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Algorithms for Finding 2D MHD Equilibria with Given "Almost Ideal" MHD Constraints[1] T.H. JENSEN, General Atomics — Under the constraints of ideal MHD, the flux surface topology cannot change. This not true under the constaints of almost ideal MHD (AIMHD). Equilibrium algorithms observing AIMHD constraints can therefore be used for the study of nonlinear properties of tearing modes.[2] Only the simplest cases are considered for which (i) $\partial/\partial z = 0$; (ii) $\bar{\nabla} p = 0$; (iii) $(\bar{B} \times \hat{z})^2/(\bar{B} \cdot \hat{z})^2 \ll 1$. It is the aim of this work to find algorithms which can deal with cases for which the current density may be different functions of the flux function on the two sides of a singular surface so that a finite gradient of the current density at the singular surface may exist. For such cases, island formation may result in irreversible, quantifiable changes of the AIMHD constraints and a nonlinear instability of tearing modes may exist.[3] Several approaches to making suitable algorithms for this purpose will be discussed.

[1]Supported by U.S. DOE Grant DE-FG03-95ER54309.
[2]C. Ren, T.H. Jensen, and J.D. Callen, Phys. Plasmas **5**, 2574 (1998).
[3]T.H. Jensen and W.B. Thompson, Phys. Fluids **30**, 3052 (1987).

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