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Using the Genetic Algorithm to Find Coils for Compact Stellarators[1] W.H. MINER, JR., P.M. VALANJU, Fusion Research Center, The University of Texas at Austin, S.P. HIRSHMAN, Oak Ridge National Laboratory, A. BROOKS, N. POMPHREY, Princeton Plasma Physics Laboratory — Stellarators are now optimized by finding the shape of the plasma surface that produces a desired mix of physics properties. The challenge is to find a practical coil set that creates that optimized surface with sufficient accuracy to retain the desired physics properties and still meet engineering and experimental constraints. Given the wide range of possible coil geometries, this is a daunting task requiring iterations between a practical coil geometry and the physics properties produced by it. A novel technique, the Genetic Algorithm (GA)[2], has recently been applied to this problem. The GA is a computational search procedure for finding the global minimum of a target function using natural selection. This technique has been applied to the design of coils for the NCSX. Typically > 30 coil contours are needed to reproduce the necessary accuracy. Using GA, the result can be improved by choosing a small subset (e.g. 10) contours, each carrying different currents from among a much larger number (e.g. 50).

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[2]D.E. Goldberg, **Genetic Algorithms in Search, Optimization, and Machine Leaning**, (Addison Wesley, New York) 1989.

☐ Prefer Oral Session
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