Nondegeneracy of CMC bubbles in the hyperbolic space, and applications

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Let K be a smooth function on the hyperbolic space. We deal with K-bubbles, that are embedded surfaces parametrized by $\mathbb{S}^2$, having hyperbolic mean curvature K at each point.

It is well known that no K-bubbles exist if $|K| \leq 1$; if $|K| > 1$ is a given constant, then there exists a 9-dimensional smooth manifold Z of K-bubbles, each of them being a round sphere of hyperbolic radius $\operatorname{artanh}(1/|K|)$. We prove a crucial nondegeneracy result involving the manifold Z. As an application, we provide sufficient (and almost necessary) conditions on a prescribed function ϕ, which ensure the existence of a regular curve, parametrized by $\varepsilon \approx 0$, of $K + \varepsilon\phi$ bubbles.

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