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# NEW MINIMAL SURFACES VIA EQUIVARIANT EIGEN- VALUE OPTIMIZATION (PART I)

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I'll discuss recent work with Karpukhin, Kusner, and McGrath, in which we construct many new examples of embedded minimal surfaces in  $S^3$  and free boundary minimal surfaces in  $B^3$  with prescribed topology via intrinsic shape optimization problems for Laplace and Steklov eigenvalues in the presence of symmetries. I'll describe some key analytic challenges in the existence theory for metrics maximizing Laplace and Steklov eigenvalues on surfaces—with or without prescribed symmetry—and discuss new techniques for overcoming these, as well as some lingering open questions.

(To be continued in Peter McGrath's talk.)