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Impact of Coil Design on Alpha Particle Confinement[1] JESSE COOK, ANDREW WARE, University of Montana, AARON BADER, CHRIS HEGNA, University of Wisconsin-Madison — Enhanced confinement of fusion alpha particles is an essential requirement of a fusion reactor. Previous studies of reactor scale stellarator configurations indicate that alpha particle losses would be higher than acceptable in the analyzed configurations [F. Najmabadi, et al., Fusion Sci. Technol. **54**, 655 (2008)]. More recent work indicates quasi-helically symmetric configurations can achieve enhanced alpha confinement [A. Bader, et al., J. Plasma Physics **85**, 905850508 (2019)]. The demonstration that reactor-scale coil configurations can be developed with sufficient alpha confinement is necessary to provide a pathway for stellarators as a fusion reactor concept. In this work, the FOCUS code [C. Zhu, et al., Plasma Phys. Contr. Fusion **60**, 065008 (2018)] will be used to develop coil configurations for a four-field period, reactor-scale quasi-helically symmetric stellarator. The SIMPLE code [C. Albert, et al., J. Plasma Physics **86**, 815860201 (2020)] will then be used to analyze the confinement of fusion alpha particles in these configurations. Alpha particle confinement will be examined for the fixed-boundary equilibrium and for the free-boundary equilibrium. The dependence of alpha confinement on the number of modular field coils will be examined.

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