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Geometric concepts for stellarator permanent magnet arrays[1] K. C. HAMMOND, C. ZHU, T. BROWN, K. CORRIGAN, D. A. GATES, M. SIBILIA, Princeton Plasma Physics Laboratory — The development of stellarators that use permanent magnet arrays to shape their confining magnetic fields has been a topic of recent interest, but the requirements for how such magnets must be shaped, manufactured, and assembled remain to be determined. To address these open questions, we have performed a study of geometric concepts for magnet arrays with the aid of the newly developed MAGPIE code. A proposed experiment similar to the National Compact Stellarator Experiment (NCSX) is used as a test case. Two classes of magnet geometry are explored: curved bricks that conform to a regular grid in cylindrical coordinates, and hexahedra that conform to the toroidal plasma geometry. In addition, we test constraints on the magnet polarization. While magnet configurations constrained to be polarized normally to a toroidal surface around the plasma are unable to meet the required magnetic field parameters when subject to physical limitations on the strength of present-day magnets, configurations with unconstrained polarizations are shown to satisfy the physics requirements for a targeted plasma.

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