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Uniqueness theorems for free boundary minimal surfaces

Free boundary minimal surfaces in a ball in $\mathbb{R}^n$ or a space N^n of constant curvature are proper branched minimal immersions of a surface into the ball that meet the boundary orthogonally. Such surfaces have been extensively studied, and they arise as extremals of the area functional for relative cycles in the ball. They also arise as extremals of a certain eigenvalue problem. I will talk about recent joint work with R. Schoen showing that a free boundary minimal *disk* in a constant curvature ball of any dimension is totally geodesic. This extends to higher dimensions earlier three dimensional work of J. C. C. Nitsche and R. Souam. We also have a uniqueness result for free boundary minimal *annuli*, which we use to prove a sharp eigenvalue bound on the annulus. Finally, I will discuss joint work with M. Li showing that in general, the space of *embedded* free boundary minimal surfaces in the ball of *a fixed topological type* is compact.