Sorting Category: O.5 (Theoretical)

Improved Numerical Technique to Solve the Linear Resistive MHD Problem[1] S. GALKIN, Keldysh Institute, M.S. CHU, J.M. GREENE, A.D. TURNBULL, General Atomics — A new approach to construct the linear resistive MHD modes criterion for toroidal plasma was proposed.[2] This approach does not require extraction of infinite solutions *a priori*. A special transformation converts the original system of Euler equations into a new one, where the infinite non-integrable solutions become finite functions and all solutions can then be found numerically. A weak form of new equations is used in place of the second variation of the potential energy functional. Resistive MHD criterion: (1) Numerical solution of the modified Euler equations; (2) Extraction of Frobenius series coefficients and estimation of Δ' for each resonance surface; and (3) Solution of the dispersion relation to determine growth rates on the basis of a wide class of different inner layer models. This approach was tested on 1D Sturm-Liouville problem with singular points and excellent accuracy and robustness were shown. A new version of the TWIST-R code had been developed to study resistive modes of the axisymmetric toroidal plasma. Convergence results for 2D toroidal plasma equilibria are presented and physical issues are discussed.

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[2]S. Galkin *et al.*, Bull. Am. Phys. Soc. **43** (1998) 1751.

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