submitted
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Surface currents on the plasma-vacuum interface in MHD equilibria JAMES HANSON, Auburn University — The VMEC non-axisymmetric MHD equilibrium code can compute free-boundary equilibria¹. Since VMEC assumes that magnetic fields within the plasma form closed and nested flux surfaces, the plasma-vacuum interface is a flux surface, and the total magnetic field there has no normal component. VMEC imposes this condition of zero normal field using the potential formulation of Merkel², and solves a Neumann problem for the magnetic potential in the exterior region. This boundary condition necessarily admits the possibility of a surface current on the interface. While this surface current may be small in MHD equilibrium, it is readily computed in terms of the magnetic potentials in both the interior and exterior regions, evaluated on the surface. If only the external magnetic potential is known (as in VMEC), then the surface current can be computed from the discontinuity of the tangential field across the interface. Examples of the surface current for VMEC equilibria will be shown for a zero-pressure stellarator equilibrium. Field-line following of the vacuum magnetic field shows magnetic islands within the plasma region. ¹ Hirshman S P, Van Rij W I and Merkel P, *Comp. Phys. Comm.* **43** 143–55 (1986) ² Merkel P, *J. Comp. Phys.* **66** 83–98 (1986)

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