Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Ballooning stability in quasi-symmetric stellarators E. MONDLOCH, A.S. WARE, University of Montana, R. SANCHEZ, Universidad Carlos III de Madrid, D.A. SPONG, D. DEL-CASTILLO-NEGRETE, Oak Ridge National Laboratory — Global ballooning stability is examined for three different quasi-symmetric stellarator equilibria: the quasi-poloidally symmetric QPS, the quasi-helically symmetric HSX, and the quasi-axisymmetric NCSX. Previous work on ideal MHD ballooning stability of the Quasi-Poloidal Stellarator (QPS) focused on local calculations of stability. In this work, theoretical calculations of global ballooning mode stability in QPS are done using the results of infinite-n ballooning theory and the ray tracing techniques introduced by Dewar and Glasser [1]. For comparison, this method is also applied to HSX and NCSX equlibria. Here, the mode structure of cylindrical and spherical ballooning surfaces in the different devices is examined. In both QPS and NCSX all of the unstable structures are of the localized, ballooning type and are limited to narrow bands of field lines. This is true even well above a marginal stable β. The range of α (where α is the field line label) for which unstable surfaces are found is broader in QPS than in NCSX while the range of θ_k (where $\theta_k = k_q/k_\alpha$ is the ballooning parameter) for which unstable surfaces are found is narrower in QPS than in NCSX. Results for HSX will also be discussed. The implications for second stability as compared to local calculations of second stability in these devices is discussed.
[1] R. L. Dewar and A. Glasser, Phys. Fluids 26, 3038 (1983).

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Date submitted: 25 Jul 2005 Electronic form version 1.4