Non-Local Constrained Curvature Flows within Non-Flat Ambients

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Abstract

The mean curvature flow is the most natural way to deform a hypersurface according to its curvature, since it evolves the parametrization by means of the heat equation. Huisken in 1987 introduced a variant that keeps the enclosed volume constant while the area decreases. For this modification, a global term is added to the speed of the original flow, which makes the usual methods in geometric flows (e.g. maximum principles) either fail or become more intricate. Moreover, the resulting evolution is not equivalent to the unconstrained flow because, for instance, an initially embedded curve may develop self-intersections. Accordingly, constrained mean curvature type flows are more challenging; indeed, there was no extension of Huisken's result to a non-Euclidean ambient space until 2007 [2]. In this talk, we will give a sketchy portrait of the development of the theory from the early stages to the recent applications, including the quermassintegral preserving mean curvature flows in the sphere [3] and constrained flows of curves within pinched Hadadard surfaces [1].

References

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[3] E. Cabezas-Rivas and J. Scheuer, The quermassintegral-preserving mean curvature flow in the sphere, *Anal. PDE* **17** (2024), no. 10, 3589–3621.