ON GROUPS G_n^k AND Γ_n^k AND THEIR APPLICATIONS IN ALGEBRA AND TOPOLOGY

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In 2015, I defined groups G_n^k for integer numbers $n > k$ and formulated the following principle:

If dynamical systems describing the motion of n particles admits a nice codimension 1 property governed by exactly n particles then this dynamical systems admit a topological invariant valued in G_n^k. The groups G_n^k thus give braid group presentations; they allow one to define braid groups for Euclidean spaces of arbitrary dimensions; The groups G_n^k are closely related to Coxeter groups and Kirillov-Fomin algebras .

Nevertheless, there is no obvious way to study arbitrary manifolds by using G_n^k. In a joint work with I.M. Nikonov, I introduced the second family of groups, denoted by Γ_n^k, which are closely related to triangulations of manifolds. The spaces of triangulations of a given manifolds have been widely studied. The celebrated theorem of Pachner says that any two triangulations of a given manifold can be connected by a sequence of bistellar moves or Pachner moves; Γ_n^k naturally appear when considering the set of triangulations with the fixed number of points. There are two ways of introducing this groups: the geometrical one, which depends on the metric, and the topological one. The second one can be thought of as a "braid group" of the manifold and, by definition, is an invariant of the topological type of manifold; in a similar way, one can construct the smooth version. In the present paper we give a survey of the ideas lying in the foundation of the G_n^k and Γ_n^k theories and give an overview of recent results in the study of those groups, manifolds, dynamical systems, knot and braid theories. The state of the art of groups G_n^k and Γ_n^k can be found in [1].

Список литературы

[1] V.O.Manturov, D.A.Fedoseev, S.Kim, I.M.Nikonov, On groups G_n^k and Γ_n^k: A study of manifolds, dynamics and invariants, https://arxiv.org/abs/1905.08049

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