

Abstract Submitted
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Proxy functions for turbulent transport optimization of stellarators¹ MORDECHAI RORVIG, CHRIS HEGNA, University of Wisconsin, HARRY MYNICK, Princeton Plasma Physics Laboratory, PAVLOS XANTHOPOULOS, Institute for Plasma Physics - Greifswald — The design freedom of toroidal confinement shaping suggests the possibility of optimizing the magnetic geometry for turbulent transport, particularly in stellarators. The framework for implementing such an optimization was recently established [1] using a proxy function as a measure of the ITG induced turbulent transport associated with a given geometry. Working in the framework of local 3-D equilibrium [2], we investigate the theory and implications of such proxy functions by analyzing the linear instability dependence on curvature and local shear, and the associated quasilinear transport estimates. Simple analytic models suggest the beneficial effect of local shear enters through polarization effects, which can be controlled by field torsion in small net current regimes. We test the proxy functions with local, electrostatic gyrokinetics calculations [3] of ITG modes for experimentally motivated local 3-D equilibria.

[1] H. E. Mynick, N. Pomphrey, and P. Xanthopoulos, Phys. Rev. Lett. 105, 095004 (2010).

[2] C. C. Hegna, Physics of Plasmas 7, 3921 (2000).

[3] F. Jenko, W. Dorland, M. Kotschenreuther, and B. N. Rogers, Physical Review Letters 7, 1904 (2000).

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