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A lower bound on the normal radius of hypersurfaces with applications to bounded geometries with boundary

We present the first lower bound on the normal injectivity radius of an embedded hypersurface in an arbitrary Riemannian manifold. The key ingredient of our proof is a new local two-sided radial angle comparison result for hypersurfaces, a technique originally developed by Borisenko to study strictly convex hypersurfaces. We apply our result to show, using the flatzoomer method invented by Müller and Nardmann, that in any conformal class on any manifold with boundary there exists a Riemannian metric of bounded geometry such that the boundary is convex.