

Fractal nature of Riem/Diff and other moduli space in Riemannian geometry

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Abstract

Let M be a Riemannian manifold of dimension greater than four. The graphs of many interesting functionals on this space (e.g. curvature-pinching $|K|\text{diam}^2$) have very complicated Morse landscapes with many deep valleys and high ridges. The same is true for functionals on some other interesting moduli spaces arising in Differential Geometry. As the result, one can immediately deduce the existence of many local minima for many interesting functionals.

The methods that we developed to prove these results involve many different ingredients from geometry and topology as well as from computability theory, homological group theory and even number theory.

We will attempt to give a survey of results, methods and unsolved problems in this area.