Abstract Submitted
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Computation of Singular MHD Instabilities with DCON and MATCH[1] ALAN H. GLASSER, Los Alamos National Laboratory — The DCON code is in wide use for computing the ideal MHD stability of axisymmetric toroidal plasmas. It uses an adaptive numerical integrator to solve a system of ordinary differential equations for the radial dependence of complex Fourier coefficients of the normal displacement, a generalization of Newcomb's equation, from the magnetic axis to the plasma-vacuum interface. Fixed-boundary stability is determined by a toroidal generalization of Newcomb's criterion. Free-boundary stability is determined by the sign of the lowest eigenvalue of the sum of plasma and vacuum response matrices. DCON has been extended to compute the outer ideal region matching conditions for singular modes such as resistive and neoclassical tearing modes. A matching matrix is constructed from asymptotic coefficients of resonant and nonresonant solutions on either side of each singular surface and corresponding terms from any singular surface model. A dispersion relation for growth rates and eigenfunctions is obtained from the roots of the determinant of this matrix. Numerous computational improvements will be described which now make the code accurate, robust, and reliable. Benchmarks with the PEST 3 resistive stability code will be presented.

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