

Abstract Submitted
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Penalty Functions in FOCUS to Constrain Stellarator Coil Optimization¹ THOMAS KRUGER, University of Wisconsin-Madison, CAOXIANG ZHU, Princeton Plasma Physics Laboratory, AARON BADER, DAVID ANDERSON, University of Wisconsin-Madison — Stellarator coil optimization aims to generate coils that produce a desired magnetic boundary. FOCUS is a coil optimization code that solves for coils in free space. This poster will examine penalty functions, implemented in FOCUS, that optimize coils to better match a magnetic boundary while simultaneously satisfying engineering constraints. Because FOCUS uses analytical derivatives for optimization, all penalty functions need to be differentiable. Penalty functions to optimize for minimum coil radius of curvature and minimum coil-coil separation are presented and their performances are evaluated. It is shown that optimizing for a coils average curvature or average curvature squared do not perform as well as optimizations for maximum curvature. Optimizing with penalty functions not only constrains the curvature, but also solves for coils with low normal field values on the desired boundary.

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