

Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Existence of Low Shear MHD Stellarator Equilibria? HAROLD WEITZNER, New York University — D. Lortz showed that closed line, zero rotational transform MHD equilibria exist in non-symmetric geometries. H. Grad set up a formalism for such equilibria, whose existence does not contradict his general arguments against existence of non-symmetric equilibria,. Equilibria are regularly computed with some reasonable accuracy, despite these problems. Low shear systems appear to be excluded in these arguments, as they are also omitted in the Kolmogorov, Moser, Arnold theorems on destruction of magnetic surfaces. Such states are of some interest for W7-X and for the inner regions of LHD, In this work Grad formulation is extended and equilibria are described An alternate representation of equilibria is given, and is applied to a topological torus. An expansion about a simple equilibrium state is given and resonances, which destroy equilibria appear explicitly. It is shown that there are classes of states which exclude such resonances. The work applies to low shear systems. While proof of convergence is not possible, the typical hallmarks of asymptotic expansions do not appear. The work support the conjecture that low shear MHD non-symmetric equilibria may exist. Applications to true tori will also be given.

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Date submitted: 10 Jul 2013

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