

Abstract Submitted
for the DPP00 Meeting of
The American Physical Society

Sorting Category: 6.2.0 (Theoretical)

**Delta Prime Calculations in Cylindrical and Toroidal
Finite Beta Plasmas¹**

S.A. GALKIN, UCSD, M.S. CHU, J.M. GREENE, A.D. TURNBULL, General Atomics — Accurate calculation of Δ' is crucial for classical and neoclassical tearing mode stability. Some configurations have Mercier index values $\mu > 1$, which greatly complicates the calculation of Δ' . A new technique² allows accurate computation of Δ' for a wide range of μ . The TWIST-R code uses this technique to compute the resistive MHD stability for cylindrical and toroidal plasmas with finite β . Behavior of the matching data Δ' and Γ' , respectively the difference and sum of the small solution Frobenius coefficients normalized to the large solution coefficients, is studied with respect to cross-section and profiles. In addition to the well known poles in Δ' and Γ' at integer and half integer values of μ associated with tearing or interchange parity of the mode, additional poles are found at neither integer nor half integer values of μ . Although the number and locations of these poles depends smoothly on the equilibrium parameters, the behavior of Δ' and Γ' around the poles is found to be extremely sensitive to the equilibrium data. Physical meaning of the poles and implications of their sensitivity to the equilibrium data will be discussed.

¹Work supported in part by U.S. DOE Grant DE-FG03-95ER54309.

²S.A. Galkin *et al.*, to appear in Phys. Plasmas (2000).

Prefer Oral Session
 Prefer Poster Session

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Date submitted: July 12, 2000

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