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Optimizing Stellarator Surfaces Using Magnetic Island Width Sensitivity[1] ALESSANDRO GERALDINI, MATT LANDREMAN, University of Maryland, College Park — To improve confinement, stellarator vacuum magnetic flux surfaces must be optimized to eliminate magnetic islands. Small perturbations to the intended magnetic field configuration may nonetheless cause the appearance of small magnetic islands at rational flux surfaces. For the construction of a fusion device, a large sensitivity of the width of any magnetic island on small perturbations implies that tighter tolerances on the position of coils producing the vacuum magnetic field are necessary. A quantity called shape gradient, which can be readily related to the local tolerance of the coils, appropriately quantifies the island width sensitivity from a practical point of view. Optimizing stellarator surfaces to have low island width sensitivity is achieved by minimizing this shape gradient. We present progress made in the development of a tool that aims to efficiently compute the shape gradient of the characteristic magnetic island width of stellarator vacuum magnetic fields. J. D. Hanson and J. R. Cary, Physics of Fluids B: Plasma Physics **3**, 1006 (1991). M. Landreman, E. J. Paul, Nuclear Fusion **58** (7), 076023 (2008).

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