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The Barrier Principle for Minimal Submanifolds of Arbitrary Codimension and Applications

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A hypersurface B in some n-dimensional Riemannian manifold N is called k-mean-convex with respect to a unit normal vector field ν, if the sum of the k smallest principal curvatures of B in direction ν is nonnegative, 1 ≤ k < n. This generalizes the familiar notion of mean convexity in the case k=n-1. An application of Hopf's maximum principle yields the following:
Barrier Principle. Let B ⊂ N be k-mean convex and let M ⊂ N be a k-dimensional minimal surface which touches B in some point p ∈ B from the k-mean convex side of B. Then it follows that M ∩ U ⊂ B for some neighborhood U of p.
If one can construct suitable such barriers these may be exploited in existence theorems for minimal surfaces to force specified geometric and topological properties upon these surfaces. We give such applications in the exterior Plateau problem.

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