Research description

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Initially my research was devoted to theory of dynamical systems (hyperbolic dynamics, shadowing, etc). However after the defence of my Ph.D., I gradually switched to studying group actions.

Together with Sergey Tikhomirov we study shadowing properties of group actions. Shadowing properties are important both for general theory of dynamical systems and for numerical simulations. Roughly speaking, a group action has the shadowing property if any sufficiently precise approximate trajectory is close to some exact trajectory. This theory is well developed for the classical case of actions of $\mathbb{Z}$ and $\mathbb{R}$. However very few results have been obtained for the case of actions of more complicated groups. One of the key results of (classical) theory of shadowing is a so-called shadowing lemma. It allows to establish shadowing for a broad class of dynamical systems called hyperbolic dynamical systems. It turnes out that the shadowing lemma for group actions of other finitely generated groups different from $\mathbb{Z}$ heavily depends on the structure of the group. We try to understand how the shadowing lemma should be formulated for actions of various groups.

Besides, together with Andrey Malyutin we study random walks on groups. This theory is related to theory of dynamical systems, analysis, group theory. One of the main topics of this theory is study of probabilistic boundaries of a random walk on a group (Furstenberg boundaries, Poisson-Furstenberg boundaries), which can be very informally interpreted as the space of limits of the trajectories of the random walk. We are interested in the case when a group G has a normal subgroup H with a well-known geometric boundary ∂H (e.g. H is a hyperbolic group). We study Furstenberg and Poisson-Furstenberg boundaries of random walks on G in terms of ∂H.