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Exploration of turbulent optimization in stellarators & tokamaks[1]
H. MYNICK, N. POMPHREY, PPPL, P. XANTHOPOULOS, Max Planck Institut fur Plasmaphysik, M. LUCIA, PPPL — A method[2,3] recently developed for evolving toroidal configurations to ones with reduced turbulent transport, using the STELLOPT optimization codes and the GENE gyrokinetic code, is being applied and extended. The growing body of results has found that the effectiveness of the current proxy measure Q_{prox} used by STELLOPT to estimate transport levels depends on the class of toroidal device considered. The present proxy works well for quasi-axisymmetric stellarators and tokamaks, modestly for quasi-helically symmetric designs, but not for the W7X quasi-omnigenous/quasi-isodynamic design. We are exploring the origin of this variation, and improving the dependence of the proxy on key geometric factors, extending the proxy to apply to transport channels other than the ITG turbulence it was originally developed for, and are also examining the relative effectiveness of different search algorithms. To help in these efforts, we have adapted STELLOPT to provide a new capability for mapping the topography of the cost function in the search space.

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[2]H.E. Mynick, N. Pomphrey, P. Xanthopoulos, Phys. Rev. Letters, 105, 095004 (2010).
[3]H.E. Mynick, N. Pomphrey, P. Xanthopoulos, Phys. Plasmas, 18, 056101 (2011).

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