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Klein's Erlangen Program for the Geometrical Structures with Variable Curvature

In our survey we consider groups which contain information about geometrical structures with arbitrary variable curvature and set these geometrical structures on manifolds where they act. Hence such groups realize the *Klein's Erlanger Program* [1] for these geometrical structures.

Long time was considered that such groups do not exist. E.Cartan [2] has named arisen situation as *Riemann-Klein's antagonism* - antagonism between Riemann's and Klein's approach to geometry. There are attempts of modifying of the Klein's Program for geometrical structures with arbitrary variable curvature on a way of refusal of group structure of used transformations with usage of categories, quasigroups and so on. One can encounter widespread opinion that nonassociativity is an algebraic equivalent of the geometrical notion of a curvature [3].

In our report we shall show that *realization of the Klein's Program for the geometrical structures with arbitrary variable curvature (Riemannian space and fiber bundles with connection) can be executed in framework of so called infinite deformed groups which generalize of gauge groups to the case of nontrivial action on the base manifold of bundles with use of idea of groups deformations.*

Such groups have been constructed in [4]. Klein's Erlanger Program was realized for fiber bundles with connection in [5] and for Riemannian space in [6].

In our report we also show that there is an infinite group of special automorphisms of the group of deformed diffeomorphisms, which describes parallel transports in Riemannian spaces of any variable curvature [7]. Generators of translations of such group contain the covariant derivatives, and structural functions - the curvature tensor.

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