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Weighted combinatorial Yamabe flow on triangulated surfaces

The talk is devoted to the generalized version of the discrete Yamabe flow on triangulated surfaces. In this case, certain positive weights are assigned to the vertices of the triangulation. In the case of equal weights, we obtain the Yamabe flow introduced and considered by F. Luo.

We will discuss the "naive" version of the discrete Ricci flow, show that it has a large number of first integrals and prove that it is equivalent to the Yamabe flow. We will also discuss the types of singularities the flow can develop.

Interest in this problem is due to the following results. Hamilton and Chow showed that the Ricci flow on a closed two-dimensional surface has a very important property: for any initial metric, the solution of the flow converges to a metric of constant curvature. The natural question whether the discretization of the Ricci flow has this property turns out to be nontrivial. Chow and Luo proposed a version of a discrete Ricci flow for surfaces that has this property, but on the condition that a metric of constant curvature exists for a surface with a given triangulation. Their approach uses circle packing metrics.

At the same time, the simplest discrete version of the Ricci flow ("naive") uses a set of lengths of triangulation edges as a metric. Experiments show that solutions for such a flow can develop singularities. The classification of the types of singularities is important, since it allows to define surgery on the triangulation that allow the flow solution to be continued further, i.e. allow one to define a discrete Ricci flow with surgery. The convergence of the solution to such a flow for two-dimensional surfaces to a metric of constant curvature, to my knowledge, has not yet been proven.

SCIENTIFIC SEMINAR
"DIFFERENTIAL GEOMETRY AND APPLICATIONS"

headed by Academician of RAS Anatoly T. Fomenko

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