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Analytic and computational investigation of the effect of finite parallel heat transport on the formation of magnetic islands in 3-D plasma equilibria[1] MARK SCHLUTT, C.C. HEGNA, Univ. of Wisconsin, E. HELD, Utah State Univ. — A resistive MHD model is used to investigate pressure-induced magnetic islands in 3-D equilibria. We revisit previous analytic isolated island calculations while allowing for finite parallel heat transport, to derive an equation for equilibrium island widths. Finite parallel heat transport can alter the impact of resistive interchange and bootstrap current contributions to magnetic island formation. However, Pfirsch-Schlüter currents driven by resonant components in $\frac{1}{B^2}$ are largely unaffected by transport processes. 3D MHD equilibria are modeled using NIMROD. A vacuum equilibrium helical magnetic field is loaded into the geometry of a straight stellarator. The symmetry of the vacuum field with a dominant magnetic harmonic can be spoiled by adding small magnetic perturbations. These perturbations alter the magnetic spectrum, and produce magnetic islands and regions of stochasticity. Numerical simulations are performed that include the effect of a heating source and self-consistent anisotropic transport in a variety of magnetic configurations. The effect of finite parallel heat transport on the island formation and saturation processes is examined.

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