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Equilibrium, stability and transport in quasi-symmetric stellarators[1] A.S. WARE, F. BUNT, K. LENNARD, T. MARINE, K. MCGARVEY-LECHABLE, University of Montana — We present an overview of research efforts at the University of Montana to understand the equilibrium, stability and transport properties of quasi-symmetric stellarators. Quasi-symmetry in three-dimensional magnetic confinement devices provides a path for external control of the confining magnetic field while achieving confinement comparable to axisymmetric configurations. In a quasi-symmetric toroidal configuration, magnetic field strength in magnetic flux coordinates is given by $B(\psi, \theta, \zeta) \approx B(\psi, M\theta + N\zeta)$ where M and N are integers. We summarize efforts to optimize quasi-symmetric configurations, both fixed- boundary and free-boundary. The ideal ballooning stability properties of these configurations are analyzed and finite-β optimizations are undertaken to improve stability. Transport properties are analyzed using the NEO and PENTA codes and the effect of symmetry-breaking has been tested. Finally, an effort to develop a transformation from Boozer coordinates to VMEC coordinates is discussed.

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