Abstract Submitted
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Stellarator figures of merit near the magnetic axis[1] MATT LANDREMAN, ROGERIO JORGE, University of Maryland, College Park — A new paradigm for rapid stellarator configuration design has been recently demonstrated, in which the shapes of quasisymmetric or omnigenous flux surfaces are computed directly using an expansion in small distance from the magnetic axis [1]. To further develop this approach, here we derive several other quantities of interest that can be rapidly computed from this near-axis expansion: (1) Magnetic well. (2) Mercier and resistive interchange stability. (3) The $\nabla \vec{B}$ and $\nabla\nabla \vec{B}$ tensors, which can be used for direct derivative-based optimization of electromagnetic coil shapes to achieve the desired magnetic configuration. (4) The minor radius at which the flux surface shapes would become singular, providing a lower bound on the achievable aspect ratio. (5) For configurations that are constructed to achieve a desired magnetic field to first order in the expansion, we compute the error field that arises at second order. [1] Landreman & Sengupta, J Plasma Phys 85, 905850608 (2019)

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