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THE GROUPS G_n^k AND Γ_n^k AND THEIR APPLICATIONS IN TOPOLOGY, ALGEBRA AND GEOMETRY

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ABSTRACT

In 2015, the author defined the two-parametric family of groups G_n^k, that depend on two integer parameters $n > k$, and formulated the following principle:

"If a dynamical system describing the motion of n particles possesses a nice co-dimension 1 property governed by exactly k particles, then this dynamical system has a topological invariant valued in G_n^k."

The first examples describe motions of points on the plane with properties that "3 points are collinear" and "4 points belong to the same circle or line", which lead to homomorphisms from the pure braid group given by $PB_n \to G_n^3$, and $PB_n \to G_n^k$, respectively. In a similar manner we defined other series of groups Γ_n^4, that correspond to the configuration space of triangulations.We shall describe various examples and applications of the groups G_n^k and Γ_n^4in algebra, geometry and topology and formulate some open problems.

This is joint work with several collaborators including I.M. Nikonov, S. Kim, D.A. Fedoseev, Z. Wan, J. Wu and H. Yan.

[1] Manturov, V.O., Fedoseev, D.A., Nikonov, I.M. and Kim, S. 2020 *Invariants and Pictures: Low-Dimensional Topology and Combinatorial Group Theory.* World Scientific.