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Mapping the global topography of the cost function in STELLOPT[1] M. LUCIA, H.E. MYNICK, N. POMPHREY, PPPL — Stellarator designs have long been optimized for reduced neoclassical transport, but optimization for reduced turbulent transport is a relatively nascent research thrust. Recent work has addressed[2] this "turbulent optimization" by using the GENE/GIST nonlinear gyrokinetic code and the STELLOPT stellarator optimization code. That work demonstrated that STELLOPT can produce stellarator designs that reduce the turbulent transport without adversely affecting other design metrics. STELLOPT utilizes a Levenberg-Marquardt (LM) algorithm to find a local minimum of a cost function in a shape space $\mathbf{z}$ of coefficients that define the plasma boundary. However, a visualization of the topography of the cost function in $\mathbf{z}$ space might reveal a lower global minimum and provide insight into why the LM algorithm missed it. The current work uses STELLOPT to provide this capability, replacing its LM algorithm with one that produces maps of the wider topography of the cost function. Analysis of these maps will be used to gain insight into the properties of the studied design configurations and to identify possible improvements to STELLOPT's optimization algorithm.

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[2]H.E. Mynick, N. Pomphrey, P. Xanthopoulos, PRL **105**, 095044 (2010)

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