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Existence of constant mean curvature surfaces

Constant mean curvature (CMC) surfaces arise in many different contexts and are natural generalizations of minimal surfaces. A basic question is finding CMC surfaces with controlled topology in 3-manifolds. In this talk, I will describe some recent progress on this question obtained using the mapping approach, focusing on joint work with Xin Zhou (Cornell), in which we address the genus zero case, where the surface sought after is a sphere. Our main result is that in an arbitrary Riemannian 3-sphere, for almost every H there exists a branched immersed 2-sphere with constant mean curvature H. Moreover, the existence extends to all H when the ambient metric has positive Ricci curvature.