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Tearing mode stability analysis via a new numerical matching technique for resistive reduced MHD[1] M. FURUKAWA, Grad. Sch. Frontier Sci., U. Tokyo, S. TOKUDA, Japan Atomic Energy Agency, L. -J. ZHENG, IFS, U. Texas at Austin — We consider numerical analysis of tearing mode stability in cylinderical geometry. One of the conventional methods is to solve the resistive reduced MHD (rrMHD) equations as an eigenvalue problem. If we adopt finite difference/element methods, we need to calculate eigenvalues of a large matrix. We have developed a technique to reduce the matrix size, other than mesh accumulation, by extending the idea of asymptotic matching method adopted for analytic studies. The plasma region is divided into outer regions and an inner region with "finite width (not so thin)." In the outer regions, we solve the inertia-less MHD (Newcomb) equation. We take one of the boundaries of each outer region not so close to the resonant surface; then there is no difficulty in integrating the Newcomb equation. In the inner region, the rrMHD equations are solved with boundary conditions obtained from the outer solution. Then we only need to compute eigenvalues of a matrix of considerably smaller size. We applied this method and obtained tearing mode growth rates efficiently.

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