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**A New Method For The Optimization Of Finite Build Stellarator Coils**[1] LUQUANT SINGH, THOMAS KRUGER, University of Wisconsin - Madison, CAOXIANG ZHU, STUART HUDSON, Princeton Plasma Physics Laboratory, DAVID ANDERSON, AARON BADER, University of Wisconsin - Madison — To date, all major stellarator coil optimization codes, such as FOCUS, ONSET, REGCOIL, COILOPT++, and NESCOIL ultimately produce current-carrying single filament coils. In reality, stellarator coils have finite depth and thickness, which can make the single filament model a poor approximation, particularly when coils are placed close to the plasma. The finite build of a coil, termed the "winding pack", can be approximated by a multi-filament model. In this model, each coil is comprised of a set of closely packed single filaments. The torsion of the winding pack, determined by the multi-filaments, is not determined a priori and is a parameter that should be optimized over. Here we present a new method to construct stellarator coils with a finite build given a set of single filament coils; we also provide a mechanism to optimize for the winding pack torsion using the multi-filament model. The method is applied to compare the difference in fidelity, to producing a desired magnetic boundary, between the single filaments, unoptimized multi-filaments, and optimized multi-filament coils.

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