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The Isoperimetric Problem and Related Mean Curvature Type Flows

The isoperimetric problem asks to find, among all domains of a given volume, those whose boundaries have minimal surface area. A natural approach to this problem is to consider volume preserving and area decreasing geometric flows. In this talk, we introduce a flow which is a novel modification of the mean curvature-type flow first introduced by Guan and Li, which was later generalized by Guan-Li-Wang and Li-Pan. These flows are defined in terms of conformal Killing vector fields and rely on Minkowski identities to prove volume preservation and area monotonicity. Our results allow one to establish the isoperimetric inequalities in general geometries for a category of surfaces larger than the usual star-shaped or convex categories all previous works were restricted to.