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Stellarator Beta Limits With Finite Transport Along Stochastic Fields (PhD Oral-24)[1] T. A. BECHTEL, C. R. SOVINEC, C. C. HEGNA, University of Wisconsin - Madison — The nonlinear, extended MHD code NIMROD is employed to simulate self-consistent stellarator behavior at high beta. Finite anisotropic thermal conduction allows for sustained pressure gradients within stochastic regions. The configuration under investigation is an l=2, M=10 torsatron with vacuum rotational transform near unity. Finite-beta plasmas are generated from vacuum fields using a volumetric heating source and temperature dependent resistivity. In sufficiently dissipative regimes, steady-state solutions are obtained which exhibit a conventional equilibrium beta limit. The parametric dependence of the equilibrium beta limit is examined in detail and compared with several reduced models for effective radial transport across stochastic magnetic fields, in the collisional limit. Simulations with less dissipation show signs of interchange-like instabilities which also act to limit the achievable beta, even when simulations only include modes which preserve toroidal stellarator symmetry. Present numerical resources only allow for a preliminary investigation of this behavior, but highlight the importance of ongoing computational development (C. R. Sovinec, C. M. Guilbault, and T. A. Bechtel, this meeting.).

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